

**REPORT NUMBER: SPNCAP-KAR-19-011
NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

**FCA US LLC
2019 DODGE GRAND CARAVAN SE 5-DOOR MINIVAN**

NHTSA No: M20190303

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



JANUARY 4, 2019

FINAL REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF CRASHWORTHINESS STANDARDS
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Division Chief, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

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Date: _____

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		15. Supplementary Notes																												
16. Abstract <p>A 32.20 km/h 75° rigid pole side NCAP impact test was conducted on the subject 2019 Dodge Grand Caravan SE 5-door minivan 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 December 17, 2018.</p> <p>The impact velocity was 32.10 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 443 mm located at level 3. The test vehicle's occupant performance data is as follows:</p>																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 35%;">Measurement Description</th> <th colspan="3" style="text-align: center;">Driver ATD (SID-IIs)</th> </tr> <tr> <th style="width: 15%;">Units</th> <th style="width: 15%;">Threshold</th> <th style="width: 35%;">Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td style="text-align: center;">1000</td> <td style="text-align: center;">311.9</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td style="text-align: center;">g</td> <td style="text-align: center;">82</td> <td style="text-align: center;">35</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetabular and Iliac Forces)</td> <td style="text-align: center;">N</td> <td style="text-align: center;">5525</td> <td style="text-align: center;">2715</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">38</td> <td style="text-align: center;">24</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td style="text-align: center;">mm</td> <td style="text-align: center;">45</td> <td style="text-align: center;">27</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (SID-IIs)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	311.9	Resultant Lower Spine Acceleration	g	82	35	Total Pelvic Force (Sum of Acetabular and Iliac Forces)	N	5525	2715	Maximum Thoracic Rib Deflection	mm	38	24	Maximum Abdominal Rib Deflection	mm	45	27
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<p>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.</p>																														
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 Dodge Grand Caravan SE 5-door minivan. 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 Dodge Grand Caravan SE 5-door minivan. The subject vehicle was towed into the rigid pole at an angle of 75.3° and a velocity of 32.10 km/h. The test was conducted by Applus IDIADA KARCO Engineering, LLC. in Adelanto, California on December 17, 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	Driver ATD (SID-IIs)	
		IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	311.9
Lower Spine (T12) Resultant Acceleration	g	82	35
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2715
Maximum Thoracic Rib Deflection	mm	38*	24
Maximum Abdominal Rib Deflection	mm	45*	27

*Proposed IARV

Supplemental restraint information is given below:

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	Yes	No	No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other (Active Head Restraint)	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. The roof buckled significantly and the windshield separated from the roof.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303

Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20190303
Model Year	2019
Make	Dodge
Model	Grand Caravan SE
Body Style	5-Door Minivan
VIN	2C4RDGBG4KR547036
Body Color	Gray
Odometer Reading (km / mi)	156 / 97
Engine Displacement (L)	3.6
Type / No. of Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6 Speed
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

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

Does Owner's Manual provide instructions to turn off automatic door locks? No

DATA FROM CERTIFICATION LABEL

Manufactured By	FCA US LLC
Date of Manufacture	Sep-18
Vehicle Type	MPV

GVWR (kg)	2745
GAWR Front (kg)	1339
GAWR Rear (kg)	1407

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Designated Seating Capacity	2	2	3	7	
Capacity Weight (VCW) (kg)				521.0	A
DSC x 68.04 (kg)				476.3	B
Cargo Weight (RCLW) (kg)				44.7	A-B

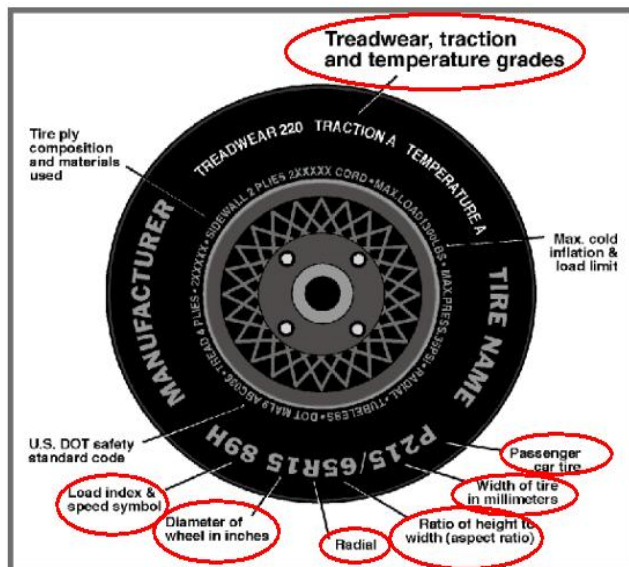
VEHICLE SEAT TYPE

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

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18



Measured Parameter	Front	Front
Max. Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	250	250
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Michelin	Michelin
Tire Model	Energy Saver A/S	Energy Saver A/S
Treadware	480	480
Traction Grade	A	A
Temperature Grade	B	B
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 1 Polyamide, 2 Steel	1 Polyester, 1 Polyamide, 2 Steel
Load Index/Speed Symbol	100T	!00T
Tire Material	Polyester, Polyamide, Steel	Polyester, Polyamide, Steel
DOT Safety Code Left	M33T OOKX 3218	M33T OOKX 3218
DOT Safety Code Right	M33T OOKX 3218	M33T OOKX 3218

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

TIRE PRESSURES

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

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	593.5	424.0		607.0	465.5		605.5	467.0	
Right	kg	543.0	441.5		538.5	476.0		545.5	477.0	
Ratio	%	56.8%	43.2%	100.0%	54.9%	45.1%	100.0%	54.9%	45.1%	100.0%
Total	kg	1136.5	865.5	2002.0	1145.5	941.5	2087.0	1151.0	944.0	2095.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2002.0	A
Actual Weight of 1 P572V ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	44.7	C
Calculated Vehicle Target Wt (TVTW)	kg	2095.7	A+B+C

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

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

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	°	-1.9	-1.9	-1.8	Yes
Front Passenger Sill Angle (front-to-rear)*	°	-1.6	-1.4	-1.3	Yes
Front Bumper-Line Angle (left-to-right)**	°	-0.4	-0.4	-0.3	Yes
Rear Bumper-Line Angle (left-to-right)**	°	-0.4	-0.5	-0.6	Yes
Vehicle CG (Aft of Front Axle)	mm	1330	1388	1386	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	14	23	20	

*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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Rear Trim / Non-Struck Side Door Trim	14.0
Ballast / Equipment Added	40.0

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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

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			

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	Fixed	328	Max			
			Mid	310	323	328
			Min			
Front Passenger Seat	Fixed	345	Max			
			Mid	330	336	345
			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			Max			
			Mid			
			Min			

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

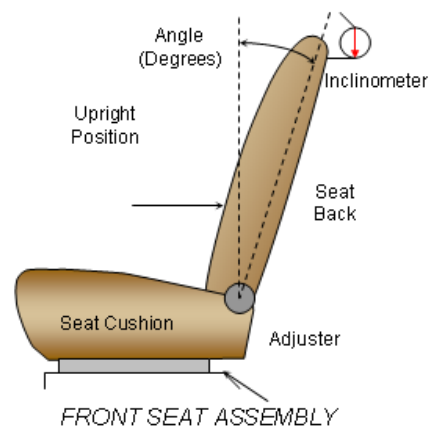
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	214	32	0	0
Front Passenger Seat	221	33	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				

*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	61.2	19	0.6	7
Front Passenger Seat	63.2	19	0.4	7
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				

*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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

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, M3, M2, ..., L from top to bottom.

	Total No. of Positions	Placed in Position
Driver Seat	5	H
Rear Seat	5	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	3	L

DATA SHEET NO. 2 ... (CONTINUED)

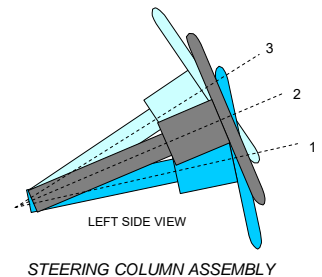
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

STEERING COLUMN ADJUSTMENT

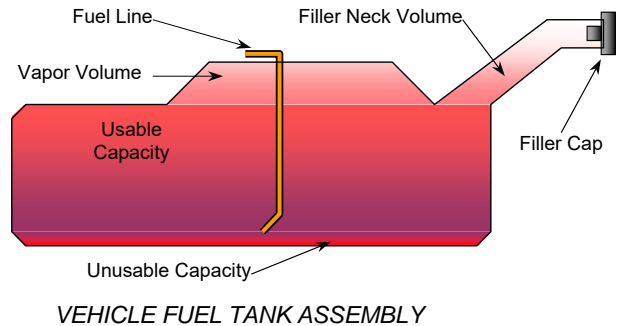
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion.

	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	21.6	115
Geometric Center - Position 2	24.6	133
Uppermost - Position 3	27.5	150
Telescoping Steering Wheel Travel		35
Test Position	24.6	133



FUEL PUMP

The vehicle is equipped with an electric fuel pump. The pump operates after the ignition switch is turned ON. After that, the pump operates only while the engine is running.



FUEL TANK CAPACITY

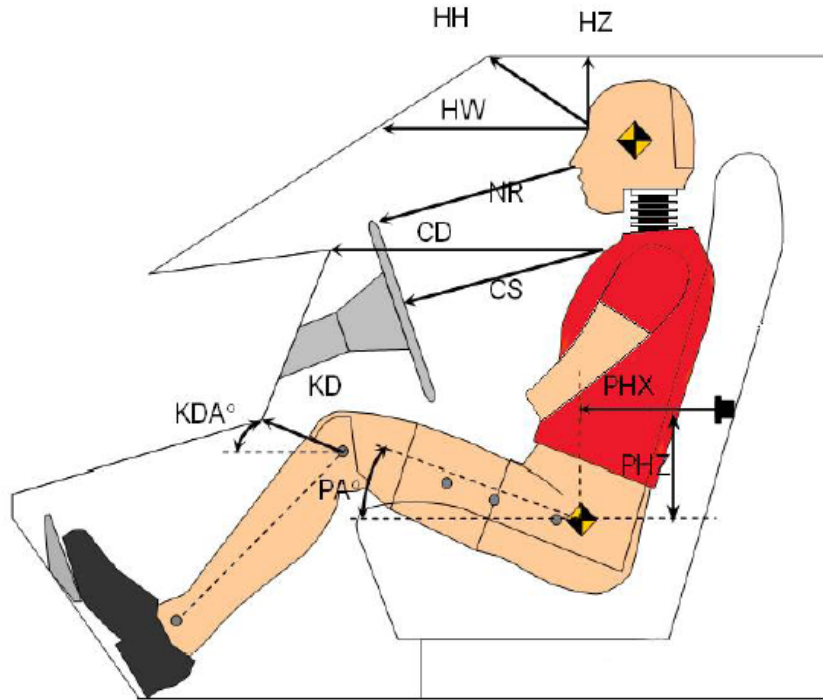
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	75.70
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	75.70
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	70.40
Actual amount of Solvent Used in Test	70.40
1/3 of Usable Capacity	25.23

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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

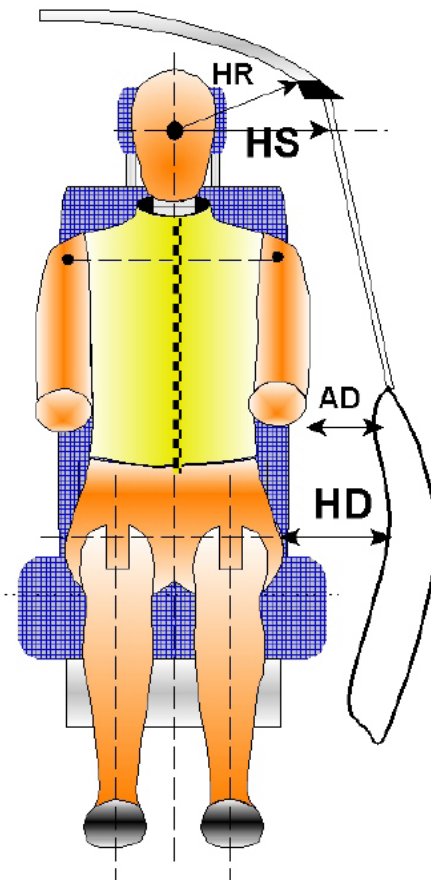


Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	326	
HW	Head to Windshield	597	
HZ	Head to Roof	212	
NR	Nose to Rim	227	
CD	Chest to Dash	409	
CS	Chest to Steering Wheel	155	
KD(L)/KDA(L)°	Left Knee to Dash	95	23.4
KD(R)/KDA(R)°	Right Knee to Dash	107	33.3
PAX°	Pelvic Tilt Angle (x-axis)		19.3
PAY°	Pelvic Tilt Angle (y-axis)		0.1
PHX	Hip Point to Striker (x-axis)	366	
PHZ	Hip Point to Striker (z-axis)	16	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

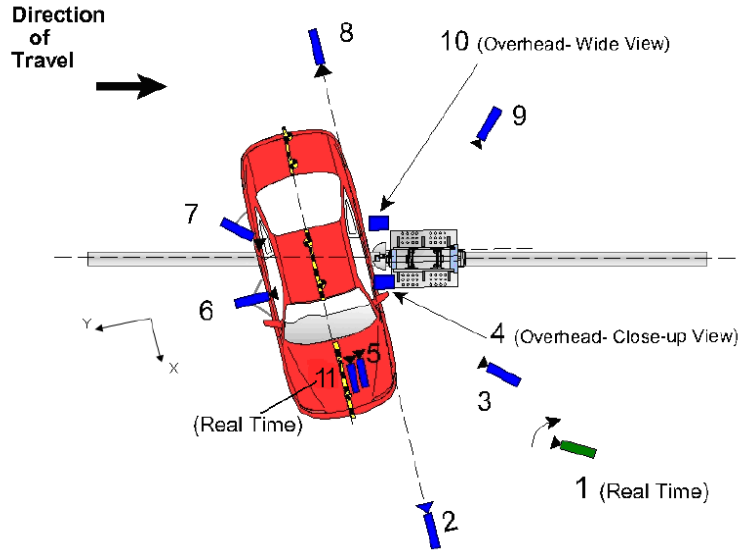


Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	306
HS	Head to Side Window	mm	429
AD	Arm to Door	mm	177
HD	Hip Point to Door	mm	175

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18



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	1.34	0.64	-1.58	8.5	1000
6	On-Board - Dummy Side View	-0.05	2.12	-1.35	8.5	1000
7	On-Board - Dummy Rear Oblique View	-1.08	2.18	-1.38	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	1.25	0.62	-1.35		30

*All measurements accurate to ±6 mm

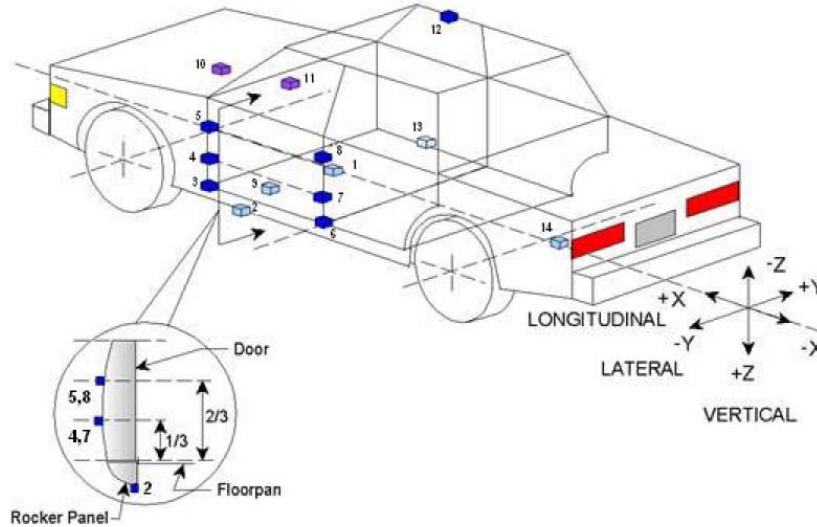
INSTRUMENTATION

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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

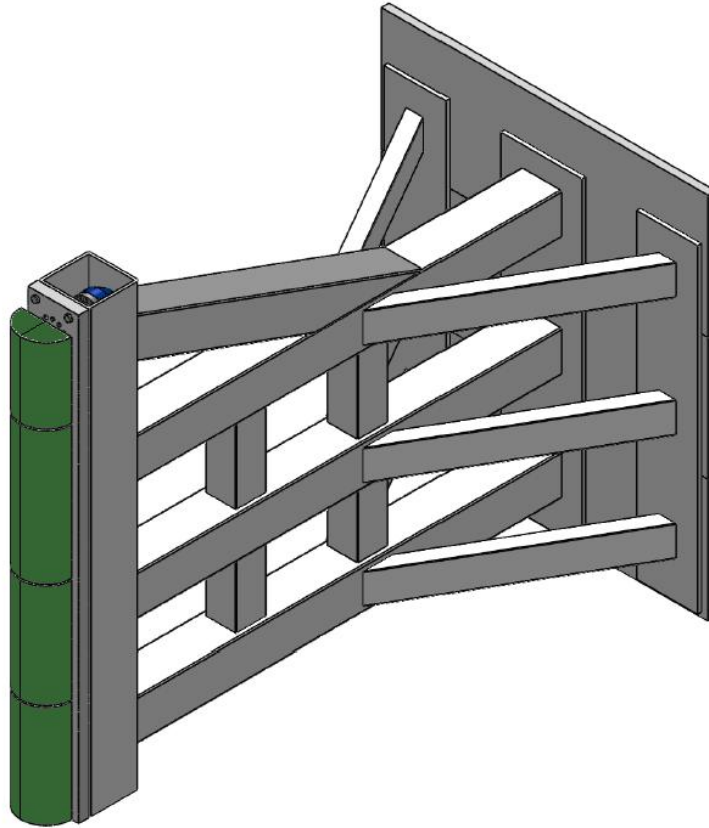


Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2800	0	-480
2	Left Floor Sill	2990	-820	-255
3	A-Pillar Sill	3620	-790	-500
4	A-Pillar Low	3410	-920	-600
5	A-Pillar Mid	3710	-920	-720
6	B-Pillar Sill	2720	-800	-520
7	B-Pillar Low	2660	-800	-620
8	B-Pillar Mid	2600	-800	-820
9	Driver Seat Track	2890	-620	-550
10	Engine Top	4500	0	-950
11	Firewall	3900	-50	-880
12	Right Roof	2700	650	-1710
13	Right Floor Sill	3180	770	-430
14	Rear Floorpan	440	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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18



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 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

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, Passenger Seatback
Left Shoulder	Curtain Airbag, Side Airbag, Seatback
Upper Torso	Side Airbag, Seatback
Lower Torso	Side Airbag, Seatback
Left Hip	Side Airbag, Seat
Left Knee	Door Panel, 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	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge System Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Record Width of Opening at Striker (mm)	N/A	N/A	N/A	N/A	N/A

POST-TEST SEAT PERFORMANCE

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	Yes	Yes
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

DATA SHEET NO. 8 ... (CONTINUED)

POST-TEST OBSERVATIONS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No separation occurred
Sill Separation	No separation occurred
Windshield Damage	Broken and separated from the roof
Side Window Damage	Left front window broken
Other Notable Effects	Roof buckled significantly

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

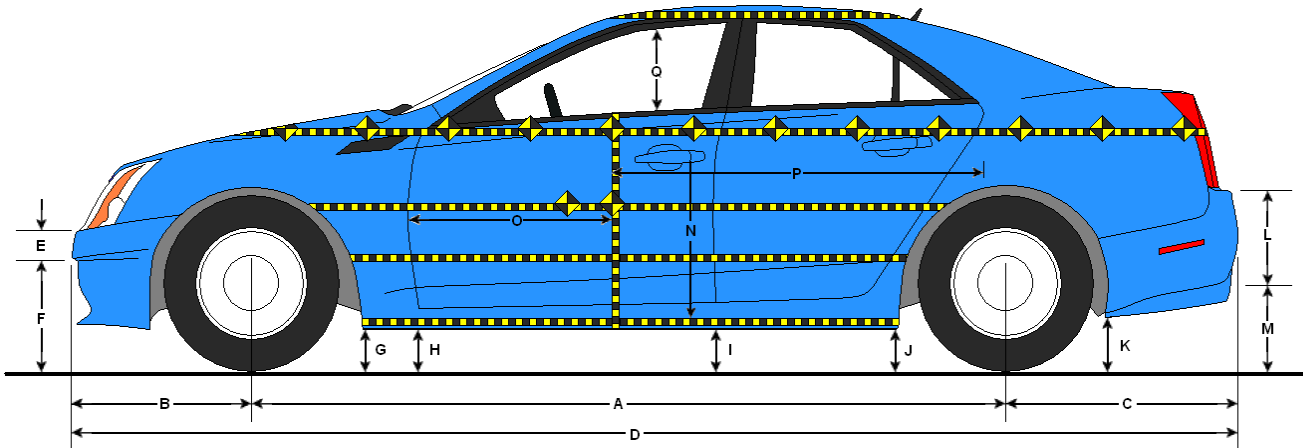
IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		1049
Actual Impact Point (Aft of Front Axle)	mm		1057
Horizontal Offset (+ forward / - rearward)	mm	± 38 of Intended Impact Point	-8
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	°	75 ± 3	75.3
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.10
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.11

DATA SHEET NO. 9

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18



LEFT SIDE VIEW

All measurements in mm with tolerance of ± 3 mm

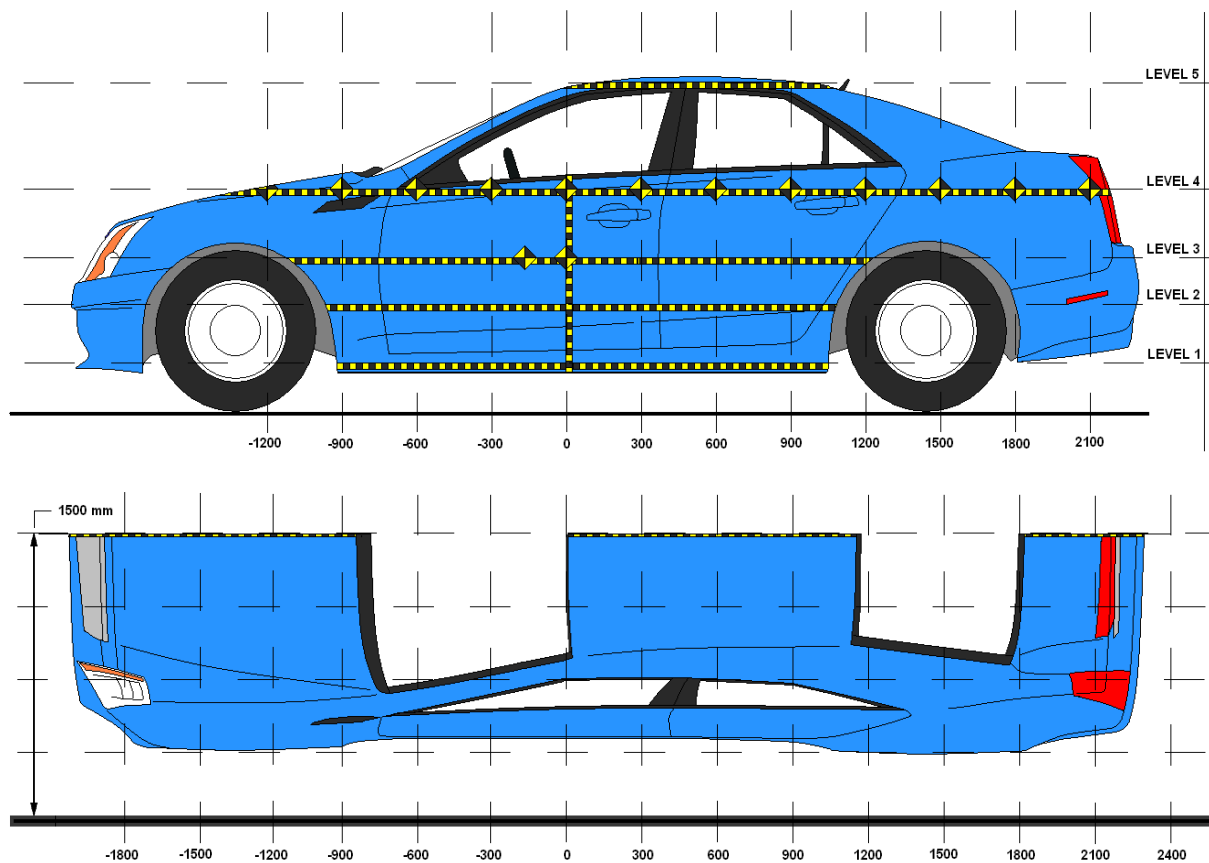
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3076	3012	-64
B	Front Axle to FSOV	961	975	14
C	Rear Axle to RSOV	1113	1135	22
D	Total Length at Centerline	5133	5122	-11
E	Front Bumper Thickness	160	160	0
F	Front Bumper Bottom to Ground	453	457	4
G	Sill Height at Front Wheel Well	276	238	-38
H	Sill Height at Front Door Leading Edge	279	250	-29
I	Sill Height at B-Pillar	305	248	-57
J1	Sill Height at Rear Wheel Well	331	323	-8
J2	Pinch Weld Height at Rear Wheel Well	315	313	-2
K	Sill Height Aft of Rear Wheel Well	396	400	4
L	Rear Bumper Thickness	135	136	1
M	Rear Bumper Bottom to Ground	455	454	-1
N	Sill Height to Bottom of Front Window Sill	759	765	6
O	Front Door Leading Edge to Impact CL	578	477	-101
P	Rear Door Trailing Edge to Impact CL	1638	1543	-95
Q	Front Window Opening	563	559	-4
R	Right Side Length	3660	3673	13
S	Left Side Length	3661	3553	-108
T	Vehicle Width at B-Pillar	1958	1915	-43

DATA SHEET NO. 10

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303
 Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18



NOTE: All measurements in mm with tolerance of ± 3 mm

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	312	397	0
2	Occupant H-Point	748	442	0
3	Mid-Door	817	443	0
4	Window Sill	1057	417	0
5	Window Top	1694	228	0

DATA SHEET NO. 10 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303

Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

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			533	608				591	646				58	38	
-750		531	545	594			604	613	645			73	68	51	
-600	585	543	541	577		650	621	615	639		65	78	74	62	
-450	582	537	536	565		710	685	683	704		128	148	147	139	
-300	577	532	530	555		784	770	770	779		207	238	240	224	
-150	572	527	525	547		866	868	867	864		294	341	342	317	
0	569	524	522	540	771	966	966	965	957	999	397	442	443	417	228
150	567	522	520	535	767	936	947	949	941	976	369	425	429	406	209
300	566	521	518	531	765	835	829	833	824	949	269	308	315	293	184
450	565	521	517	529	763	759	704	701	708	915	194	183	184	179	152
600	564	524	520	531	761	724	640	634	638	791	160	116	114	107	30
750	567	525	522	534	761	695	628	623	629	787	128	103	101	95	26
900	568	527	524	532	762	670	617	612	616	784	102	90	88	84	22
1050	570	529	526	534	763	648	606	601	606	782	78	77	75	72	19
1200	576	533	529	537	766	631	596	591	596	781	55	63	62	59	15
1350	577	537	534	540	770	617	587	581	587	779	40	50	47	47	9
1500	580	542	539	545	771	606	578	574	579	779	26	36	35	34	8
1650		541	544	549	774		573	580	572	824		32	36	23	50
1800			529	553	782			563	588	824			34	35	42
1950															
2100															
2250															
2400															
2550															
2700															
2850															

DATA SHEET NO. 10 ... (CONTINUED)

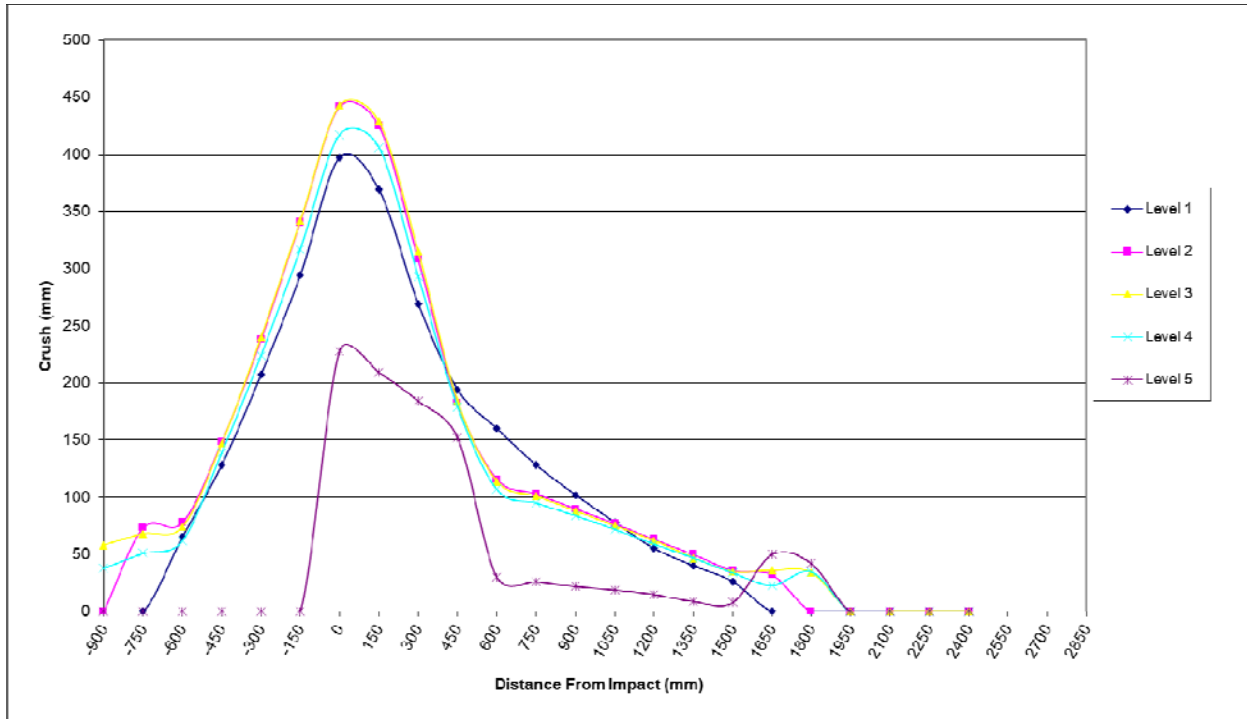
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan

NHTSA No. M20190303

Test Program: NCAP Side Pole Impact Test

Test Date: 12/17/18

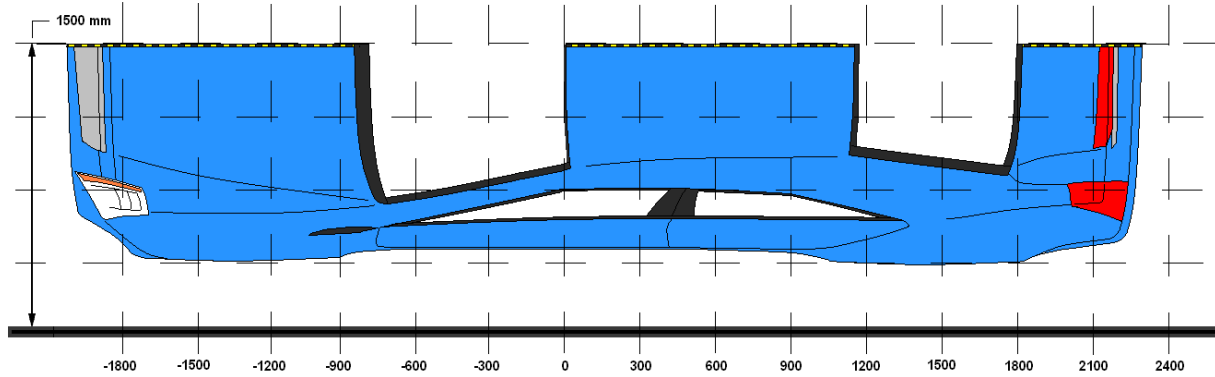


DATA SHEET NO. 11

VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303

Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18



DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	1800	5	782	824	42
2	1350	2	537	587	50
3	750	1	567	695	128
4	150	3	520	949	429
5	-450	2	537	685	148
6	-900	3	533	591	58

DATA SHEET NO. 12

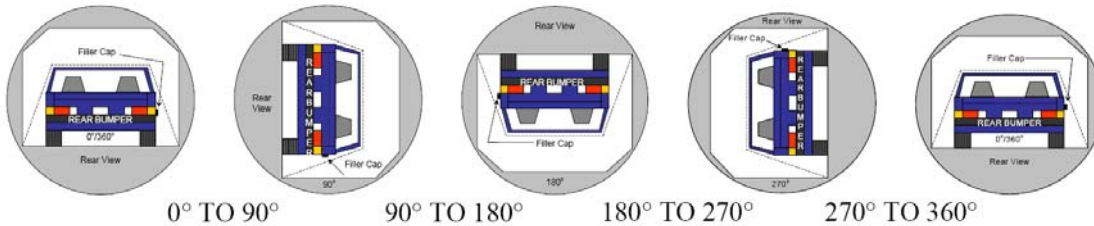
FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303

Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18

Temperature at Time of Impact: 21.7° C Test Time: 12:09 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°	81	300	381
90° To 180°	79	300	379
180° To 270°	82	300	382
270° To 360°	80	300	380

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

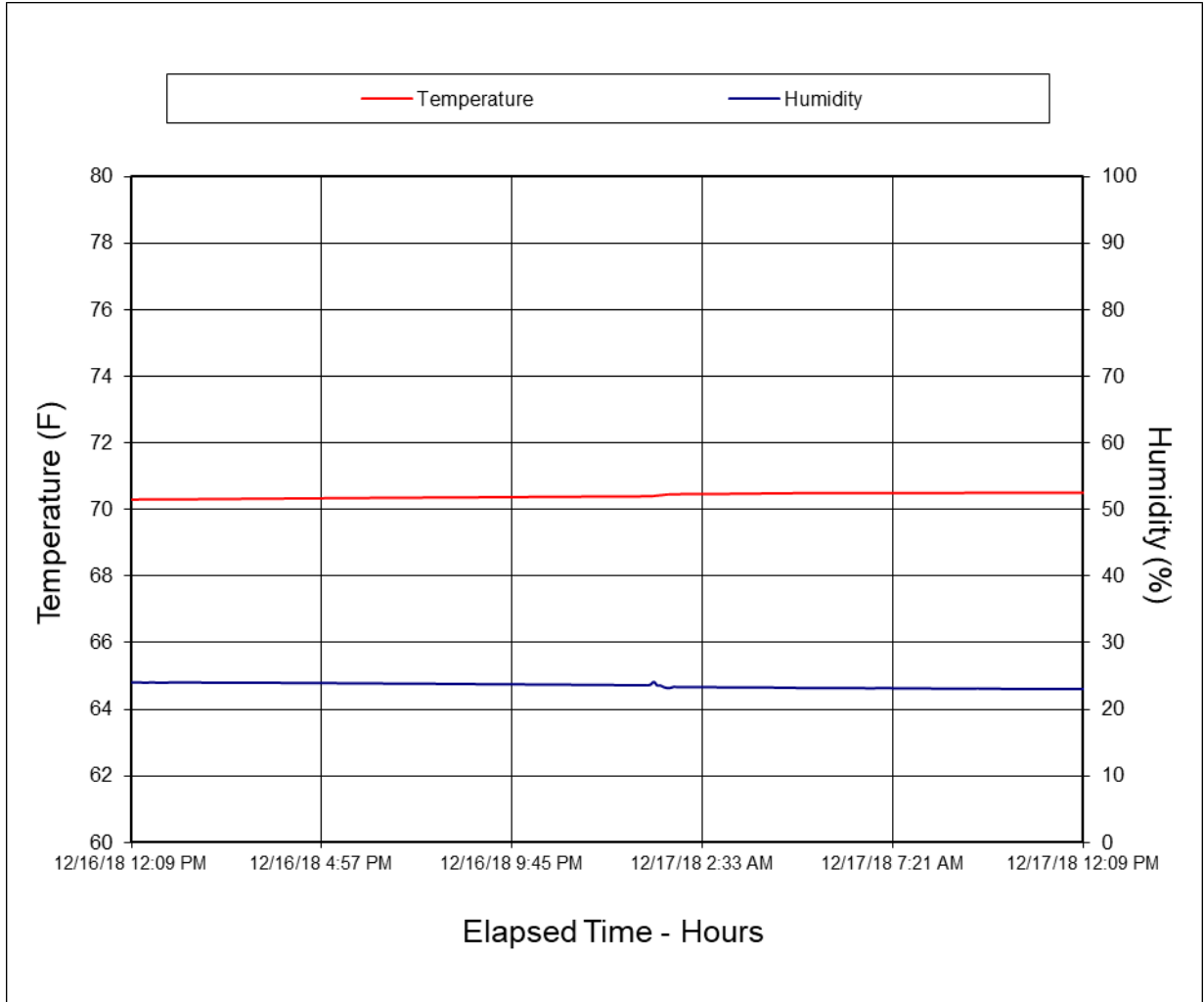
Test Phase	Spillage Location
0° To 90°	No Spillage Occurred
90° To 180°	No Spillage Occurred
180° To 270°	No Spillage Occurred
270° To 360°	No Spillage Occurred

DATA SHEET NO. 13

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan NHTSA No. M20190303

Test Program: NCAP Side Pole Impact Test Test Date: 12/17/18



**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

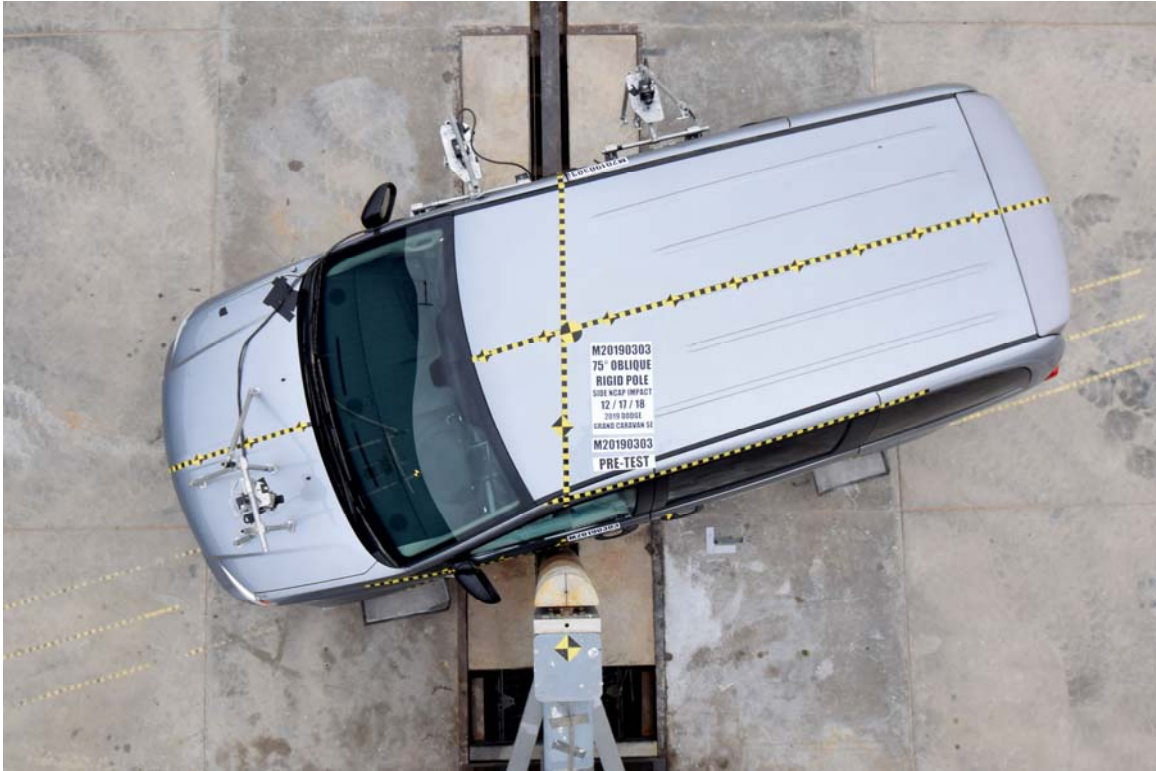


FIGURE 15. Pre-Test Overhead View of Test Area

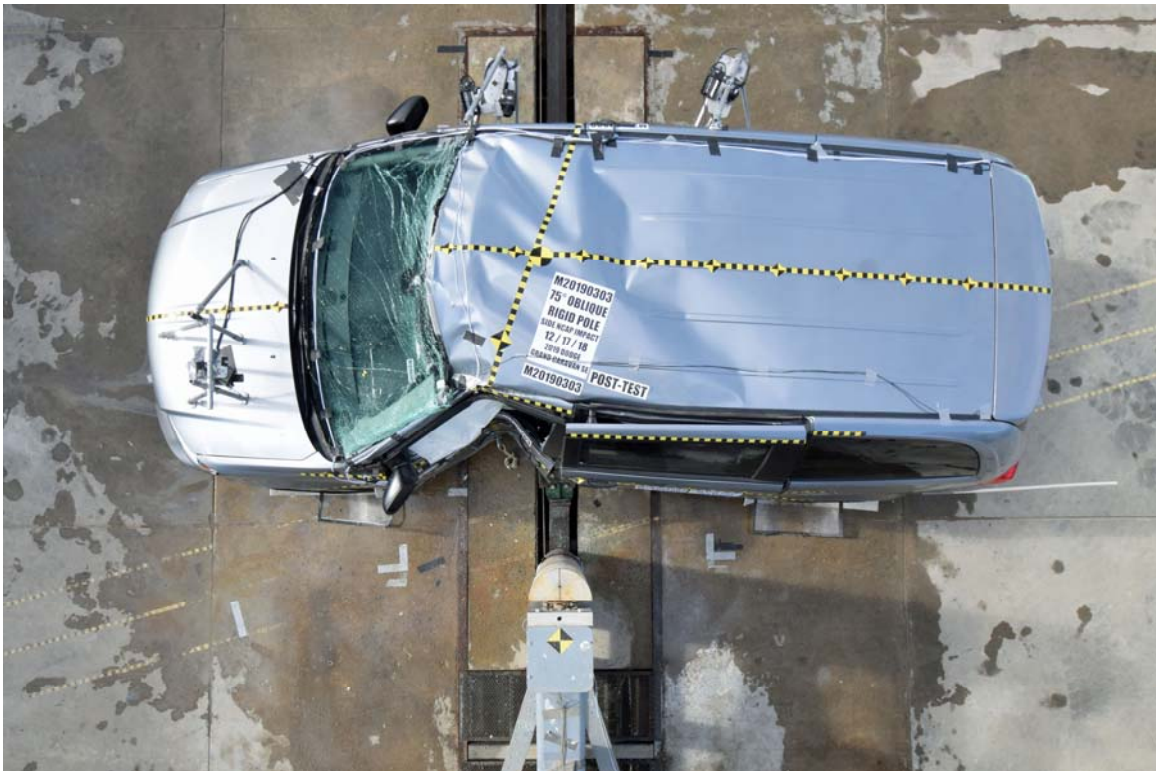


FIGURE 16. Post-Test Overhead View of Test Area



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

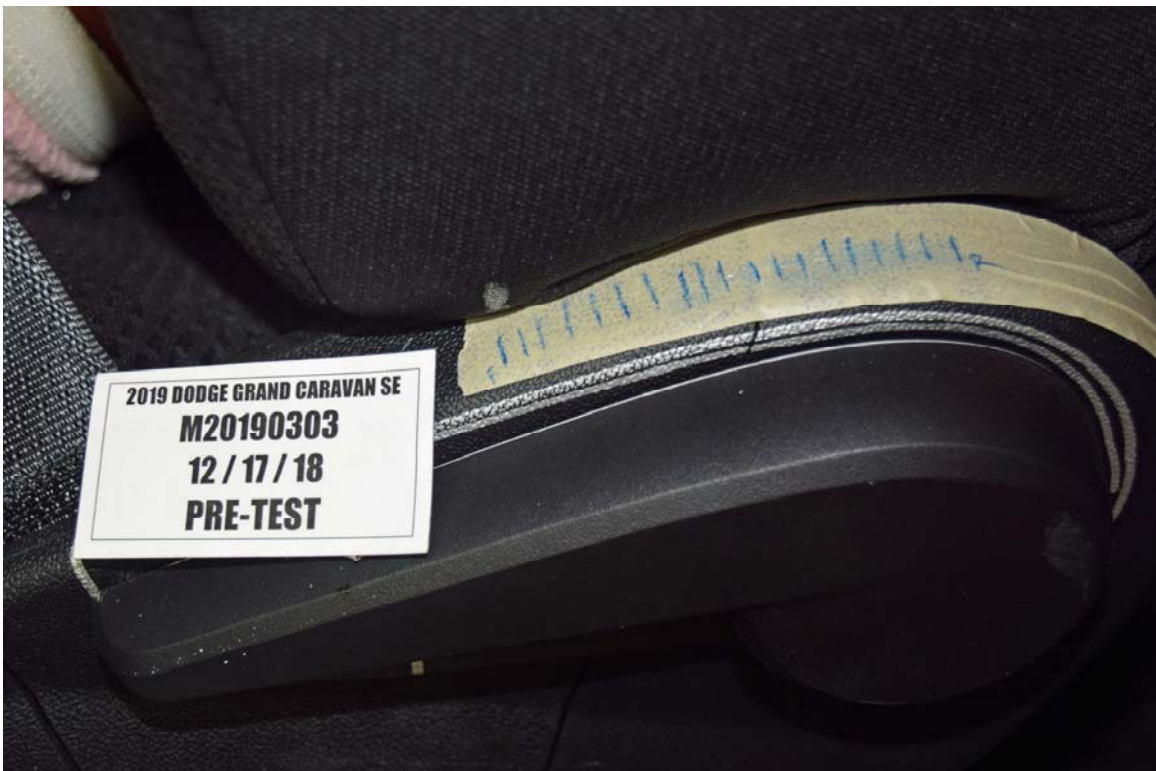


FIGURE 38. Pre-Test Close-Up Left Side View of Driver Seat Back



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

Photograph Not Available

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

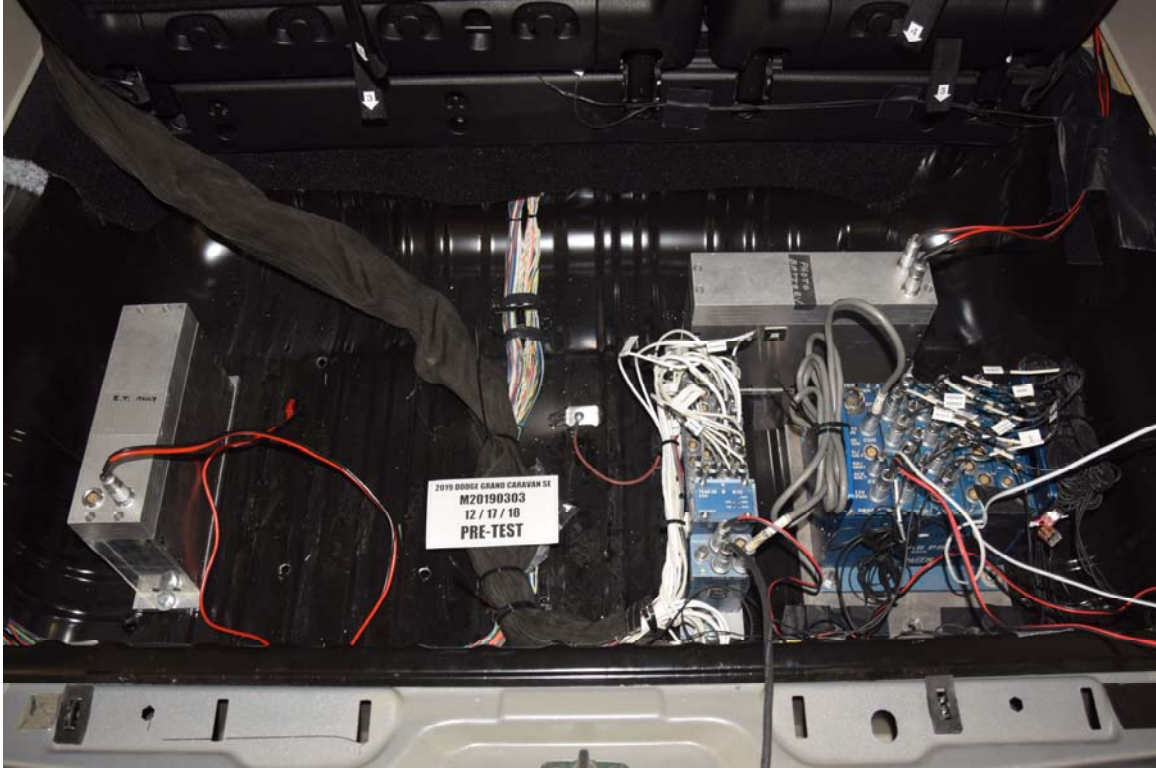


FIGURE 61. Pre-Test Ballast View



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

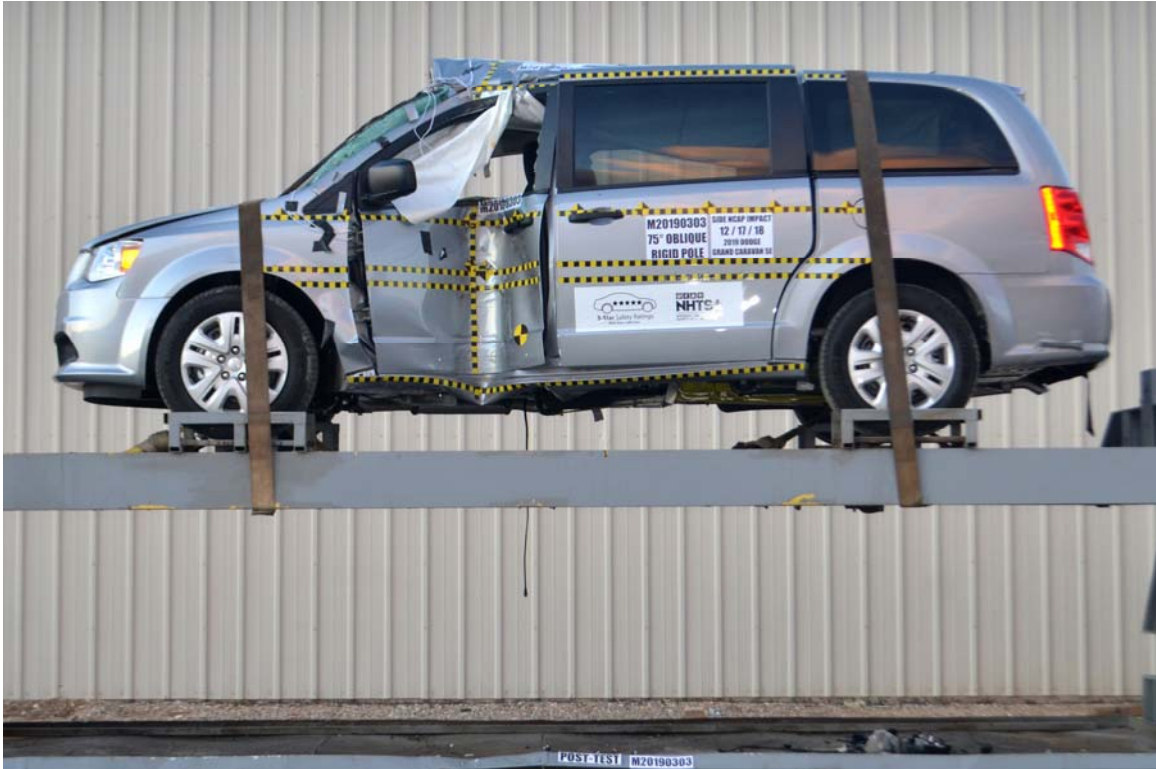


FIGURE 63. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 64. FMVSS No. 301 Static Rollover 90 Degrees



FIGURE 65. FMVSS No. 301 Static Rollover 180 Degrees

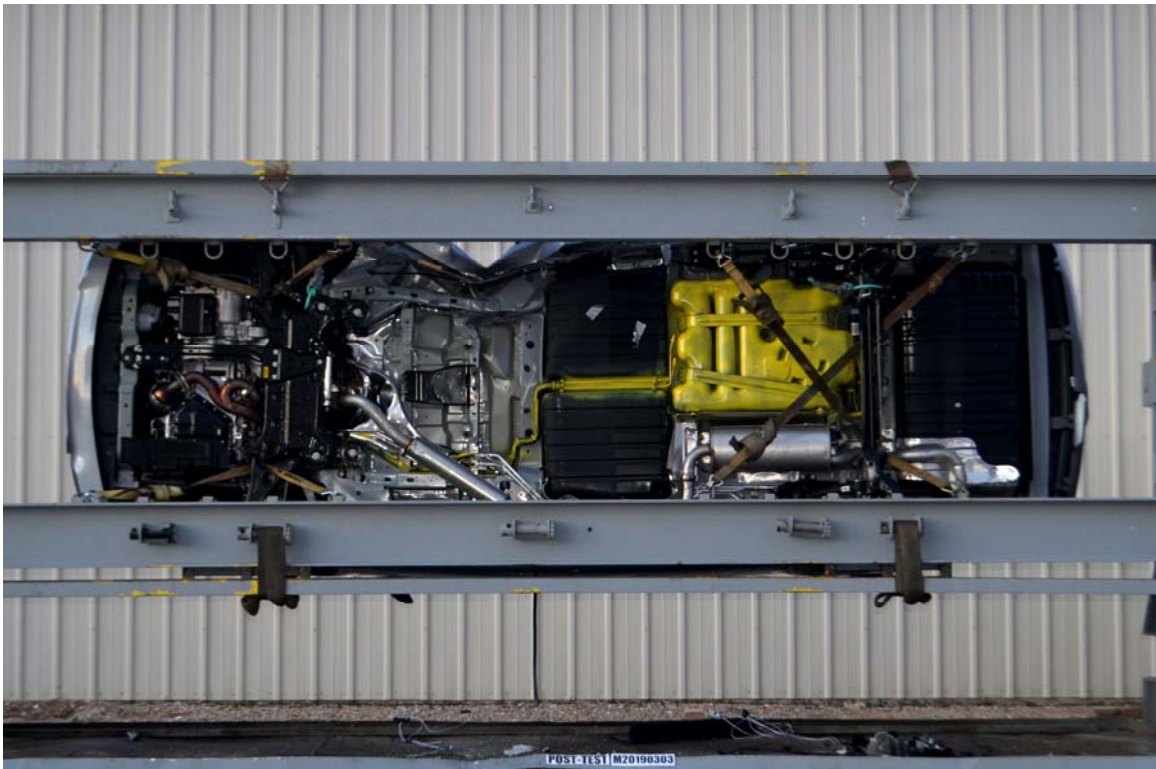


FIGURE 66. FMVSS No. 301 Static Rollover 270 Degrees



FIGURE 67. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 68. Impact Event

2019 DODGE GRAND CARAVAN SE

THIS VEHICLE IS MANUFACTURED TO MEET SPECIFIC UNITED STATES REQUIREMENTS. THIS VEHICLE IS NOT MANUFACTURED FOR SALE OR REGISTRATION OUTSIDE OF THE UNITED STATES.

MANUFACTURER'S SUGGESTED RETAIL PRICE OF THIS MODEL INCLUDING DEALER PREPARATION

Base Price: \$26,650

DODGE GRAND CARAVAN SE
 Exterior Color: Silver Clear-Coat Exterior Paint
 Interior Color: Black Light Graystone Interior Colors
 Interior: Cloth Low-Back Bucket Seats
 Engine: 3.6-Liter V6 24-Valve VTI Engine
 Transmission: 6-Speed Automatic GZTE Transmission

STANDARD EQUIPMENT (UNLESS REPLACED BY OPTIONAL EQUIPMENT)

FUNCTIONAL SAFETY FEATURES
 Advanced Multistage Front Airbags
 Supplemental Side-Curtain Airbags in All Rows
 Supplemental Front Seat-Mounted Side Airbags
 Driver Inflation Knee-Booster Airbag
 LATCH Ready Child Seat Anchor System
 Daytime Running Lamps
 Anti-Lock 4-Wheel Heavy-Duty Disc Brakes
 Electronic Stability Control
 Tire Pressure Monitoring Sensor
 ParkView® Rear Back-Up Camera
 Speed Overhaul

EXTERIOR FEATURES
 17-inch x 6.5-inch Steel Wheels
 P225/55R17 85W All-Season Touring Tires
 Power-Heated Mirrors with Manual Fold-Away
 Rear Window Wiper / Washer

OPTIONAL EQUIPMENT (May Replace Standard Equipment)
Customer Preferred Package 295
 Black Door Handles
 P225/55R17 85W All-Season Tires

DESTINATION CHARGE \$1,395

TOTAL PRICE: * \$28,045

WARRANTY COVERAGE
 5-year or 60,000-mile Powertrain Limited Warranty.
 3-year or 50,000-mile Basic Limited Warranty.
 Ask Dealer for a copy of the limited warranties or see your owner's manual for details.

5 YEAR / 60,000 MILE POWERTRAIN WARRANTY

INTERIOR FEATURES
 2nd-Row Bench w/1st-Row 60/40 Stow 'n' Go® Bench
 Steering Wheel Mounted Audio Controls
 6.5-inch Touchscreen Display
 6 Speakers
 Auto-Dimming Rear View Mirror
 Tilt / Telescoping Steering Column
 12-Volt DC Front and Rear Power Outlets
 12-Volt Auxiliary Power Outlet
 Power Windows with Driver's One-Touch-Down Feature
 Second-Row Power Windows
 Power Third-Row Ventilated Windows
 3-Zone Manual Temperature Control

Assembly Plant/Port of Entry: WINDSOR, ONTARIO, CANADA
 VIN: 2C4-RD6G4KR-547036 L4404 0204

SALES AND SERVICE LOCATIONS:
 SOUTH OAK CREEK, ILL. 60443-2900
 MATTHESON, ILL. 60443-2900
 *BASED ON PRICE OF OPTION IF PURCHASED SEPARATELY.

For more information visit: www.dodge.com or call 1-800-4ADODGE

FCA US LLC

EPA DOT Fuel Economy and Environment

These estimates reflect new EPA methods beginning with 2017 models. Emissions range from 18 to 32 MPGe. The best vehicle rates 136 MPGe. Values are based on gasoline and do not reflect performance and ratings based on E85.

Fuel Economy
20 MPG
 17 25 5.0
 combined city/hwy city highway gallons per 100 miles
 Driving Range
 Estimated 230 miles

You spend \$2,500 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel COST \$1,900

Fuel Economy & Greenhouse Gas Rating (tailpipe only) Smog Rating (tailpipe only)

This vehicle emits 485 grams CO2 per mile. The best emits 10 grams per mile (tailpipe only). Producing and distributing tailpipe emissions.

fuelconomy.gov
 Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated
 Based on the combined ratings of frontal, side, and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver Passenger	★★★★
Side Crash	Front seat Rear seat	Not Rated Not Rated
Rollover		★★★★

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

PARTS CONTENT INFORMATION FOR VEHICLES IN THIS CARLINE: U.S./CANADIAN PARTS CONTENT: 76% MAJOR SOURCES OF FOREIGN PARTS CONTENT: MEXICO: 15% NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER WORK-PARTS TOOLS.

FOR THIS VEHICLE: FINAL ASSEMBLY POINT: WINDSOR, ONTARIO, CANADA COUNTRY OF ORIGIN: ENGINE: UNITED STATES TRANSMISSION: UNITED STATES

VEHICLE PROTECTION
 A PRODUCT OF FCA US LLC
 MOPAR. Ask for Mopar Vehicle Protection for your vehicle. We Built It. We Back It.

FIGURE 69. Monroney Label

GETTING TO KNOW YOUR VEHICLE

HEAD RESTRAINTS

Head restraints are designed to reduce the risk of injury by restricting head movement in the event of a rear impact. Head restraints should be adjusted so that the top of the head restraint is located above the top of your ear.

WARNING!

- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a crash.
- Head restraints should never be adjusted while the vehicle is in motion. Driving a vehicle with the head restraints improperly adjusted or removed could cause serious injury or death in the event of a collision.

Supplemental Active Head Restraints — Front Seats

Active Head Restraints are passive, deployable components, and vehicles with this equipment cannot be readily identified by any markings, only through visual inspection of the head restraint. The Active Head Restraints (AHR) will be split in two halves, with the front half being soft foam and trim, the back half being decorative plastic.

When AHRs deploy during a rear impact, the front half of the head restraint extends forward to minimize the gap between the back of the occupant's head and the AHR. This system is designed to help prevent or reduce the extent of injuries to the driver and front passenger in certain types of rear impacts. Refer to "Occupant Restraints" in "Safety" in your Owner's Manual for further information.

To raise the head restraint, pull upward on the head restraint. To lower the head restraint, push the adjustment button, located at the base of the head restraint, and push downward on the head restraint.



Adjustment Button

Active Head Restraint (Tilted)

Active Head Restraint (Normal Position)

NOTE:

- The head restraints should only be removed by qualified technicians, for service purposes only. If either of the head restraints require removal, see your authorized dealer.
- In the event of deployment of an Active Head Restraint, refer to "Occupant Restraints" in "Safety" in your Owner's Manual for further information.

WARNING!

- ALL the head restraints MUST be re-installed in the vehicle to properly protect the occupants.
- All occupants, including the driver, should not operate a vehicle or sit in a vehicle's seat until the head restraints are placed in their proper positions in order to minimize the risk of neck injury in the event of a collision.
- Do not place items over the top of the Active Head Restraint, such as coats, seat covers or portable DVD players. These items may interfere with the operation of the Active Head Restraint in the event of a collision and could result in serious injury or death.
- Active Head Restraints may be deployed if they are struck by an object such as a hand, foot or loose cargo. To avoid accidental deployment of the Active Head Restraint ensure that all cargo is secured, as loose cargo could contact the Active Head Restraint during sudden stops. Failure to follow this warning could cause personal injury if the Active Head Restraint is deployed.

GETTING TO KNOW YOUR VEHICLE

Head Restraints — Second Row Head Seats

The head restraints on the second row head seats are non-adjustable and non-removable. The head restraint will automatically fold forward when the seat release lever is pulled during the Stow of Go procedure. Refer to "Stow" in this section for further information.

Head Restraints — Second Row Bench

The second row bench seat is equipped with adjustable head restraints.

To raise the head restraint, pull upward on the head restraint. To lower the head restraint, push the adjustment button, located at the base of the head restraint, and push downward.

NOTE:

- For child restraint tethering, refer to "Occupant Restraint Systems" in "Safety" for further information.

NOTE:

- To remove the head restraint, raise it as far as it can go. Then, push the release button and the adjustment button at the base of each post while pulling the head restraint up. Seatback angle may need to be adjusted to fully remove the head restraint. To re-install the head restraint, put the head restraint posts into the holes and push downward. Then, adjust the head restraint to the appropriate height.

WARNING!

- A loose head restraint thrown forward in a collision or hard stop could cause serious injury or death to occupants of the vehicle. Always securely slow remove head restraints in a location outside the occupant compartment.
- ALL the head restraints MUST be re-installed in the vehicle to properly protect the occupants. Follow the re-installation instructions above prior to operating the vehicle or occupying a seat.

NOTE:

- The head restraints must be raised manually when occupying the third row.
- Do not fold if there are passengers seated in the third row seats.

The head restraint in the center position can be raised and lowered for either routing or height adjustment. Refer to "Occupant Restraint Systems" in "Safety" for further information.


NOTE:

- To remove the center head restraint, raise it as far as it can go. Then, push both the release button and the adjustment button at the base of each post while pulling the head restraint up. To re-install the head restraint, put the head restraint posts into the holes and push downward. Then, using the adjustment button, adjust the head restraint to the appropriate height.

STEERING WHEEL

Tilt/Telescoping Steering Column

This feature allows you to tilt the steering column upward or downward. It also allows you to lengthen or shorten the steering column. The tilt/telescoping lever is located below the steering wheel at the end of the steering column.



Tilt/Telescoping Lever

To unlock the steering column, push the lever downward (toward the floor). To tilt the steering column, move the steering wheel upward or downward as desired. To lengthen or shorten the steering column, pull the steering wheel outward or push it inward as desired. To lock the steering column in position, push the lever upward until fully engaged.

WARNING!

- Do not adjust the steering column while driving. Adjusting the steering column while driving or driving with the steering column unlocked, could cause the driver to lose control of the vehicle. Failure to follow this warning may result in serious injury or death.

Heated Steering Wheel — If Equipped

The steering wheel contains a heating element that helps warm your hands in cold weather. The heated steering wheel has only one temperature setting. Once the heated steering wheel has been turned on it can operate for an average of 80 minutes before automatically shutting off. This time may vary depending on the temperature of the environment. The heated steering wheel can shut off early or may not turn on when the steering wheel is already warm.

FIGURE 70. Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

Photograph Not Applicable

FIGURE 71. Post-Test View of Shattered Vehicle Inner Door Panel

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)

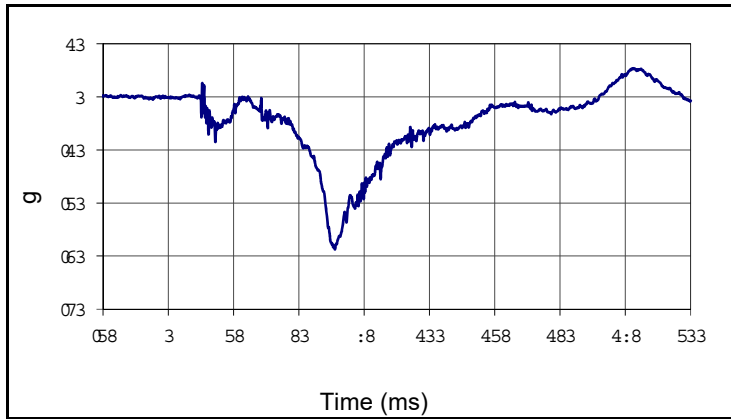
Left B-Pillar Sill Acceleration
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration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

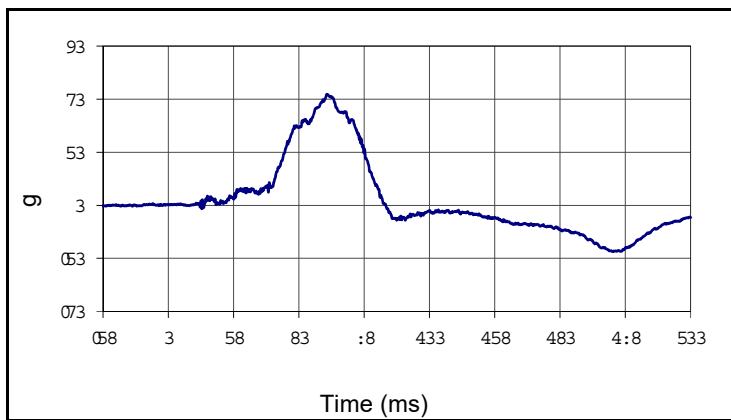
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan
 Test Program: NCAP Side Pole Impact Test

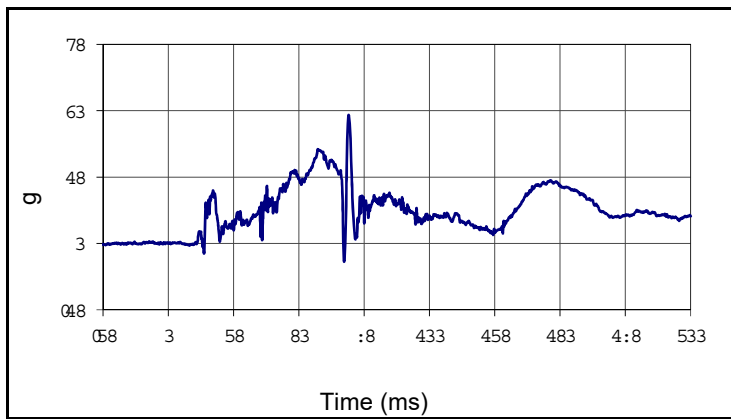
NHTSA No.: M20190303
 Test Date: 12/17/2018



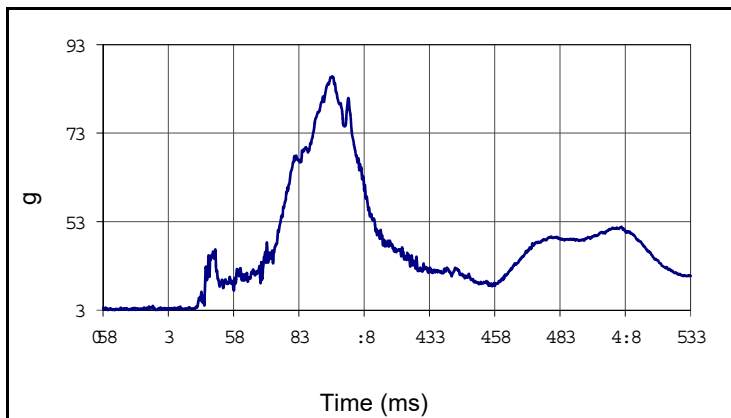
Curve Description			
Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
5.4	178.3	-28.7	63.8



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
41.9	60.8	-17.5	170.1



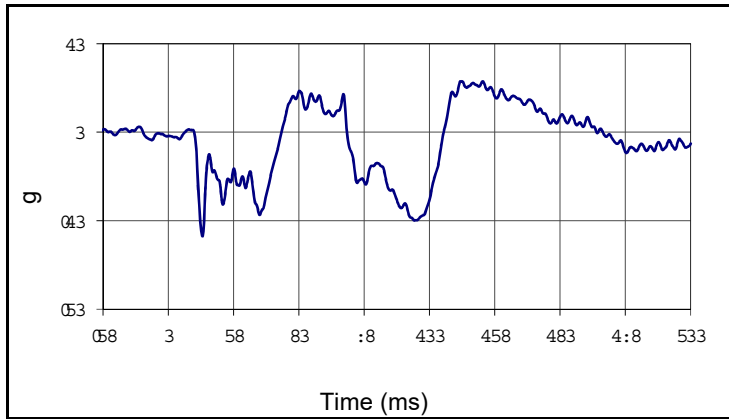
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
29.0	69.0	-4.1	67.3



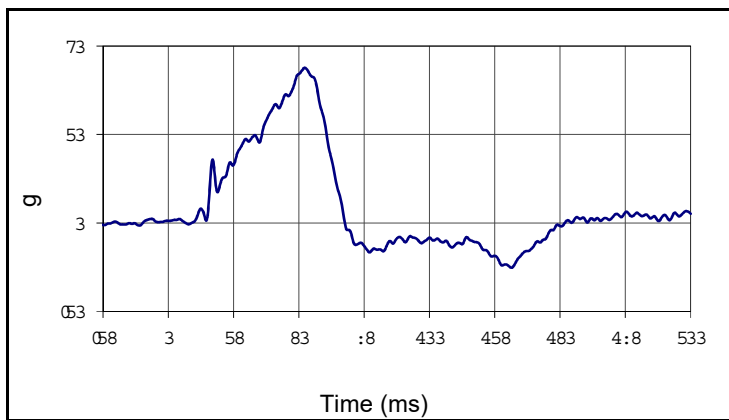
Curve Description			
Driver Head Acceleration Primary Resultant			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
52.8	62.6	0.1	5.8

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan
 Test Program: NCAP Side Pole Impact Test

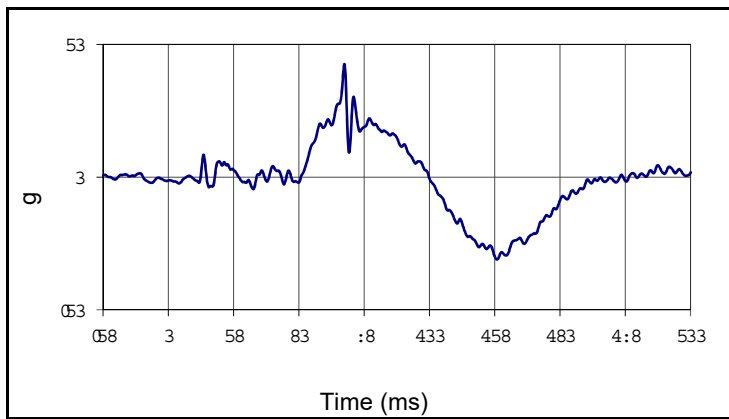
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 Test Date: 12/17/2018



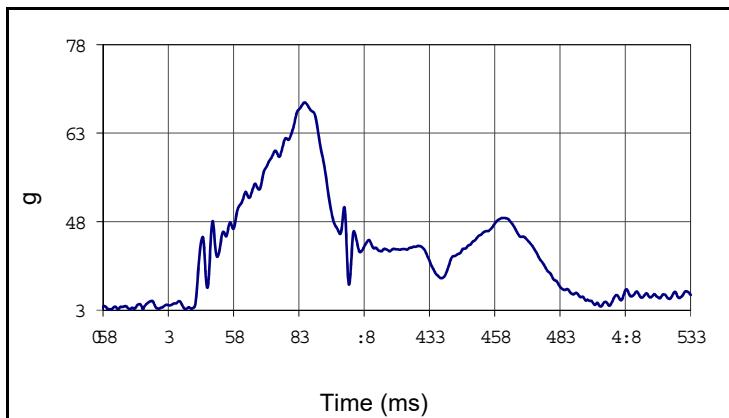
Curve Description			
Driver Lower Spine T12 Acceleration X			
Plot No.		SAE Class	Units
005		180	g
Max	Time	Min	Time
5.8	111.8	-11.8	13.1



Curve Description			
Driver Lower Spine T12 Acceleration Y			
Plot No.		SAE Class	Units
006		180	g
Max	Time	Min	Time
35.1	52.2	-10.1	131.4



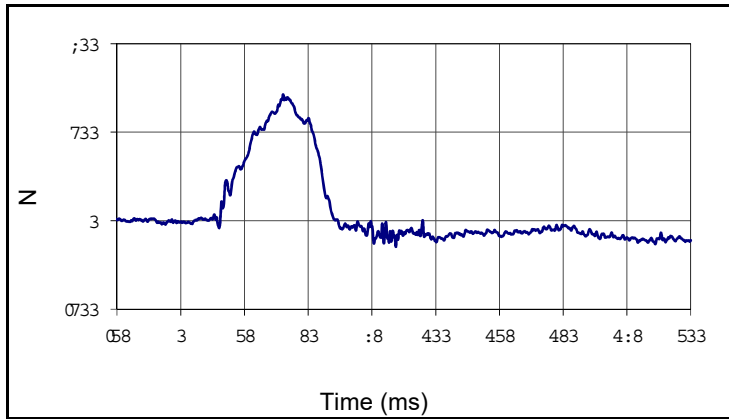
Curve Description			
Driver Lower Spine T12 Acceleration Z			
Plot No.		SAE Class	Units
007		180	g
Max	Time	Min	Time
17.0	67.4	-12.4	125.8



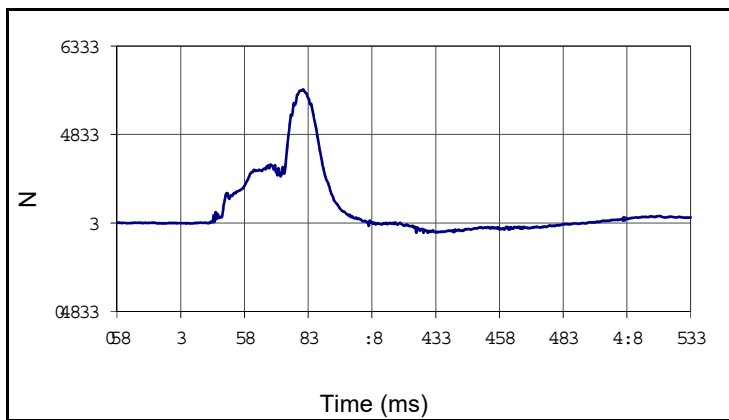
Curve Description			
Driver Lower Spine T12 Acceleration Resultant			
Plot No.		SAE Class	Units
008		180	g
Max	Time	Min	Time
35.2	52.2	0.1	6.6

Test Vehicle: 2019 Dodge Grand Caravan SE 5-Door Minivan
 Test Program: NCAP Side Pole Impact Test

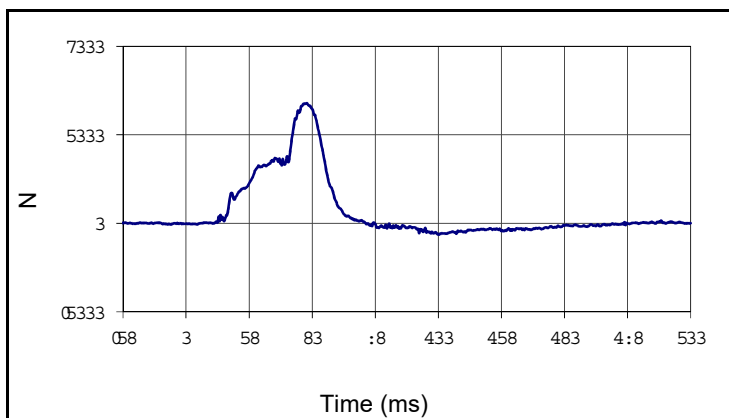
NHTSA No.: M20190303
 Test Date: 12/17/2018



Curve Description			
Driver Iliac Wing Force on Impact Side Y			
Plot No.		SAE Class	Units
009		600	N
Max	Time	Min	Time
570.3	40.1	-118.0	84.4



Curve Description			
Driver Acetabulum Force on Impact Side Y			
Plot No.		SAE Class	Units
010		600	N
Max	Time	Min	Time
2264.7	47.9	-165.6	96.9



Curve Description			
Driver Total Pelvic Force on Impact Side Y			
Plot No.		SAE Class	Units
011		600	N
Max	Time	Min	Time
2715.5	47.8	-257.5	100.2

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: 2018-12-13

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	778	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	106	Pass
F - Thigh Clearance	mm	119	135	125	Pass
G - Head Breadth	mm	140	148	146	Pass
H - Head Back From Backline	mm	40	46	44	Pass
I - Head Depth	mm	178	188	185	Pass
J - Head Circumference	mm	541	551	549	Pass
K - Buttock To Knee Length	mm	514	540	523	Pass
L - Popliteal Height	mm	343	369	351	Pass
K - Knee Pivot To Floor Height	mm	392	409	400	Pass
N - Buttock Popliteal Length	mm	416	442	431	Pass
O - Chest Depth W/O Jacket	mm	195	211	200	Pass
P - Foot Length	mm	216	232	225	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	318	Pass
R - Arm Length	mm	249	259	256	Pass
S - Knee Joint To Seatback	mm	477	493	482	Pass
V - Shoulder Width	mm	341	357	352	Pass
W - Foot Width	mm	78	94	87	Pass
Y - Chest Circumference W/Jacket	mm	851	881	867	Pass
Z - Waist Circumference	mm	761	791	774	Pass
Overall Test Results					Pass

Technician: 
 J. Hernandez

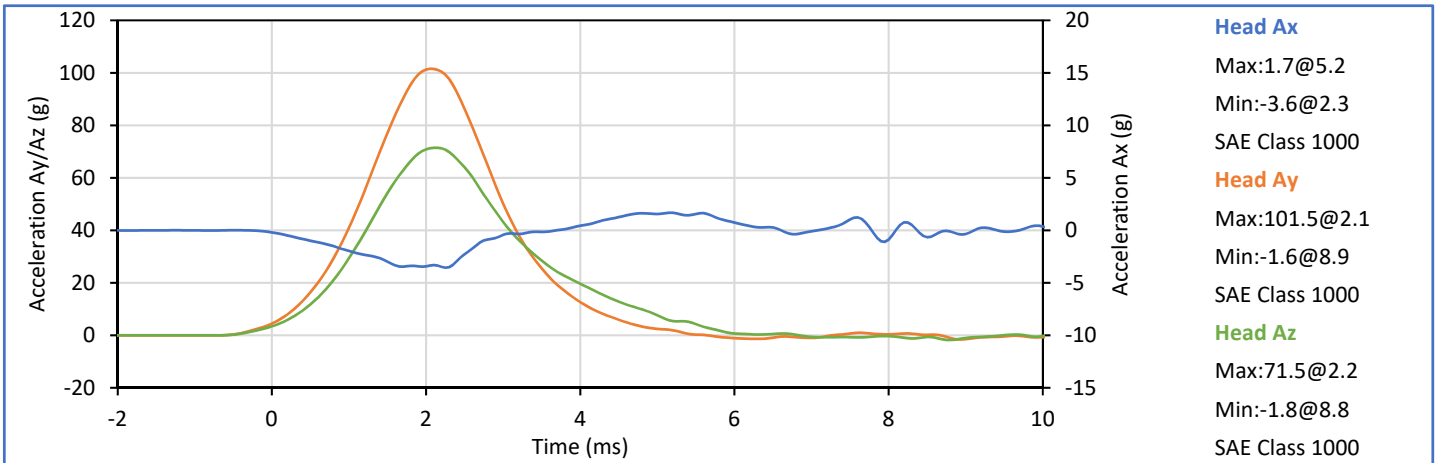
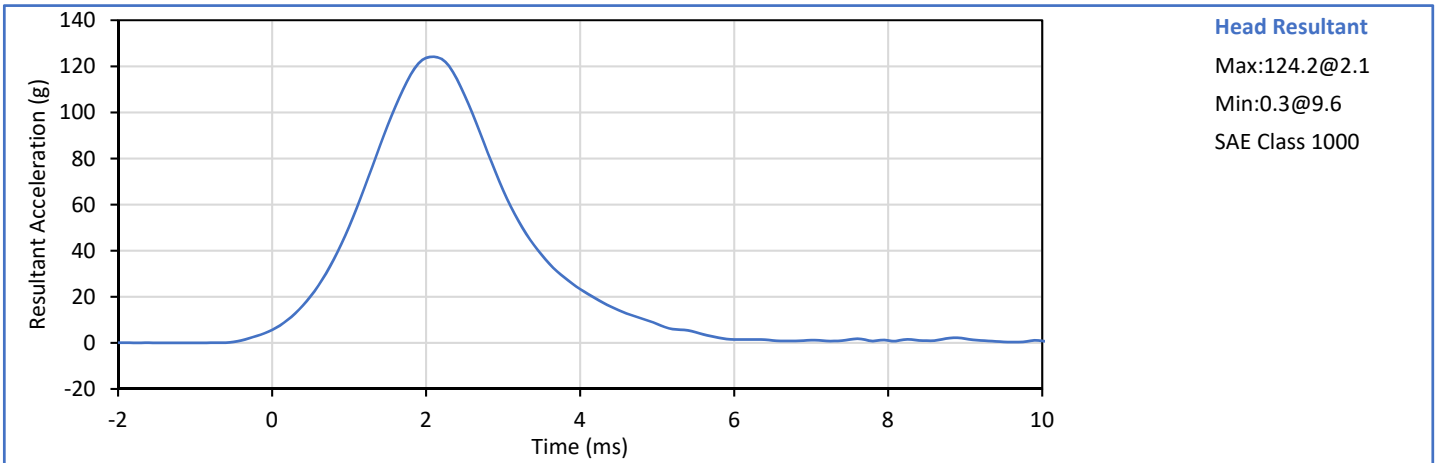
Approved By: 
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-13

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	20.8	Pass
Laboratory Humidity	%	10	70	29	Pass
Peak Resultant Acceleration	g	115.0	137.0	124.2	Pass
Peak Head Ax	g	-15.0	15.0	-3.6	Pass
Oscillations After Main Pulse	%	0.0	15.0	1.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

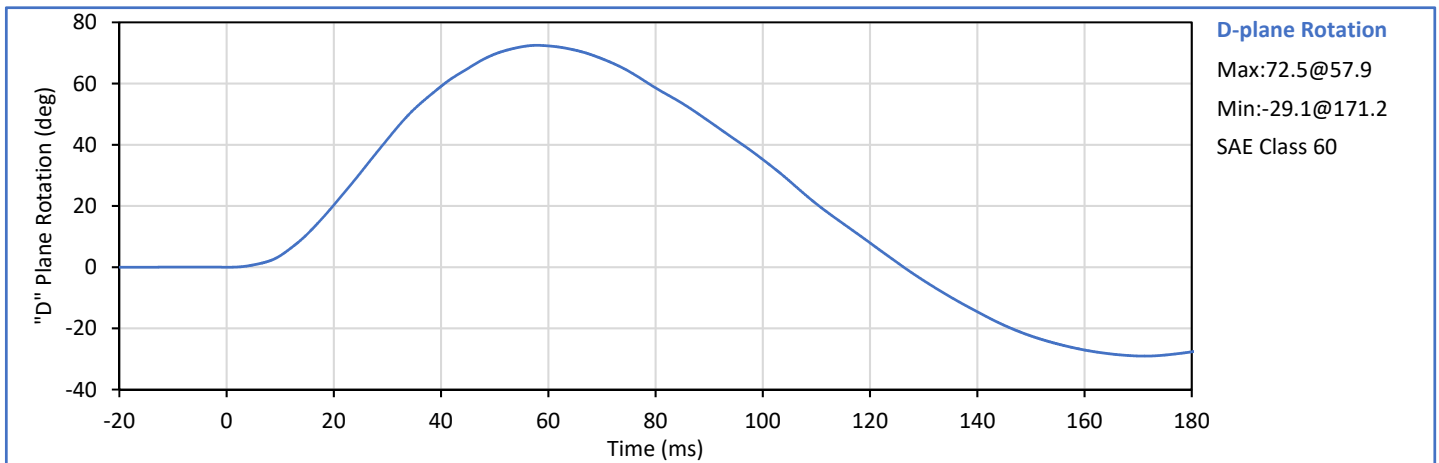
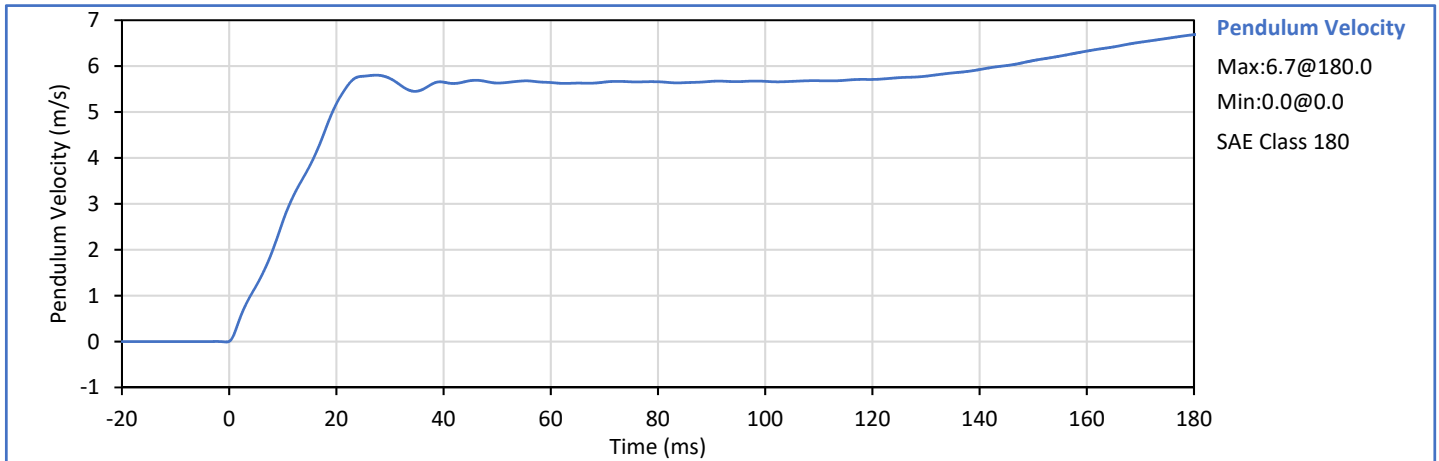
Approved By:
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-14

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	5.54	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.61	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.82	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	5.18	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.78	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.80	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	72.5	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	57.9	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-43.6	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	107.7	Pass
Overall Test Results					Pass



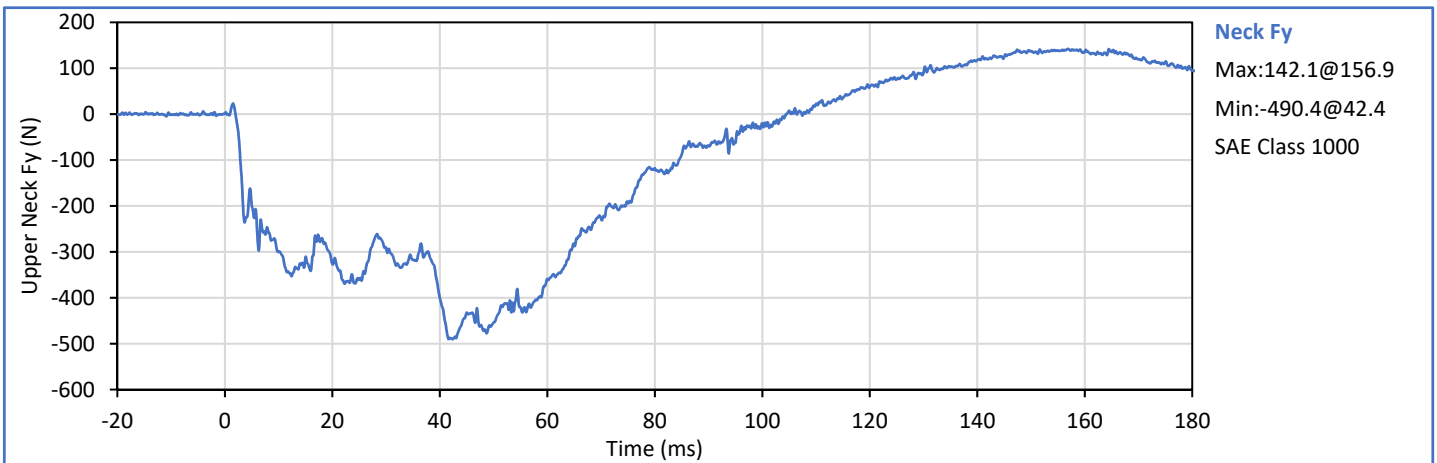
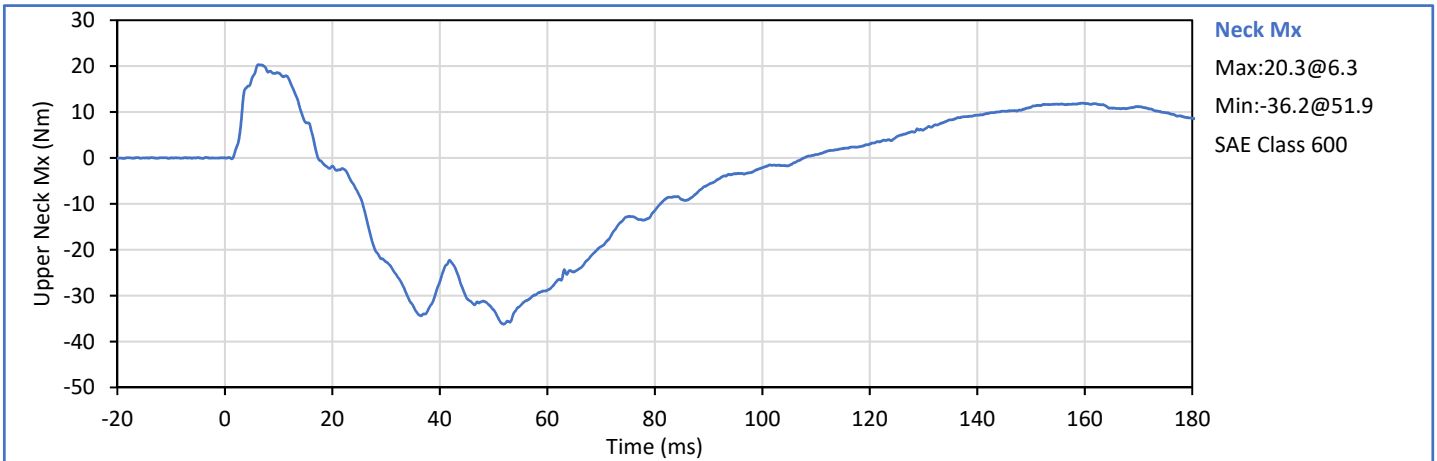
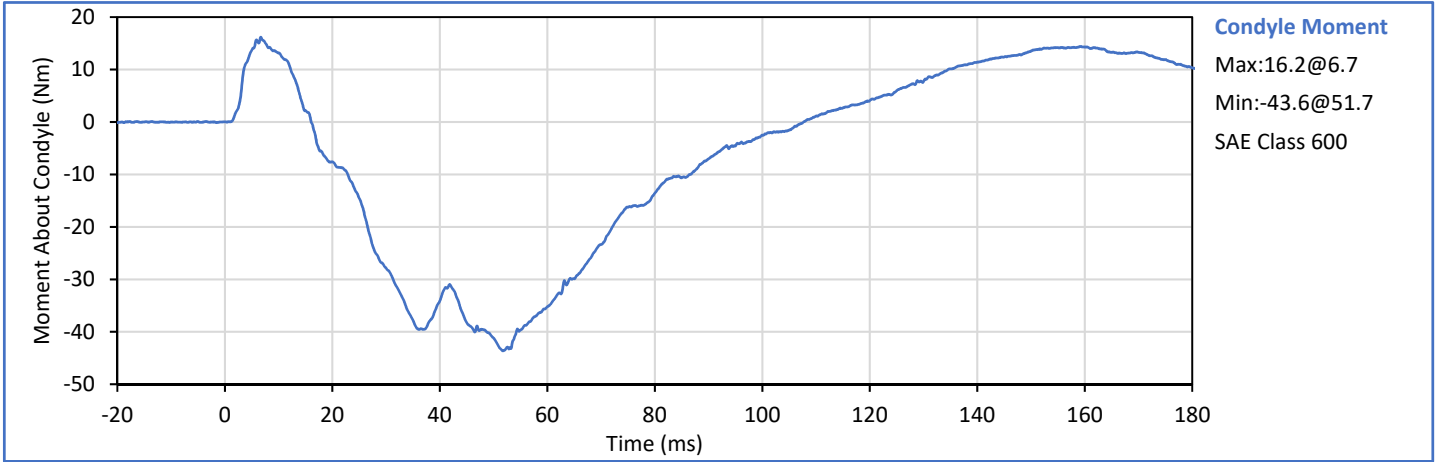
Technician:
 J. Hernandez

Approved By:
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-14

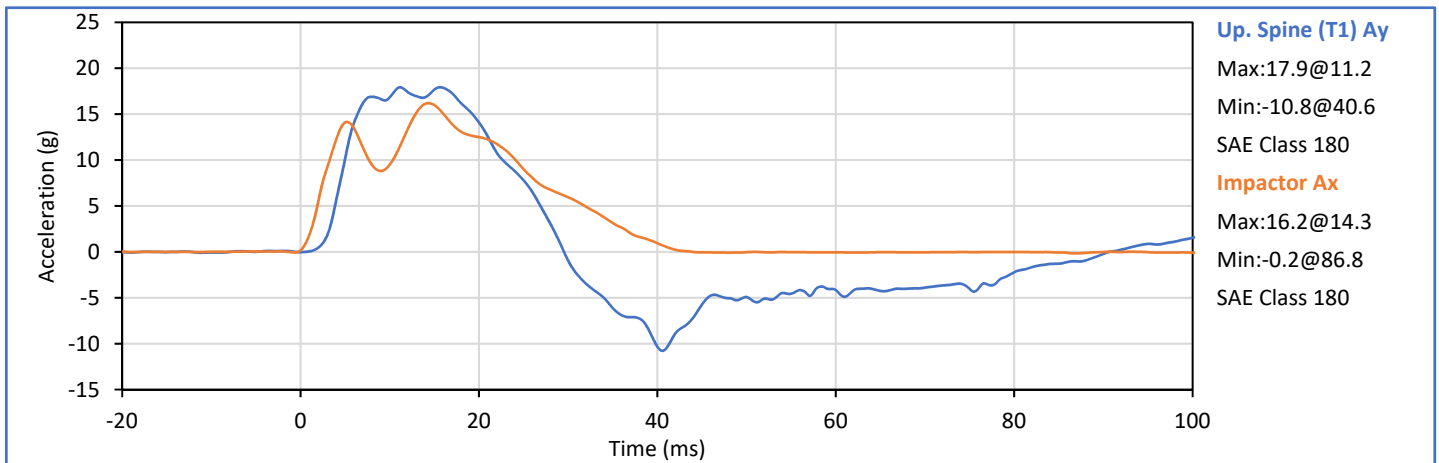
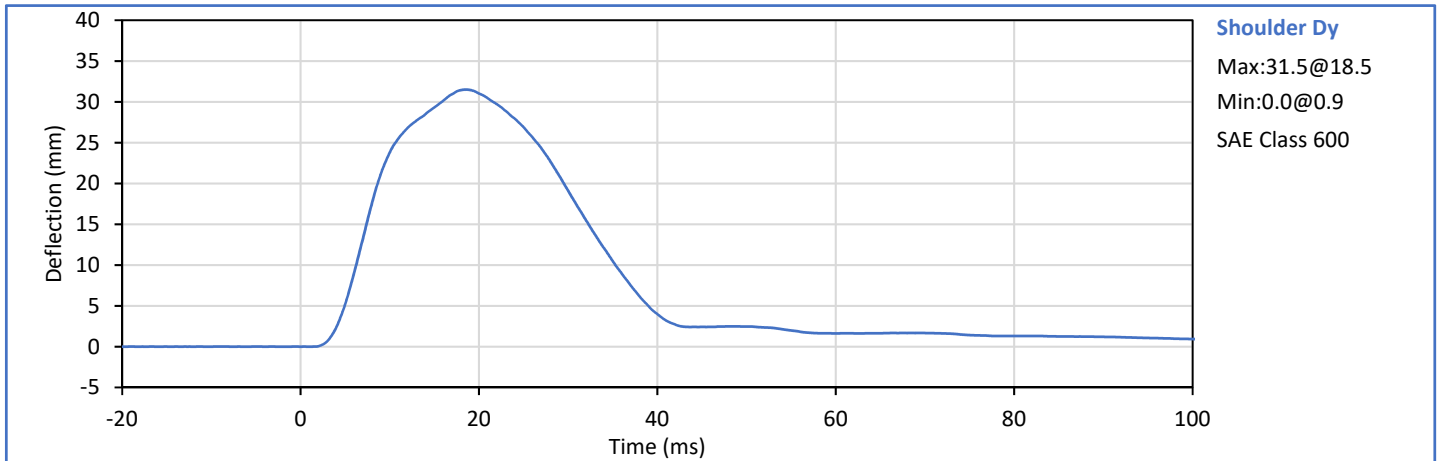




ATD Serial No.: 299

Test Date: 2018-12-14

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	4.35	Pass
Peak Shoulder Dy	mm	28.0	37.0	31.5	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	17.9	Pass
Peak Impactor Ax	g	13.0	18.0	16.2	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*
 J. Hernandez

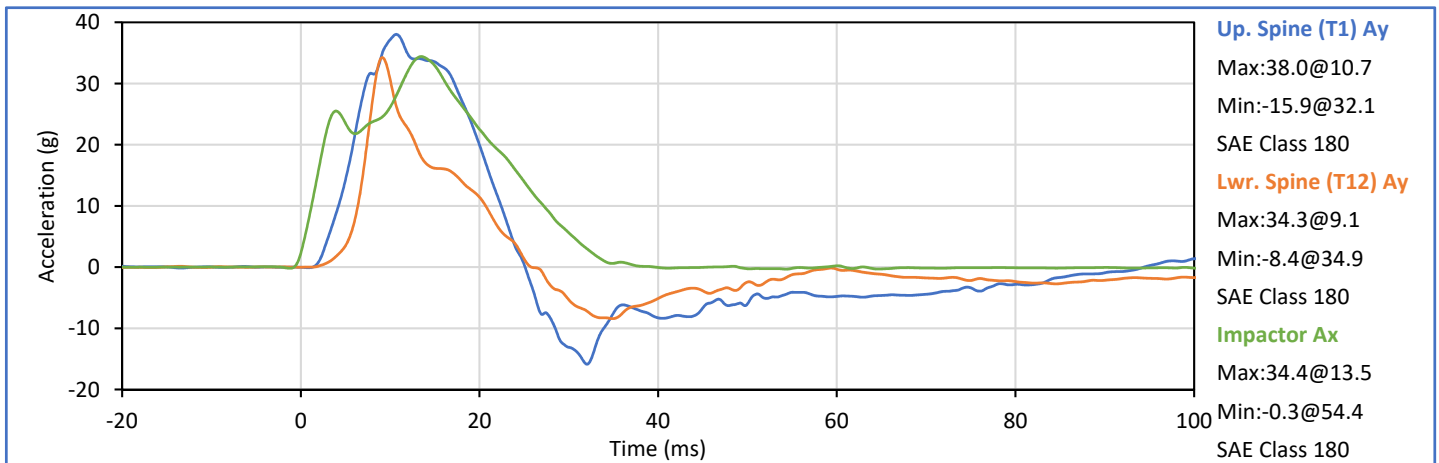
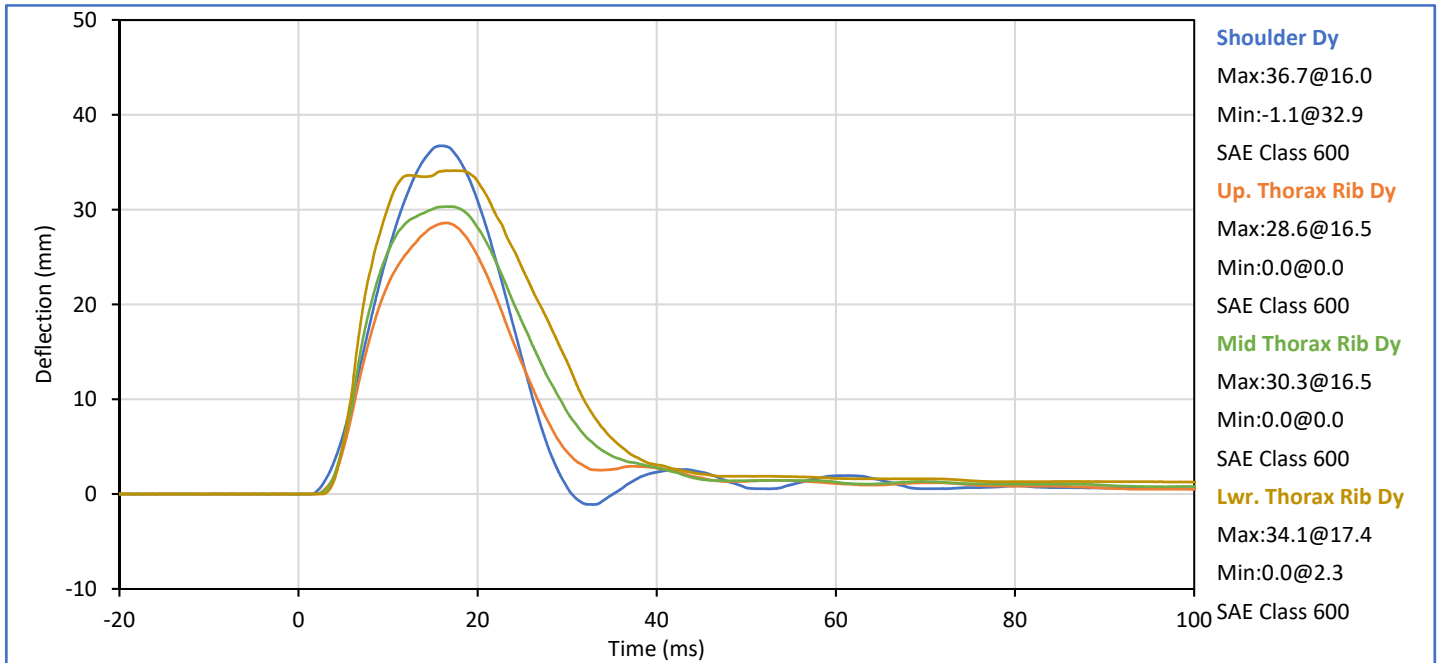
Approved By: *P. Puzzuto*
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-14

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	6.64	Pass
Peak Shoulder Dy	mm	31.0	40.0	36.7	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.6	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	38.0	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	34.3	Pass
Peak Impactor Ax	g	30.0	36.0	34.4	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

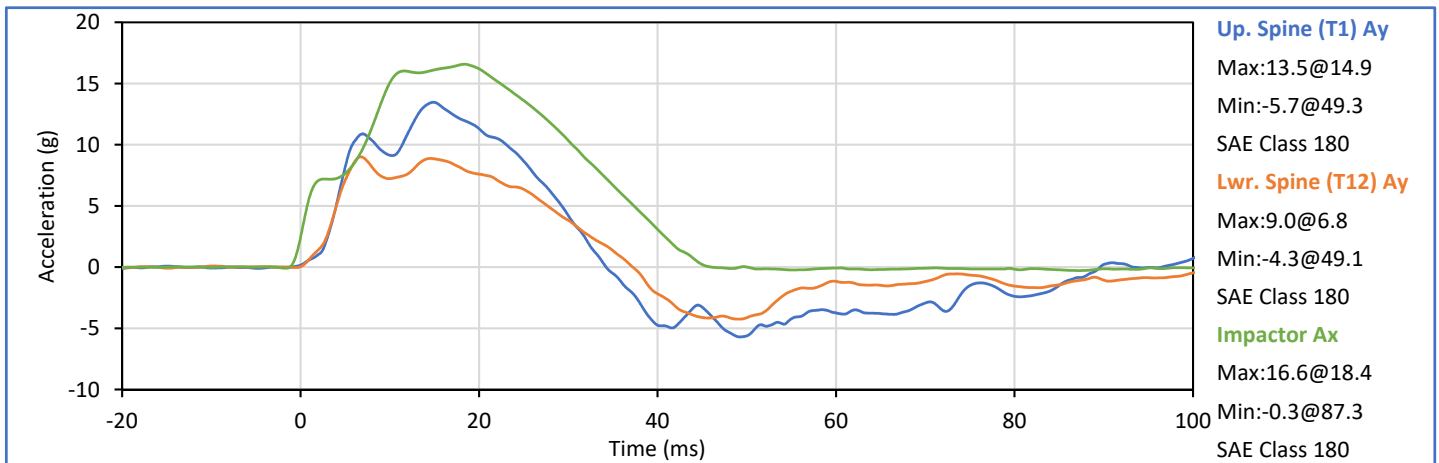
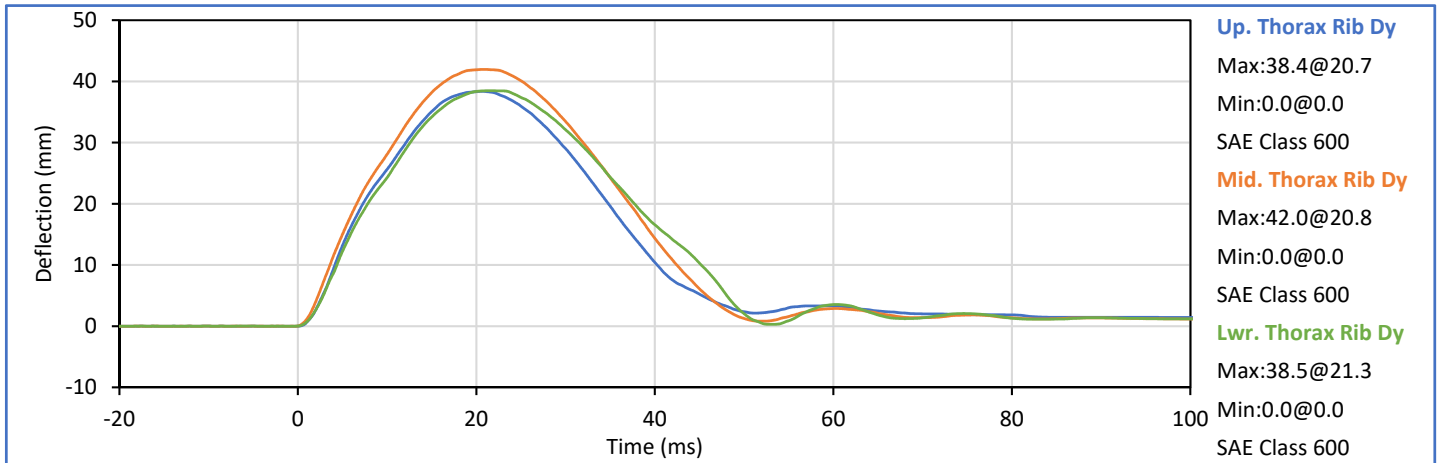
Approved By:
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Rib Dy	mm	32.0	40.0	38.4	Pass
Peak Middle Rib Dy	mm	39.0	45.0	42.0	Pass
Peak Lower Rib Dy	mm	35.0	43.0	38.5	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	13.5	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.0	Pass
Peak Impactor Ax	g	14.0	18.0	16.6	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

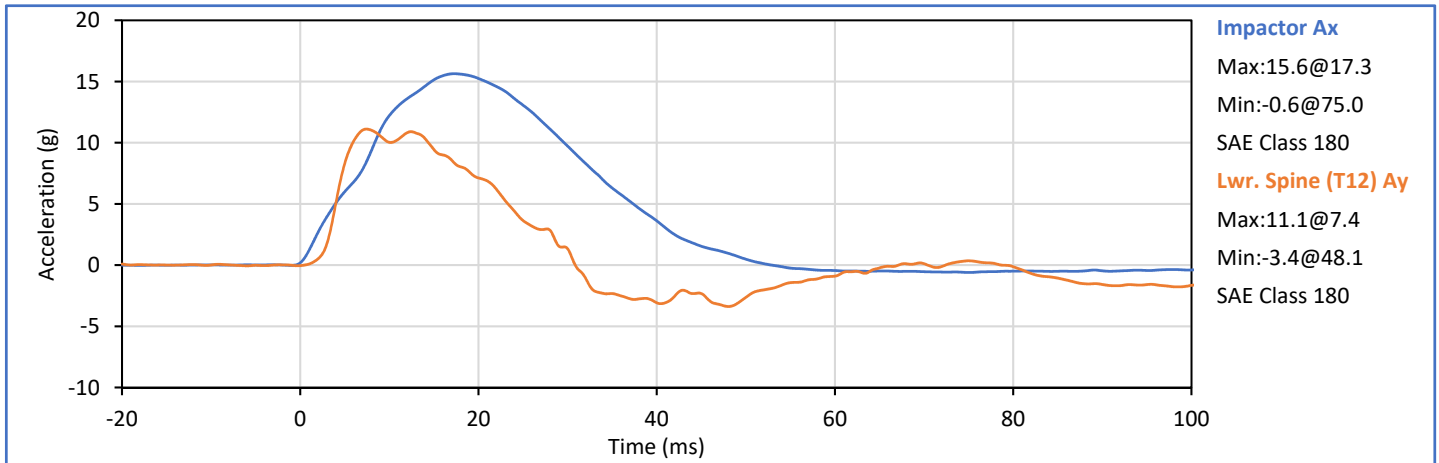
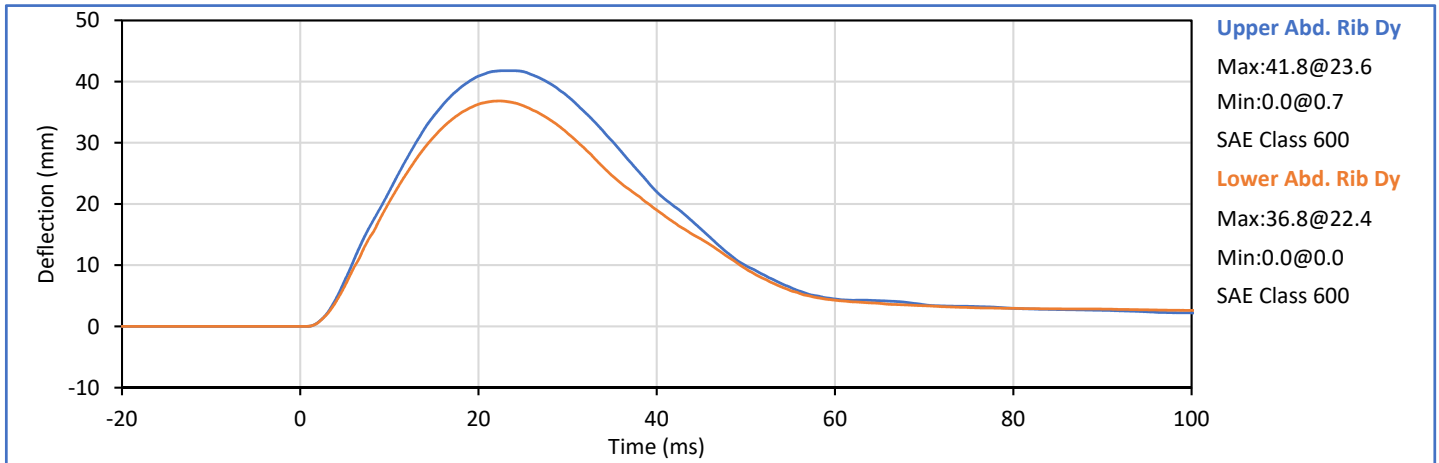
Approved By:
 P. Puzzuto




ATD Serial No.: 299

Test Date: 2018-12-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.32	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	41.8	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	36.8	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	11.1	Pass
Peak Impactor Ax	g	12.0	16.0	15.6	Pass
Overall Test Results					Pass



Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto

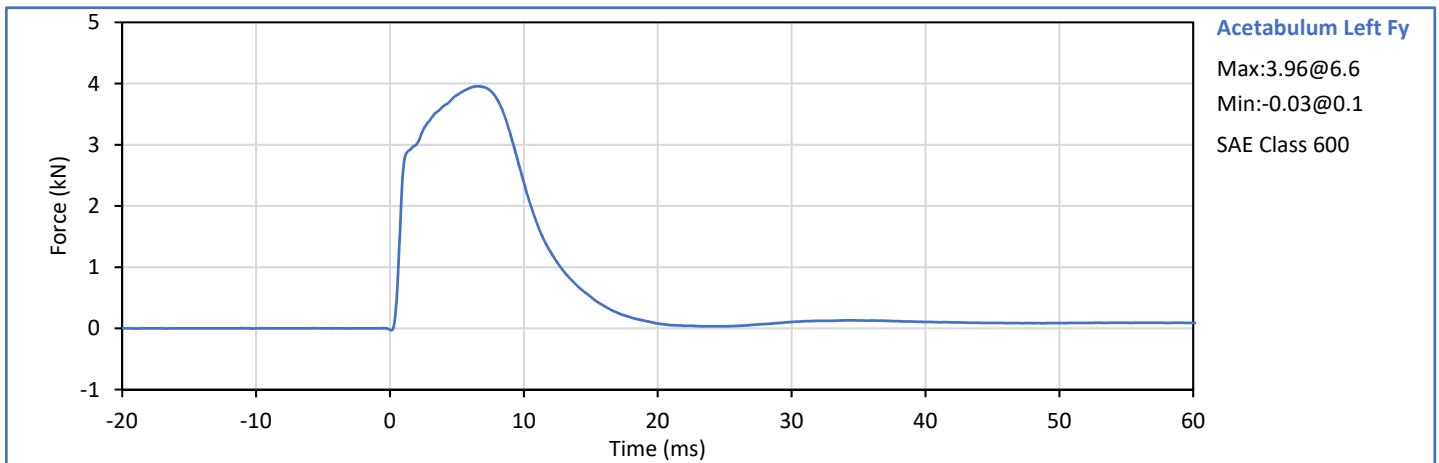
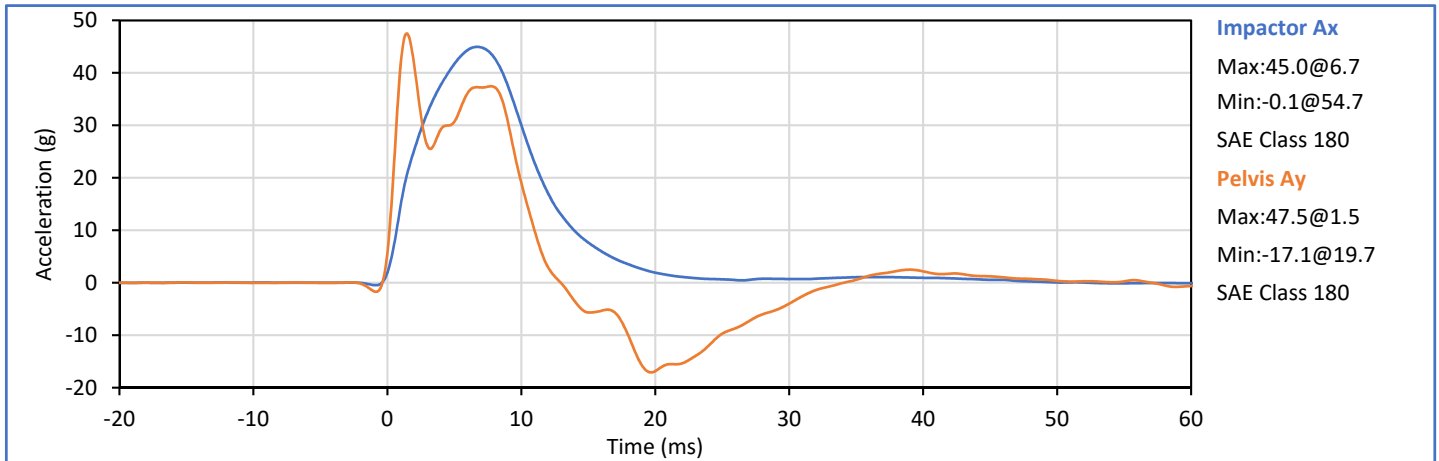


ATD Serial No.: 299

Test Date: 2018-12-14

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	6.67	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.96	Pass
Pelvis Ay after 6ms	g	34.0	42.0	37.5	Pass
Peak Impactor Ax	g	38.0	47.0	45.0	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 11407 (SACO)



Technician: *J. Hernandez*
 J. Hernandez

Approved By: *P. Puzzuto*
 P. Puzzuto



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

**SID-IIs Small Side Impact ATD
 Pelvis Acetabulum Impact**

ATD Serial No.: 299

Test Date: 2018-12-14

Pelvis Plug S/N: 11407 (SACO)

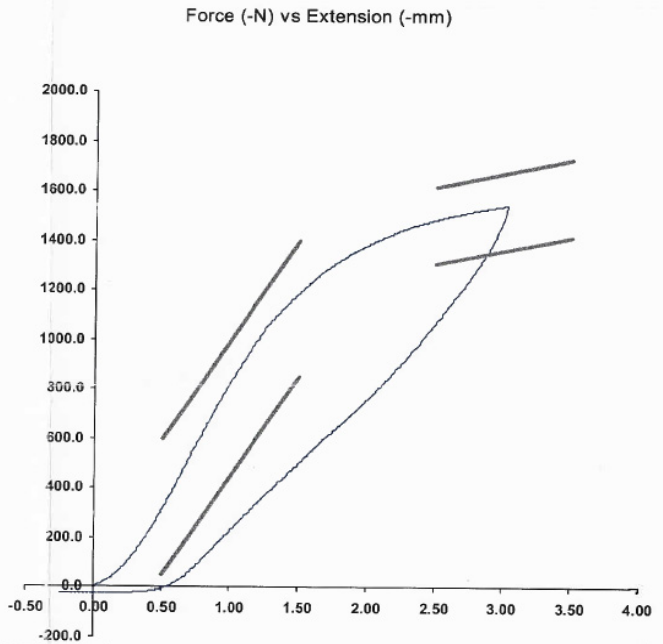


SID-IIs Pelvis Plug Certification Test

Plug S/N 11407
 Test Number 2876
 Report Number 2873
 Test Date 8/29/2016 9:37:50 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	317.92	50.00	600.00
Force @ 1.5 mm (N)	1,190.92	850.00	1,400.00
Force @ 2.5 mm (N)	1,484.24	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,540.17	1,361.00	1,673.00

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



Operator DC
 Part Number 180-4450

Template No 107 29-Aug-16
 SACO Research

By: DC Date: 8/29/16

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



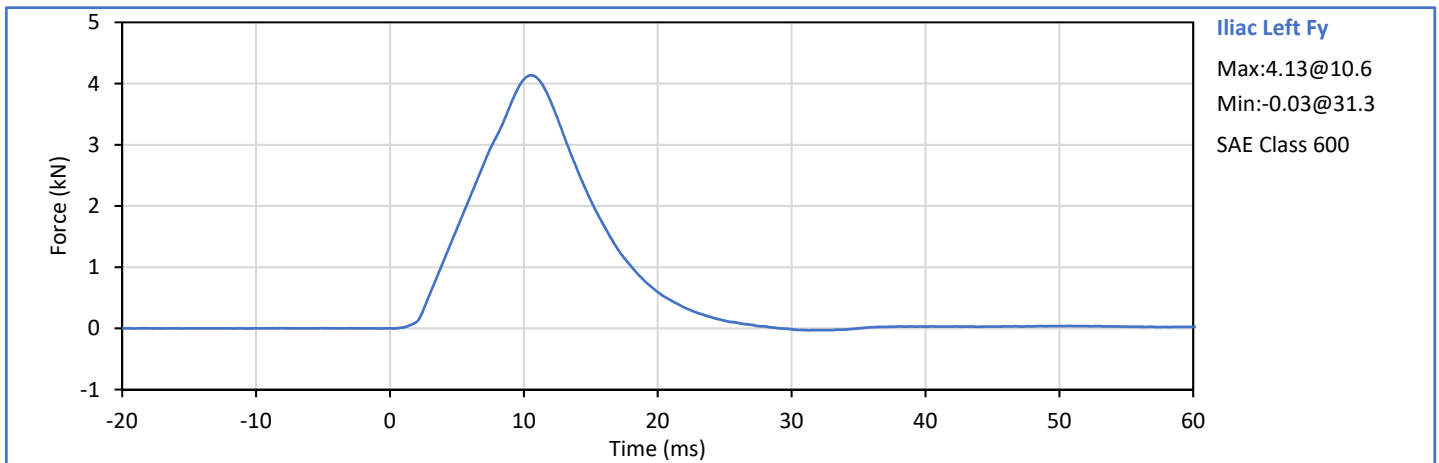
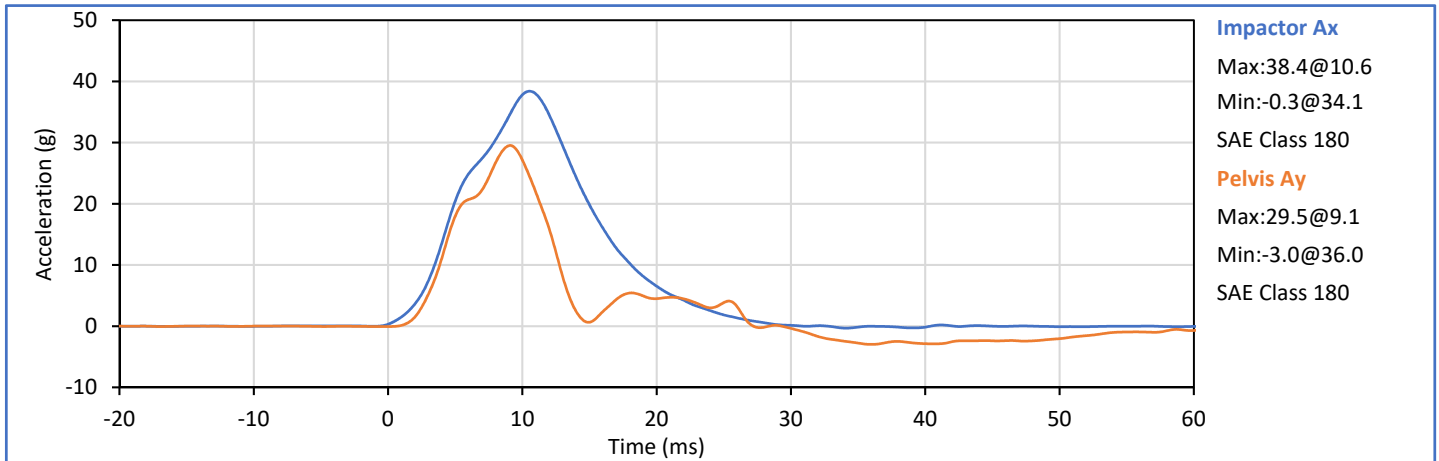
ATD Serial No.: 299

Test Date: 2018-12-14

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	30	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Iliac Fy	kN	4.10	5.10	4.13	Pass
Pelvis Ay after 6ms	g	28.0	39.0	29.5	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

Approved By:
 P. Puzzuto

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

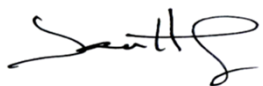



**SID-IIs Small Side Impact ATD
 External Measurements**

ATD Serial No.: 299

Test Date: 2018-12-27

Tested Parameter	Units	Spec Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.5	Pass
Laboratory Relative Humidity	%	10	70	24	Pass
A - Sitting Height	mm	772	788	783	Pass
B - Shoulder Pivot Height	mm	437	453	450	Pass
C - Hpoint Height	mm	79	89	84	Pass
D - H Point From Seatback	mm	141	151	147	Pass
E - Shoulder Pivot From Backline	mm	97	107	104	Pass
F - Thigh Clearance	mm	119	135	131	Pass
G - Head Breadth	mm	140	148	142	Pass
H - Head Back From Backline	mm	40	46	43	Pass
I - Head Depth	mm	178	188	186	Pass
J - Head Circumference	mm	541	551	545	Pass
K - Buttock To Knee Length	mm	514	540	526	Pass
L - Popliteal Height	mm	343	369	358	Pass
K - Knee Pivot To Floor Height	mm	392	409	403	Pass
N - Buttock Popliteal Length	mm	416	442	436	Pass
O - Chest Depth W/O Jacket	mm	195	211	201	Pass
P - Foot Length	mm	216	232	226	Pass
Q - Hip Breadth (W/Pelvic Plugs)	mm	313	323	317	Pass
R - Arm Length	mm	249	259	256	Pass
S - Knee Joint To Seatback	mm	477	493	488	Pass
V - Shoulder Width	mm	341	357	349	Pass
W - Foot Width	mm	78	94	89	Pass
Y - Chest Circumference W/Jacket	mm	851	881	858	Pass
Z - Waist Circumference	mm	761	791	782	Pass
Overall Test Results					Pass

Technician: 
 J. Hernandez

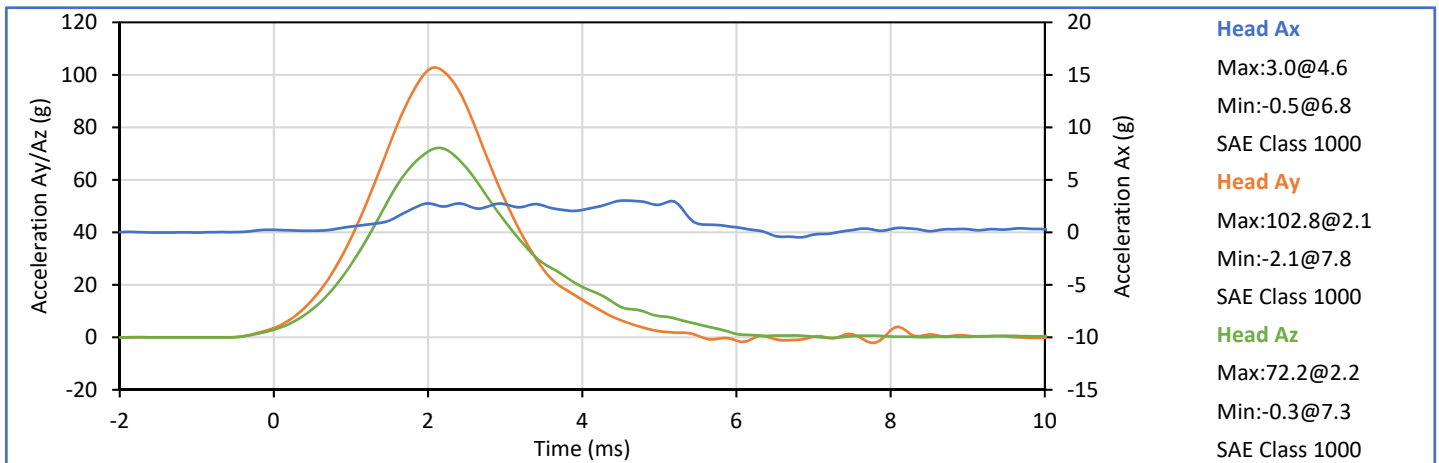
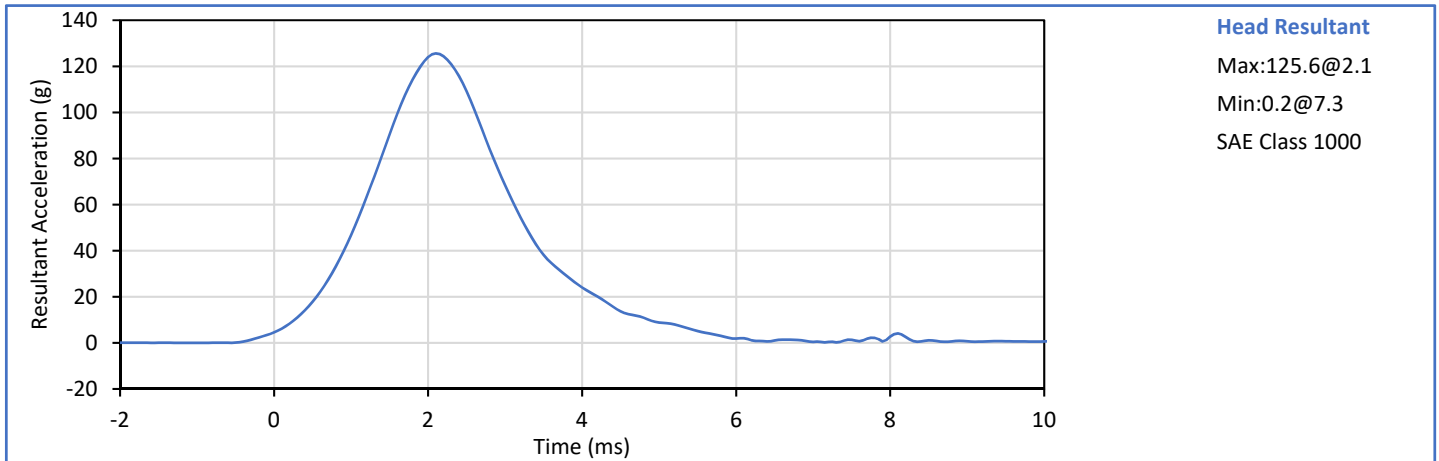
Approved By: 
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-27

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	18.9	25.6	21.5	Pass
Laboratory Humidity	%	10	70	24	Pass
Peak Resultant Acceleration	g	115.0	137.0	125.6	Pass
Peak Head Ax	g	-15.0	15.0	-0.5	Pass
Oscillations After Main Pulse	%	0.0	15.0	3.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes		Yes	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

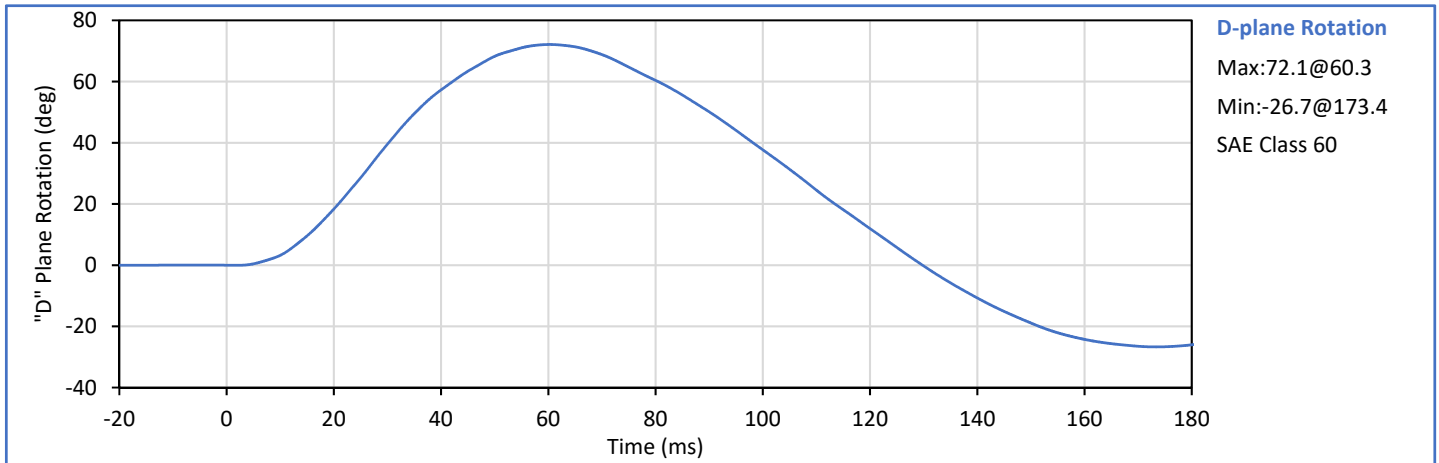
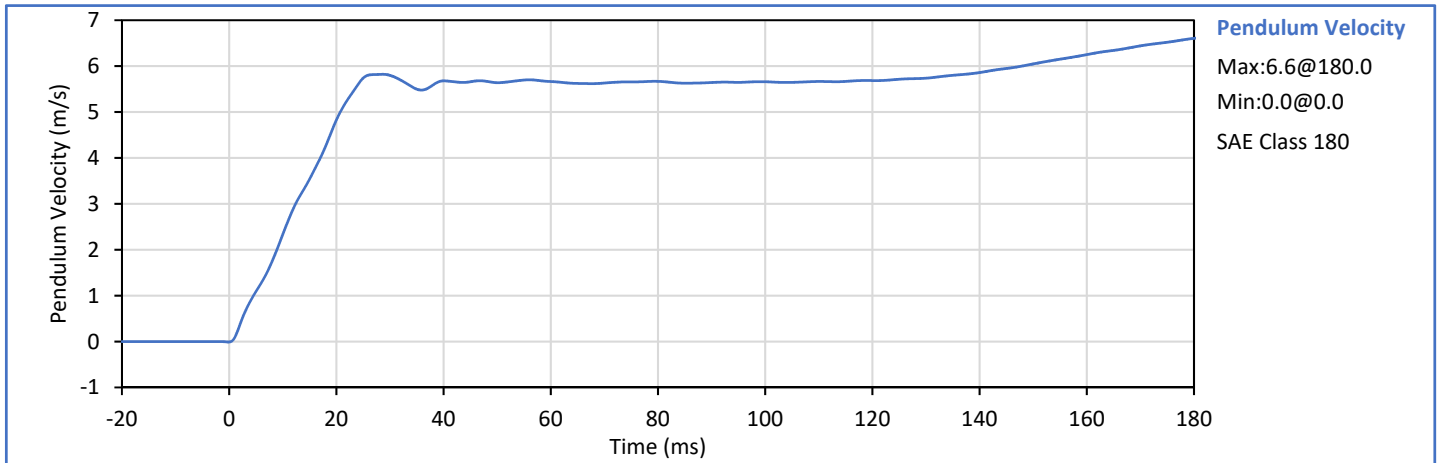
Approved By:
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.4	Pass
Laboratory Humidity	%	10	70	20	Pass
Pendulum Velocity	m/s	5.51	5.63	5.56	Pass
Pendulum Decel at 10 ms	m/s	2.20	2.80	2.33	Pass
Pendulum Decel at 15 ms	m/s	3.30	4.10	3.54	Pass
Pendulum Decel at 20 ms	m/s	4.40	5.40	4.82	Pass
Pendulum Decel at 25 ms	m/s	5.40	6.10	5.74	Pass
Pendulum Decel from 25-100 ms	m/s	5.50	6.20	5.82	Pass
Peak "D" Plane Rotation	deg	71.0	81.0	72.1	Pass
Time of Peak "D" Plane Rotation	ms	50.0	70.0	60.3	Pass
Peak Occ. Condyle Moment	Nm	-44.0	-36.0	-42.1	Pass
Time of Moment Decay to 0 Nm	ms	102.0	126.0	109.5	Pass
Overall Test Results					Pass



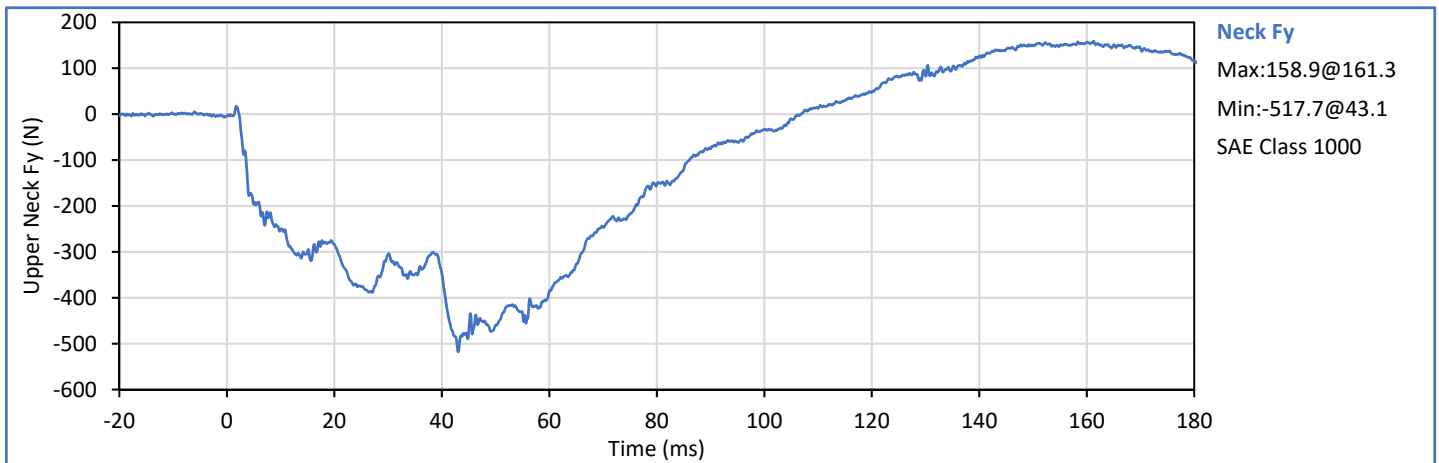
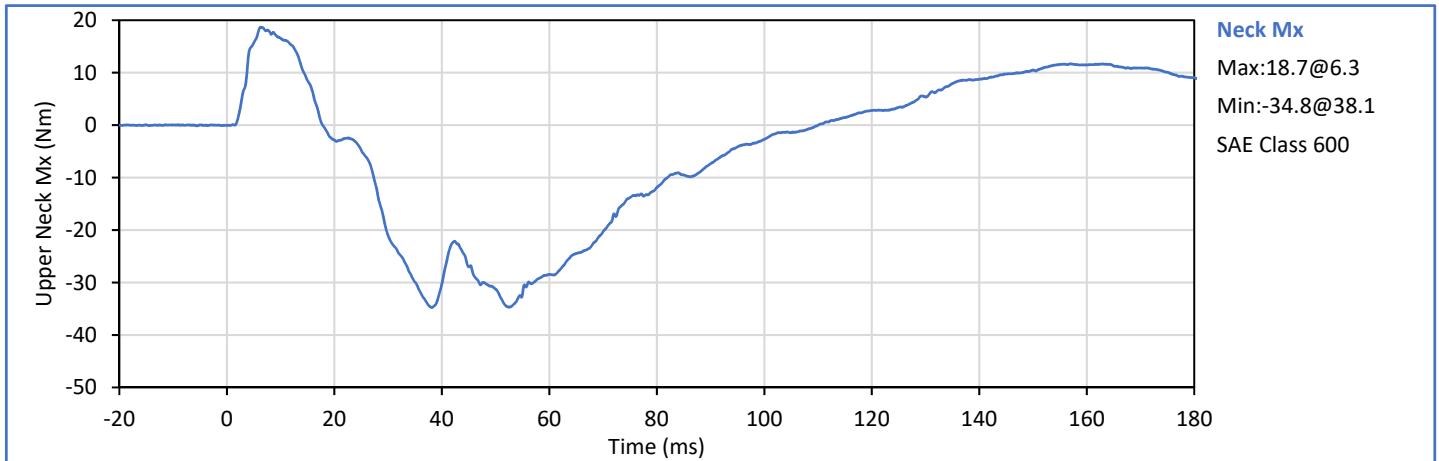
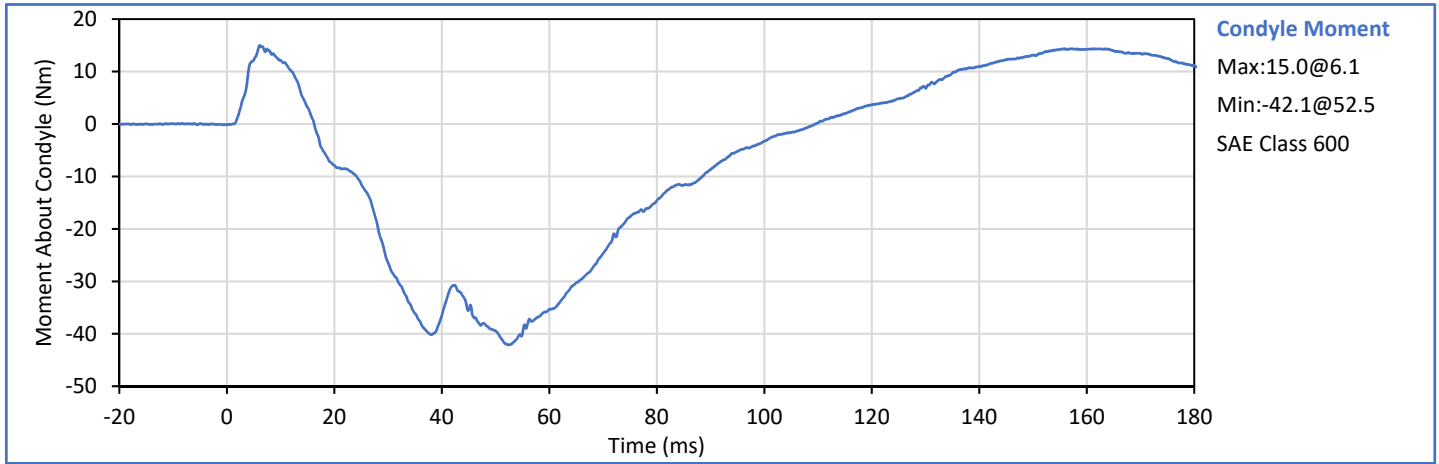
Technician: *J. Hernandez*
 J. Hernandez

Approved By: *P. Puzzuto*
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-28

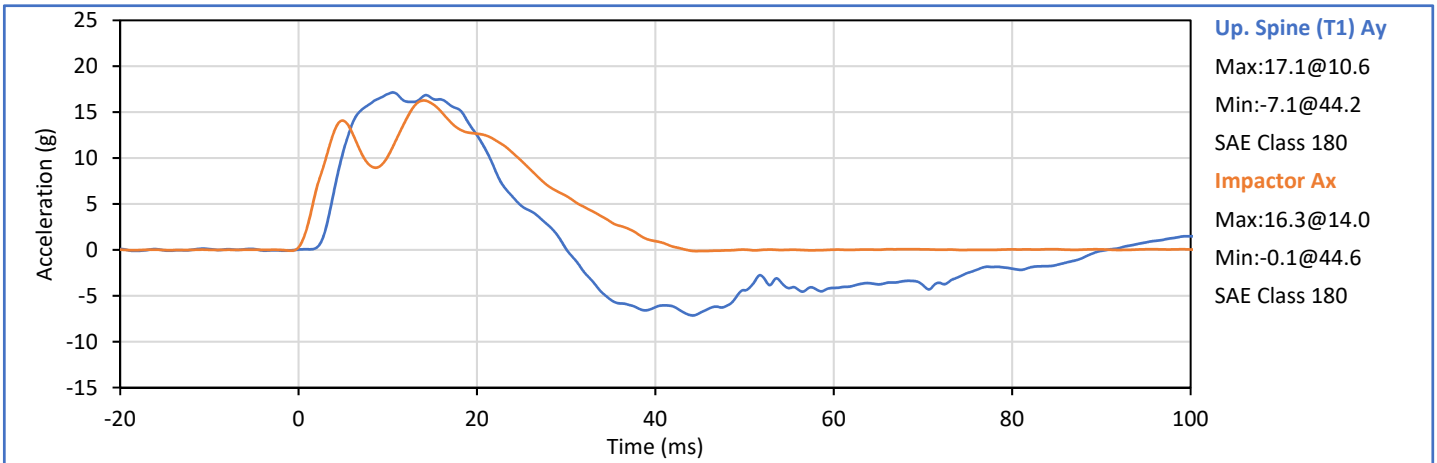
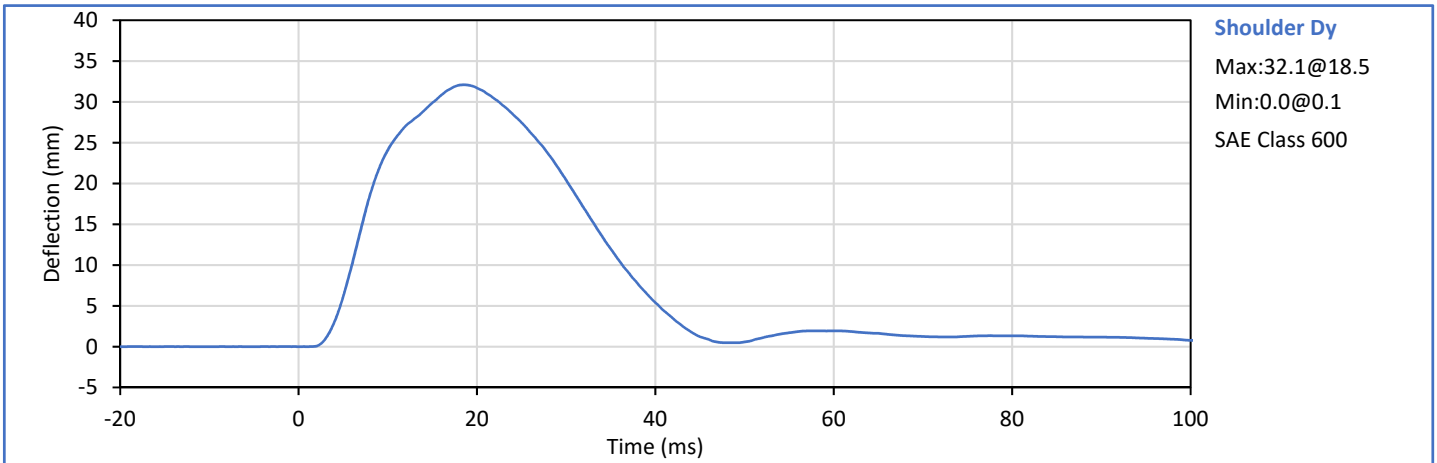




ATD Serial No.: 299

Test Date: 2018-12-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	22	Pass
Impactor Velocity	m/s	4.20	4.40	4.34	Pass
Peak Shoulder Dy	mm	28.0	37.0	32.1	Pass
Peak Upper Spine (T1) Ay	g	17.0	22.0	17.1	Pass
Peak Impactor Ax	g	13.0	18.0	16.3	Pass
Overall Test Results					Pass



Technician: *J. Hernandez*
 J. Hernandez

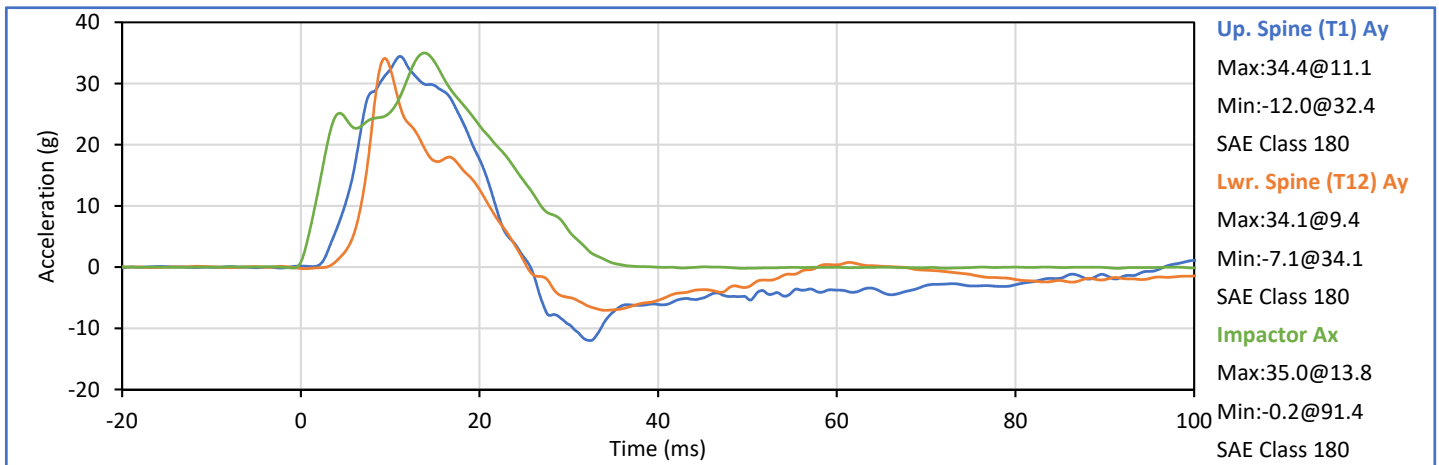
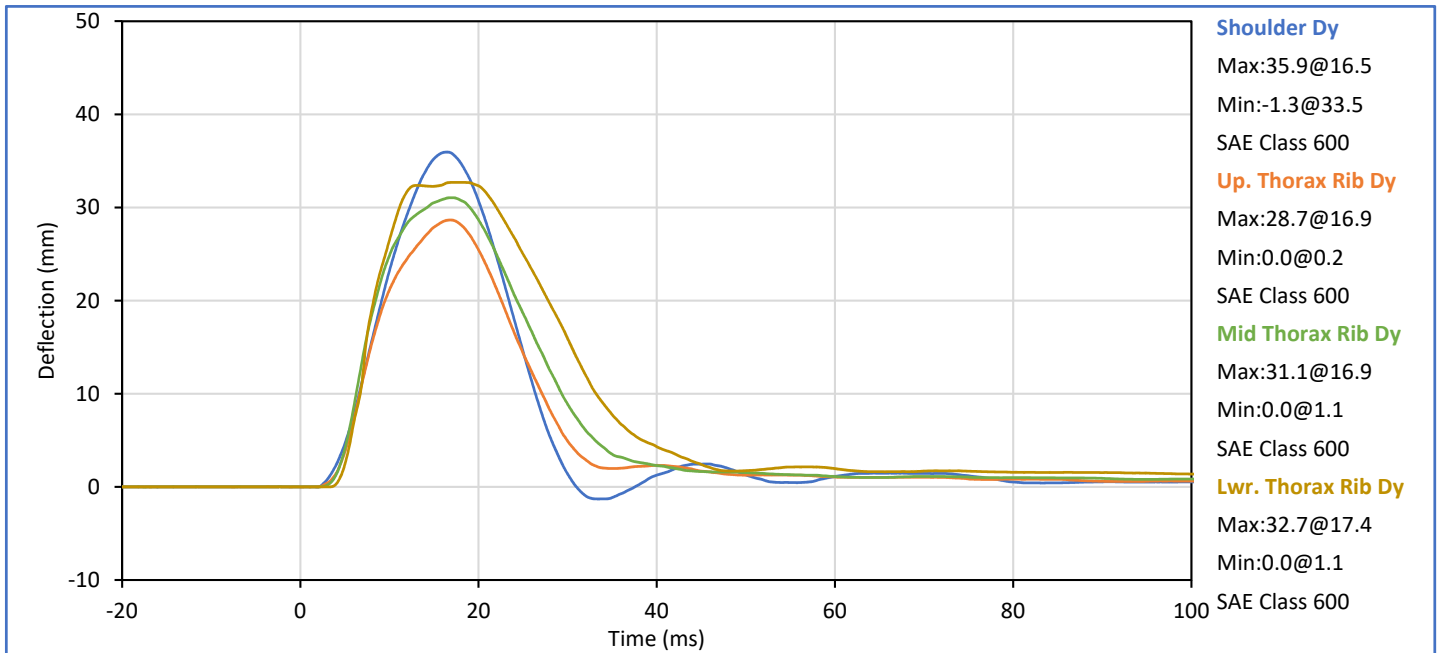
Approved By: *P. Puzzuto*
 P. Puzzuto

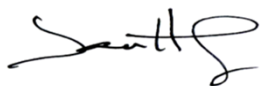



ATD Serial No.: 299

Test Date: 2018-12-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	22	Pass
Impactor Velocity	m/s	6.60	6.80	6.68	Pass
Peak Shoulder Dy	mm	31.0	40.0	35.9	Pass
Peak Upper Rib Dy	mm	25.0	32.0	28.7	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	34.4	Pass
Peak Lower Spine (T12) Ay	g	29.0	37.0	34.1	Pass
Peak Impactor Ax	g	30.0	36.0	35.0	Pass
Overall Test Results					Pass



Technician: 
 J. Hernandez

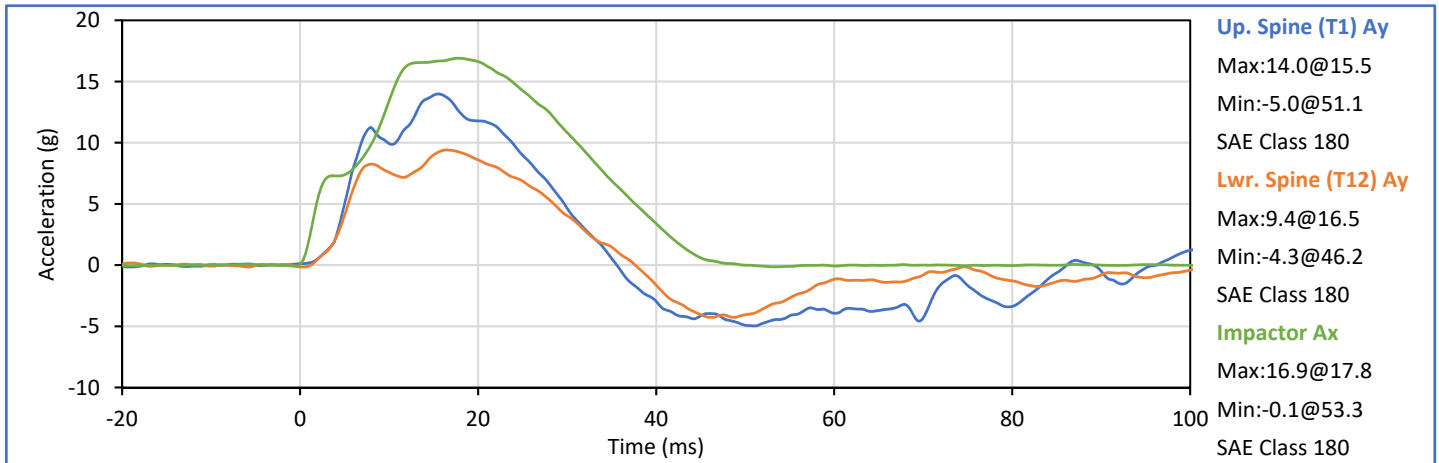
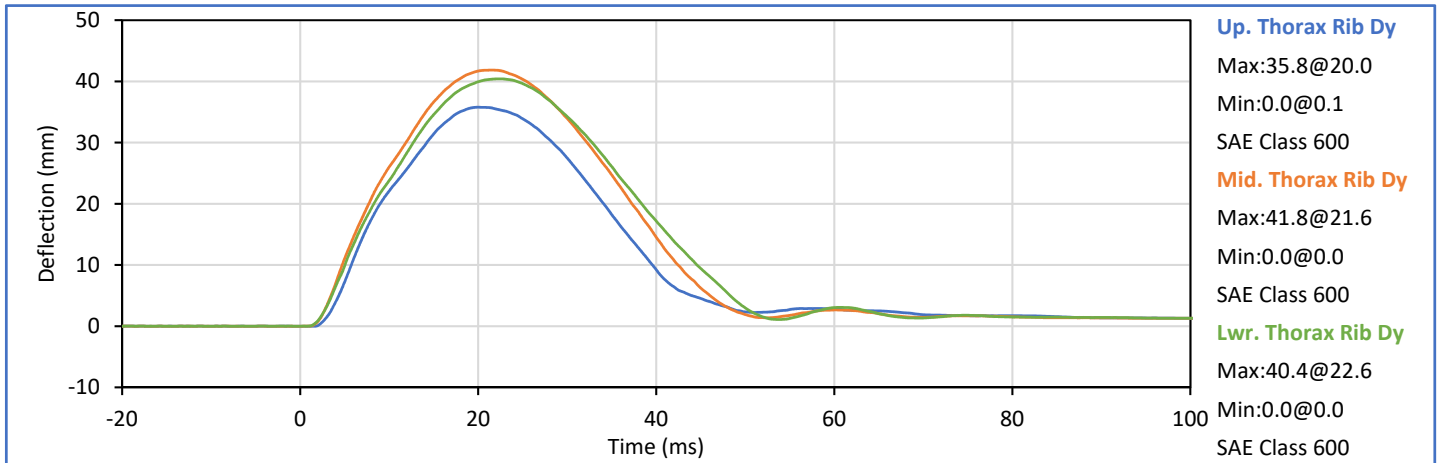
Approved By: 
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	22	Pass
Impactor Velocity	m/s	4.20	4.40	4.31	Pass
Peak Upper Rib Dy	mm	32.0	40.0	35.8	Pass
Peak Middle Rib Dy	mm	39.0	45.0	41.8	Pass
Peak Lower Rib Dy	mm	35.0	43.0	40.4	Pass
Peak Upper Spine (T1) Ay	g	13.0	17.0	14.0	Pass
Peak Lower Spine (T12) Ay	g	7.0	11.0	9.4	Pass
Peak Impactor Ax	g	14.0	18.0	16.9	Pass
Overall Test Results					Pass



Technician:
 J. Hernandez

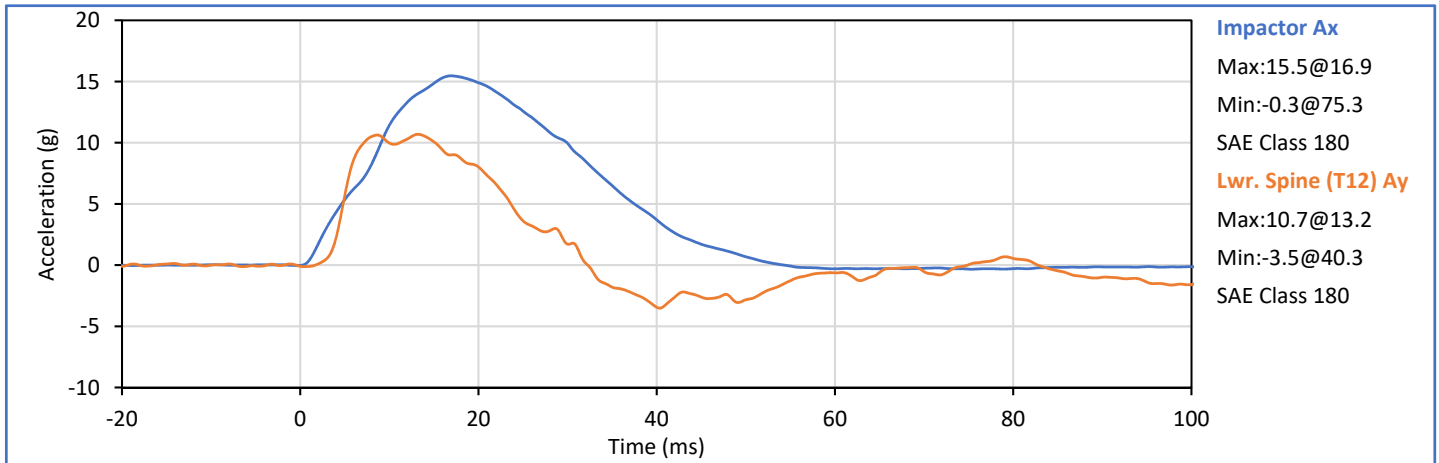
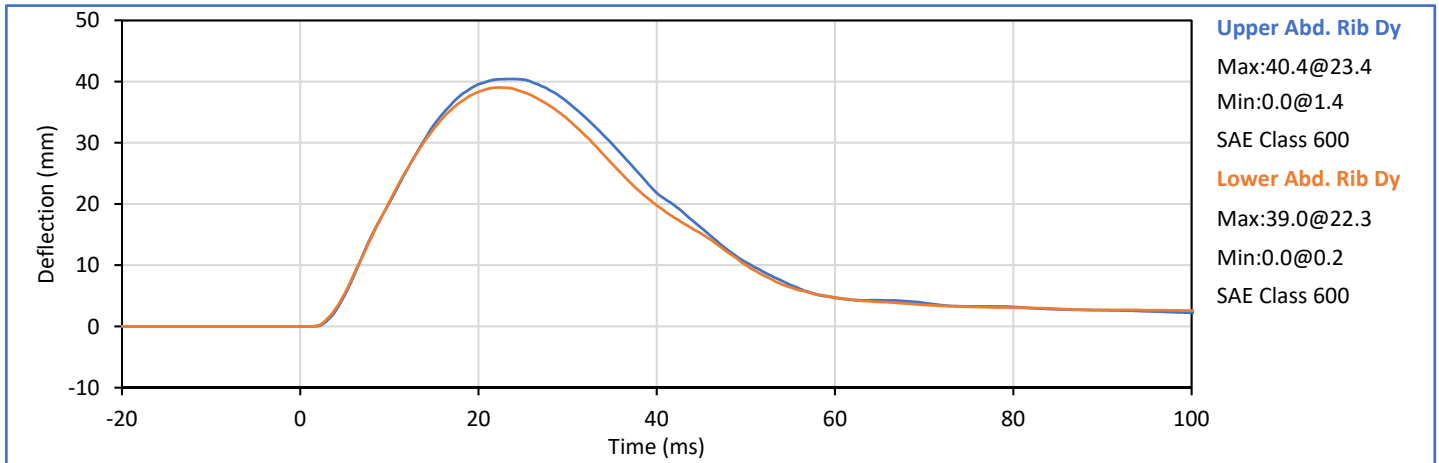
Approved By:
 P. Puzzuto

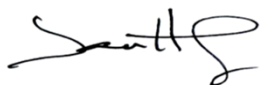



ATD Serial No.: 299

Test Date: 2018-12-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	20.9	Pass
Laboratory Humidity	%	10	70	22	Pass
Impactor Velocity	m/s	4.20	4.40	4.34	Pass
Peak Upper Abdomen Rib Dy	mm	36.0	47.0	40.4	Pass
Peak Lower Abdomen Rib Dy	mm	33.0	44.0	39.0	Pass
Peak Lower Spine T12 Ay	mm	9.0	14.0	10.7	Pass
Peak Impactor Ax	g	12.0	16.0	15.5	Pass
Overall Test Results					Pass



Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto

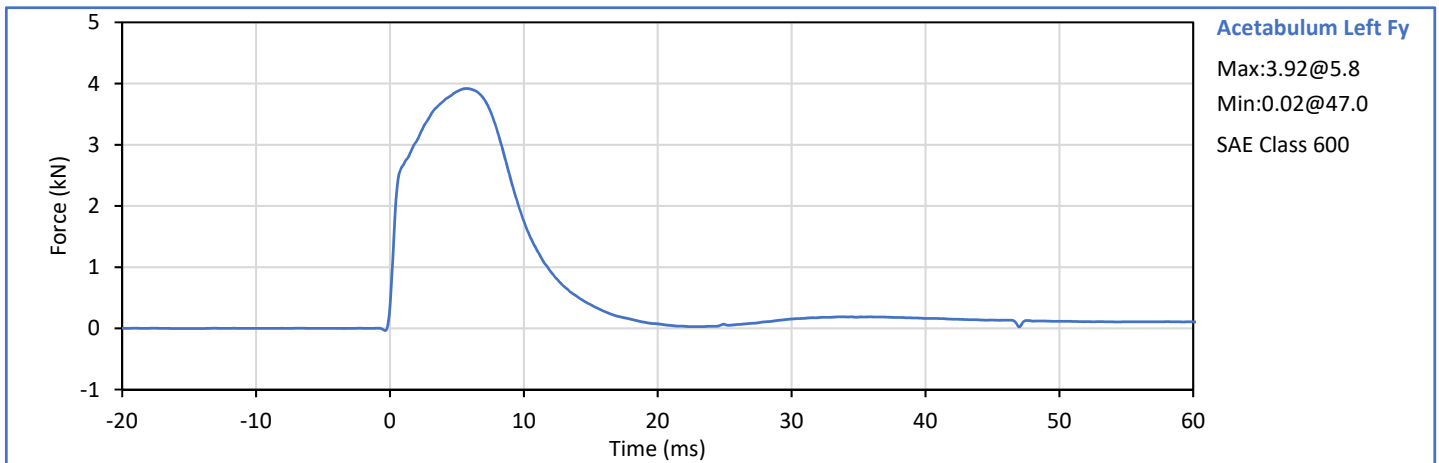
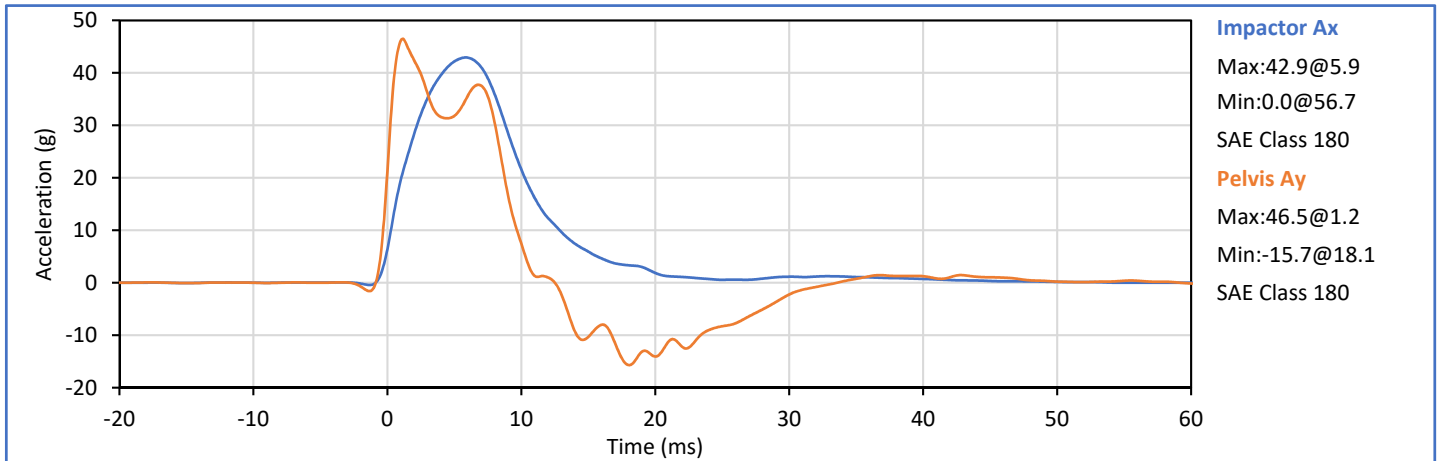


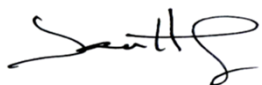
ATD Serial No.: 299


Test Date: 2018-12-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.6	Pass
Laboratory Humidity	%	10	70	21	Pass
Impactor Velocity	m/s	6.60	6.80	6.63	Pass
Peak Acetabulum Fy	kN	3.60	4.30	3.92	Pass
Pelvis Ay after 6ms	g	34.0	42.0	37.7	Pass
Peak Impactor Ax	g	38.0	47.0	42.9	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 11821 (SACO)



Technician: 
 J. Hernandez

Approved By: 
 P. Puzzuto



ATD Serial No.: 299

Test Date: 2018-12-28

Pelvis Plug S/N: 11821 (SACO)



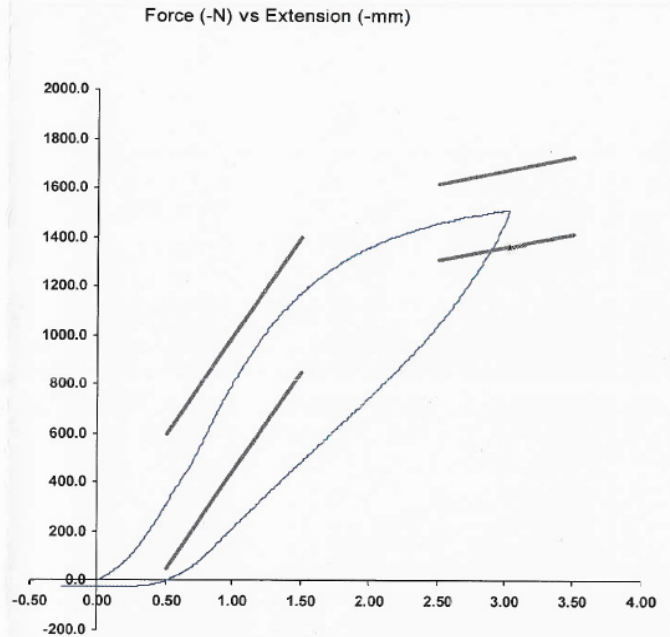
SID-IIs Pelvis Plug Certification Test

Plug S/N 11821
 Test Number 5931
 Report Number 5947
 Test Date 1/23/2018 7:54:14 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	310.45	50.00	600.00
Force @ 1.5 mm (N)	1,172.99	850.00	1,400.00
Force @ 2.5 mm (N)	1,457.19	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,511.28	1,361.00	1,673.00

Testing Machine STM-20 5965542
 Load Cell S/N (FI360947), Units (LBS) 1000
 Preload Value (-N) 22.24
 Crosshead Speed (mm / min) or Rate 12.7
 Extension or Position Measured by XHD_100 (XHD100)

Notes:



Operator _____
 Part Number 180-4450

Template No 107 23-Jan-18
 SACO Research

By : DC Date : 1/23/18
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



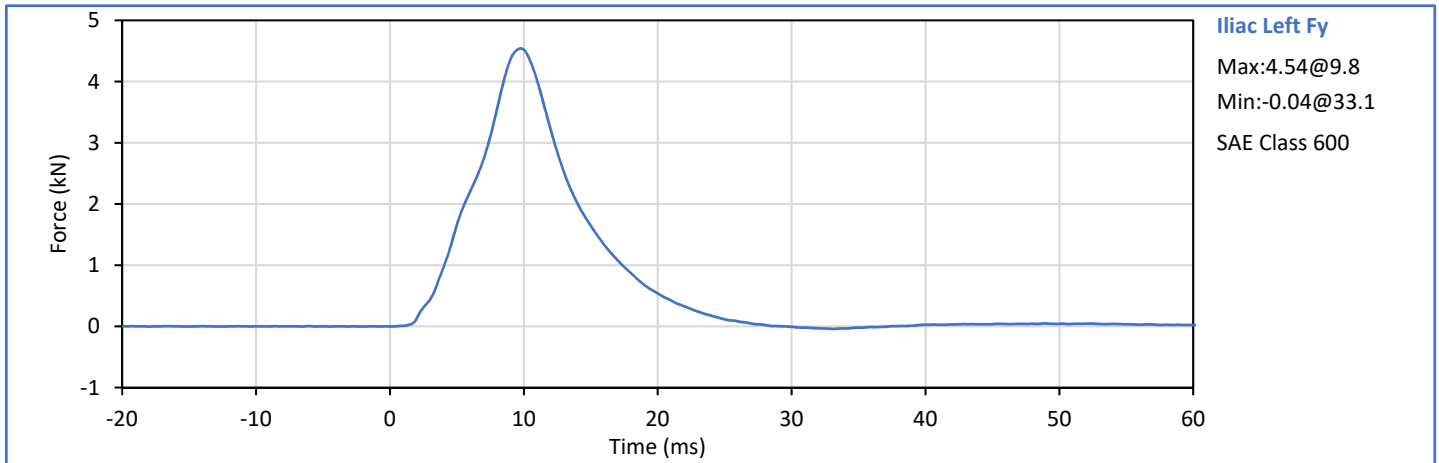
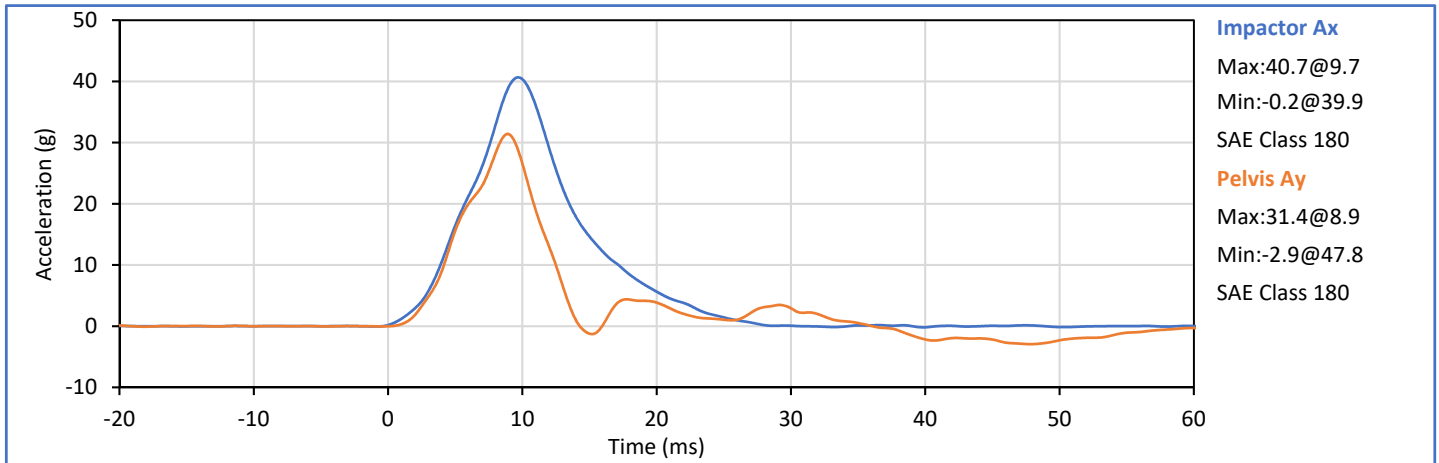
ATD Serial No.: 299

Test Date: 2018-12-28

Tested Parameter	Units	Spec. Low	Spec. High	Result	Pass/Fail
Laboratory Temperature	°C	20.6	22.2	21.2	Pass
Laboratory Humidity	%	10	70	21	Pass
Impactor Velocity	m/s	4.20	4.40	4.37	Pass
Peak Iliac Fy	kN	4.10	5.10	4.54	Pass
Pelvis Ay after 6ms	g	28.0	39.0	31.4	Pass
Peak Impactor Ax	g	36.0	45.0	40.7	Pass
Overall Test Results					Pass

Pelvis Plug S/N: 12228 (SACO) *

* Plug is not impacted and remains certified



Technician:
 J. Hernandez

Approved By:
 P. Puzzuto

APPENDIX 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	289 Fy (Iliac)	R.A. Denton	3228J	2018-10-11
Acetabulum Impact Side Force Y	277 Fy (Acetabulum)	R.A. Denton	3249J	2018-10-11

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	A254926	MSI	52F-2000	2018-06-19
Vehicle CG Ay	A254924	MSI	52F-2000	2018-06-19
Vehicle CG Az	A254897	MSI	52F-2000	2018-06-19
Left Floor Sill Ay	A145534	MSI	52F-2000	2018-09-21
A-Pillar Sill Ay	10251	Endevco	757F-2k	2018-03-08
A-Pillar Low Ay	A254909	MSI	52F-2000	2018-06-19
A-Pillar Mid Ay	A217308	MSI	52F-2000	2018-11-07
B-Pillar Sill Ay	A145939	MSI	52F-2000	2018-09-26
B-Pillar Low Ay	A248860	MSI	52F-2000	2018-09-15
B-Pillar Mid Ay	A248845	MSI	52F-2000	2018-10-01
Driver Seat Track at H-Point Ay	A145439	MSI	52F-2000	2018-09-26
Engine Top Ax	A185633	MSI	52F-2000	2018-11-06
Engine Top Ay	A185688	MSI	52F-2000	2018-09-15
Firewall Ay	10438	Endevco	757F-2k	09-04-2018
Right Roof Ay	A224482	MSI	52F-2000	2018-09-25
Right Floor Sill Ay	A147428	MSI	52F-2000	2018-11-06
Rear Floorpan Ax	A148315	MSI	52F-2000	2018-11-06
Rear Floorpan Ay	10245	Endevco	757F-2k	2018-03-08

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