

FINAL REPORT NUMBER: SPNCAP-TRC-18-008

**NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST**

**TOYOTA MOTOR MANUFACTURING, INDIANA, INC.
2018 Toyota Sienna Van
NHTSA NUMBER: M20185108**

**PREPARED BY:
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Report Date: June 8, 2018

Final REPORT

**PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NRM-110
1200 New Jersey Ave, SE
Room W43-410
Washington, D.C. 20590**

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Report Prepared By: ILO Project Operations Group

Report Approved By: _____



John Shultz

Approval Date: June 8, 2018

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

Technical Report Documentation Page

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16. Abstract A 32.2 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject vehicle, a 2018 Toyota Sienna Van, 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. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on May 10, 2018. The impact velocity was 32.20 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 22.5° C. The test vehicle's post-test maximum crush was 378 mm at Level 2. The test or target vehicle's performance is given below: <table border="1"> <thead> <tr> <th></th><th>Unit</th><th>Threshold</th><th>Front SID-IIs</th></tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆):</td><td>NA</td><td>1000</td><td>411</td></tr> <tr> <td>Resultant Lower Spine Acceleration:</td><td>g's</td><td>82</td><td>32.3</td></tr> <tr> <td>Total Pelvic Force: (sum of acetabular and iliac forces)</td><td>N</td><td>5525</td><td>3041.1</td></tr> <tr> <td>Maximum Thoracic Rib Deflection</td><td>mm</td><td>38*</td><td>13.4</td></tr> <tr> <td>Maximum Abdomen Rib Deflection</td><td>mm</td><td>45*</td><td>17.8</td></tr> </tbody> </table> * Proposed IARV The doors on the struck side did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.					Unit	Threshold	Front SID-IIs	Head Injury Criteria (HIC ₃₆):	NA	1000	411	Resultant Lower Spine Acceleration:	g's	82	32.3	Total Pelvic Force: (sum of acetabular and iliac forces)	N	5525	3041.1	Maximum Thoracic Rib Deflection	mm	38*	13.4	Maximum Abdomen Rib Deflection	mm	45*	17.8
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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 Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																									
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TABLE OF CONTENTS

<u>Section</u>	<u>Page No.</u>
1 Test Purpose and Procedure	1
2 Summary of Test Results	2
3 Occupant and Vehicle Information	4
 <u>Data Sheet No.</u>	 <u>Page No.</u>
1 General Test and Vehicle Parameter Data	5
2 Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data	8
3 Dummy Longitudinal Clearance Dimensions	11
4 Dummy Lateral Clearance Dimensions	12
5 Camera and Instrumentation Data	13
6 Vehicle Accelerometer Data	14
7 Rigid Pole Load Cell Data	15
8 Post-Test Observations	16
9 Vehicle Profile Measurements	18
10 Vehicle Exterior Crush Measurements	19
11 Vehicle Damage Profile Distances	22
12 FMVSS No. 301 Fuel Integrity Post-Impact Data	23
13 Dummy/Vehicle Temperature and Humidity Stabilization Data	24
 <u>Appendix</u>	 <u>Page No.</u>
A Photographs	A-1
B Vehicle and Dummy Response Data Plots	B-1
C Dummy Configuration and Performance Verification Data	C-1
D Test Equipment And Instrumentation Calibration Data	D-1

SECTION 1
TEST PURPOSE AND PROCEDURE

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 18 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00354. The purpose of this test is to generate comparative side impact performance in a 2018 Toyota Sienna Van manufactured by TOYOTA MOTOR MANUFACTURING, INDIANA, INC.. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a model year 2018 Toyota Sienna Van. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.20 km/h. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, OH, on May 10, 2018. Pre-test and post-test photographs of the test vehicle and the 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) dummy was instrumented accordingly:

- Primary and Redundant Head CG Triaxial Accelerometers
- Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
- Abdomen Upper and Lower Rib Displacement Potentiometers
- Lower Spine (T12) Triaxial 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	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)	NA	1000	411
Lower Spine Acceleration Resultant	G	82	32.3
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3041.1
Maximum Thoracic Rib Deflection	mm	38*	13.4
Maximum Abdominal Rib Deflection	mm	45*	17.8

* 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		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Torso Airbag	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Unknown	No	N/A
Other Safety Restraint	No	N/A	No	N/A

GENERAL COMMENTS

All 'Post' placards have the incorrect date – they have 170510 instead of 180510

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20185108
Model Year	2018
Make	Toyota
Model	Sienna LE
Body Style	MPV
VIN	5TDKZ3DC4JS913976
Body Color	Silver Sky Metallic
Odometer Reading (km/mi)	1 mi
Engine Displacement (L)	3.5
Type/No. Cylinders	Gas/6
Engine Placement	Front/Transverse
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof/T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	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	No

Does owner's manual provide instructions to turn off automatic door locks?

Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	TOYOTA MOTOR MANUFACTURING, INDIANA, INC.
Date of Manufacturer	01/18
Vehicle Type	MPV

GVWR (kg)	2715
GAWR Front (kg)	1405
GAWR Rear (kg)	1405

VEHICLE SEATING AND WEIGHT CAPACITY DATA

	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	3	8
Vehicle Capacity Weight (VCW) (kg)				607.0
DSC X 68.04 kg				544.3
Rated Cargo and Luggage Weight (RCLW) (kg)				62.7

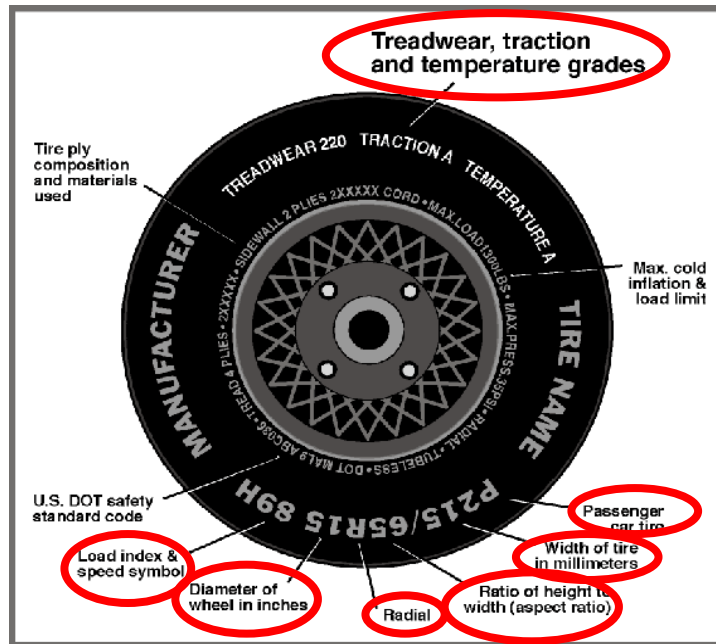
VEHICLE SEAT TYPE

Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	Yes	N/A	N/A		N/A	Yes	N/A
Rear or Second Row Seat	Yes	N/A	N/A	N/A	N/A	Yes	N/A
Third row seat	N/A	N/A	Yes	N/A	Yes	N/A	N/A

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	300	300
Cold Pressure (kPa)	240	240
Recommended Tire Size	P235/60R17	P235/60R17
Tire Size on Vehicle	P235/60R17	P235/60R17
Tire Manufacturer	Firestone	Firestone
Tire Model	FR710	FR710
Treadwear	560	560
Traction	A	A
Temperature Grades	B	B
Tire Plies Sidewall	4	4
Tire Plies Body	2	2
Load Index/Speed Symbol	100T	100T
Tire Material	Polyester/ Steel/ Nylon	Polyester/ Steel/ Nylon
DOT Safety Code Left	W204 712 4917	W204 712 4917
DOT Safety Code Right	W204 712 4917	W204 712 4917

DATA SHEET NO. 1 (CONTINUED)
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

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 Axle	Rear Axle	Total	Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	605.2	447.2		622.2	494.0		620.4	504.2	
Right	kg	575.8	411.0		571.8	456.4		577.8	456.6	
Ratio	%	57.9	42.1		55.7	44.3		55.5	44.5	
Totals	kg	1181.0	858.2	2039.2	1194.0	950.4	2144.4	1198.2	960.8	2159.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total As Delivered Weight (UVW)	kg	2039.4
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	49.0
Rated Cargo/Luggage Weight (RCLW)	kg	62.7
Calculated Vehicle Target Weight (TVTW)	kg	2151.1

(A)

(B)

(C)

(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 kg)? ☒ YES ☐ NO

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	Deg.	-0.2	-0.2	0.0	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	-0.3	-0.3	0.0	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	-0.4	-0.4	-0.5	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	0.3	-0.1	-0.2	Yes
Vehicle CG (Aft of Front Axle)	mm	1271	1338	1344	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	+27	+36	+34	

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

*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for "Meets Requirements".

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Ballast: Steel plate mounted in cargo area	54.3
Components None	0.0

Test height adjustable suspension setting, if applicable:

N/A

DATA SHEET NO. 2

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

Test Vehicle: 2018 Toyota Sienna Van

NHTSA No.: M20185108

Test Program: SPNCAP Side Impact

Test Date: 5/10/18

SEAT POSITIONING

The driver seat, front center seat (if applicable), and right 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 seats should be set to the rear-most, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max.	Min.	Mid
Driver Seat	18.3	13.5	15.9
Front Passenger Seat	N/A	N/A	11.7
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	26.0
Non-Struck Side Rear Seat	N/A	N/A	26.7
Rear Center Seat*	N/A	N/A	18.7

* If applicable.

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	Forward-Most
Driver Seat	15.9	323	Max	366	353	349
			Mid	335	327	323
			Min	304	302	298
Front Passenger Seat	11.7	268	Max	N/A	N/A	N/A
			Mid	N/A	268	N/A
			Min	N/A	N/A	N/A
Front Center Seat*	N/A	N/A	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Struck Side Rear Seat	26.0	294	Max	N/A	N/A	N/A
			Mid	N/A	294	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	26.7	291	Max	N/A	N/A	N/A
			Mid	N/A	291	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	18.7	294	Max	N/A	N/A	N/A
			Mid	N/A	294	N/A
			Min	N/A	N/A	N/A

* If applicable.

DATA SHEET NO. 2 (CONTINUED)

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

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

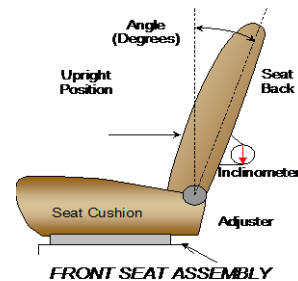
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	240	N/A	0	N/A
Front Passenger Seat	240	240	0	N/A
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	370	23	370	23
Non-Struck Side Rear Seat	370	23	370	23
Rear Center Seat*	370	23	370	23

* If applicable.

SEAT BACK ANGLE ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 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	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detent*
Driver Seat w/ Seated Dummy	51.7	N/A	-5.6	N/A
Front Passenger Seat	50.4	26	-5.4	N/A
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	24.7	13	5.7	N/A
Non-Struck Side Rear Seat	26.0	13	5.6	N/A
Rear Center Seat*	N/A	13	6.1	N/A

* If applicable.

SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted with the information provided by the manufacturer on Form No. 1

	Total # of Positions	Placed in Position #
Driver Seat	4, numbered from 0 to 3	0, Lowermost

HEAD RESTRAINT ADJUSTMENT

Head restraints are adjusted to the lowest and most full forward in-use position.

	Total # of Positions	Placed in Position #
Driver Seat	3, numbered from 0 to 2	0, Lowermost

DATA SHEET NO. 2 (CONTINUED)

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

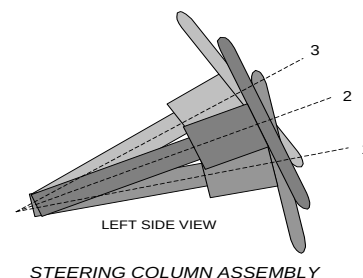
Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel geometric locus it describes when moved through its full range of motion.

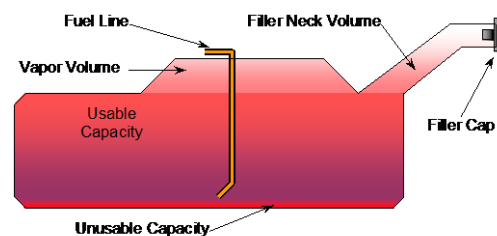
	Degrees	Fore/Aft Position, mm
Lowermost, Position No. 1	27.1	0
Geometric Center, Position No. 2	29.5	20
Uppermost, Position No. 3	31.9	40
Telescoping Steering Wheel Travel		40
Test Position	29.5	20



FUEL PUMP

Describe the fuel pump type, details about how it operates and the location of the fuel filler neck:

The fuel pump is activated when the ignition switch is turned to the "ON" position



FUEL TANK CAPACITY

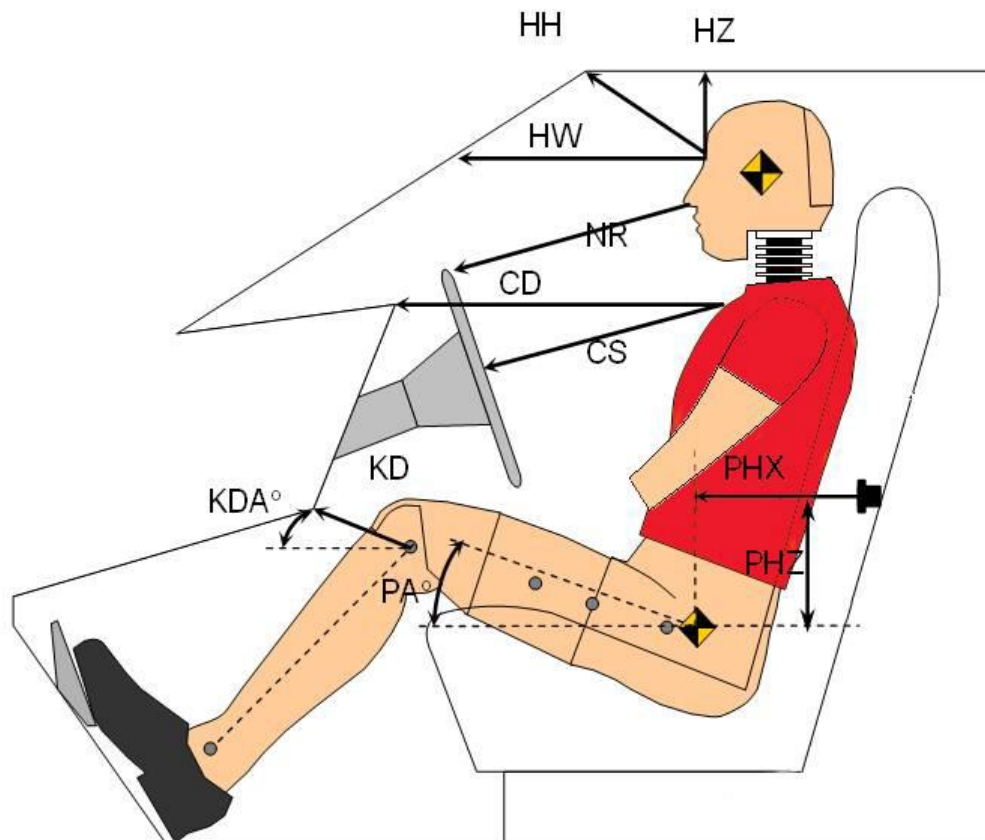
	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	77.9
Usable Capacity of "Optional" Tank (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	79.0
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	72.3
Actual Amount of Solvent Used in Test	72.3
1/3 of Usable Capacity	24.1

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

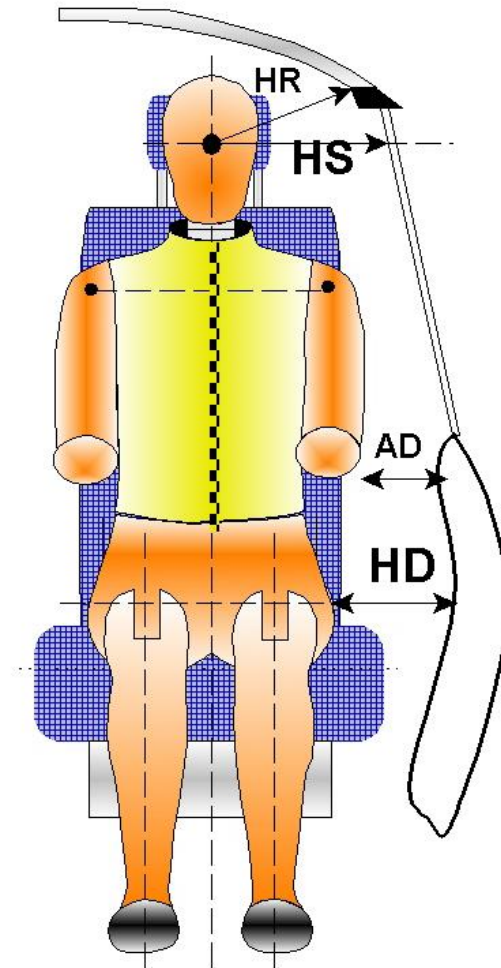


Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	346	
HW	Head to Windshield	664	
HZ	Head to Visor	251	
NR	Nose to Rim	263	
CD	Chest to Dashboard	402	
CS	Chest to Steering Wheel	183	
KDL/KDLA°	Left Knee to Dash	117	18.8
KDR/KDRA°	Right Knee to Dash	115	18.5
PAX°	Pelvic Tilt Angle (X-axis)		0.6
PAY°	Pelvic Tilt Angle (Y-axis)		17.9
PHX	Hip Point to Striker (X-Axis)	372	
PHZ	Hip Point to Striker (Z-Axis)	144	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2018 Toyota Sienna Van
Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
Test Date: 5/10/18

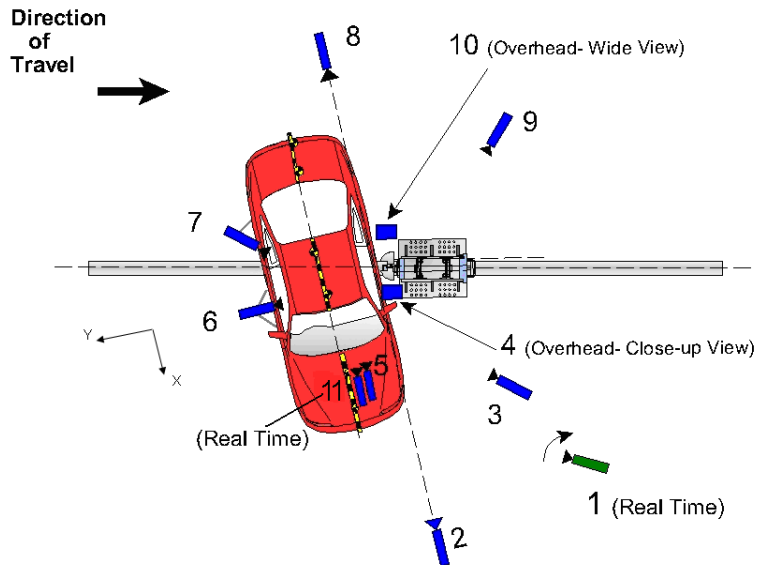


Code	Measurement Description	Length (mm)
HR	Head to Side Header	272
HS	Head to Side Window	380
AD	Arm to Door	176
HD	Hip Point to Door	163

DATA SHEET NO. 5 CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2018 Toyota Sienna Van
Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
Test Date: 5/10/18



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 (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real time (24-30 fps) pan view of impact				Zoom	30
2	Front ground level – impact view	0	5245	-1378	20	1000
3	Impact side 45° – forward pole view	7535	3893	-1474	20	1000
4	Overhead Close-up view of impact	0	0	-5650	25	1000
5	Onboard – dummy front view				25	1000
6	Onboard – dummy side view				12.5	1000
7	Onboard – dummy rear oblique view				12.5	1000
8	Rear ground level – impact view	0	-5940	-1311	20	1000
9	Impact side 45° – rearward pole view	2626	-4329	-1390	20	1000
10	Overhead wide view of impact	239	0	-5650	18	1000
11	Real time dummy front view				Zoom	30

All measurements accurate to +/- 6 mm.

NOTE: Vehicle was at a 75° angle to the rigid pole.

If applicable, explain why camera(s) did not run: N/A

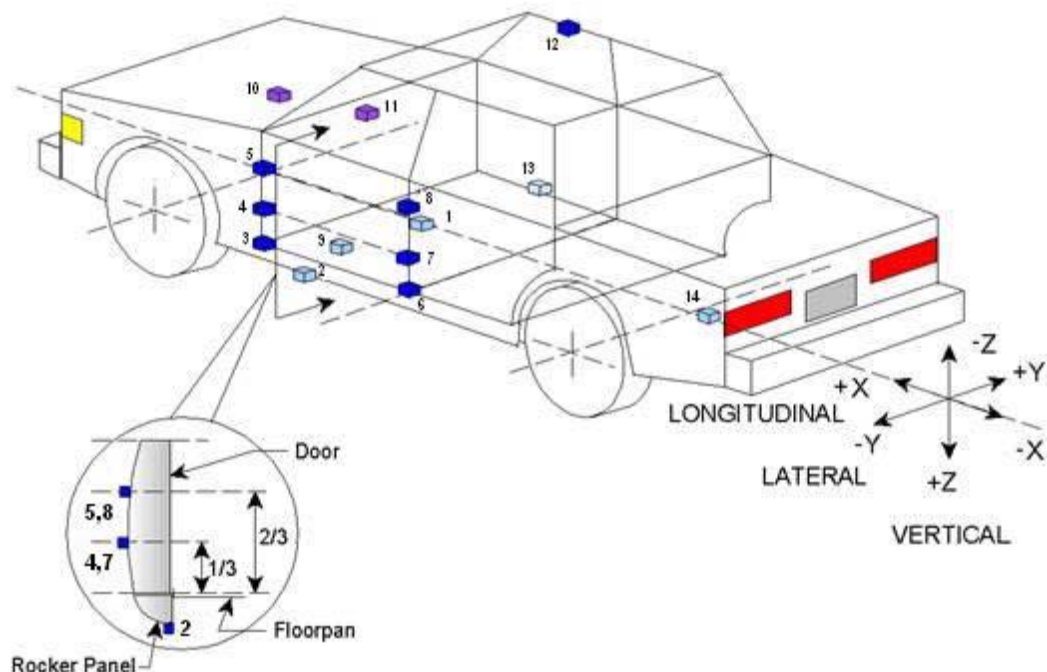
INSTRUMENTATION

	Number of Channels
Driver Dummy	16
Vehicle Structure	18
Pole Load Cells	8
TOTAL	42

**DATA SHEET NO. 6
VEHICLE ACCELEROMETER DATA**

Test Vehicle: 2018 Toyota Sienna Van
Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
Test Date: 5/10/18



Accelerometer/Sensor Location				
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3278	88	-380
2	Left Floor Sill	3295	-804	-400
3	A-Pillar Sill	3553	-800	-405
4	A-Pillar Low	3700	-925	-663
5	A-Pillar Mid	3710	-915	-874
6	B-Pillar Sill	2510	-752	-445
7	B-Pillar Low	2593	-909	-573
8	B-Pillar Mid	2595	-927	-1020
9	Driver Seat Track	2918	-622	-530
10	Engine Top	4258	60	-799
11	Firewall	4434	0	-932
12	Right Roof	2795	670	-1695
13	Right Floor Sill	3281	794	-400
14	Rear Floorpan	902	0	-292

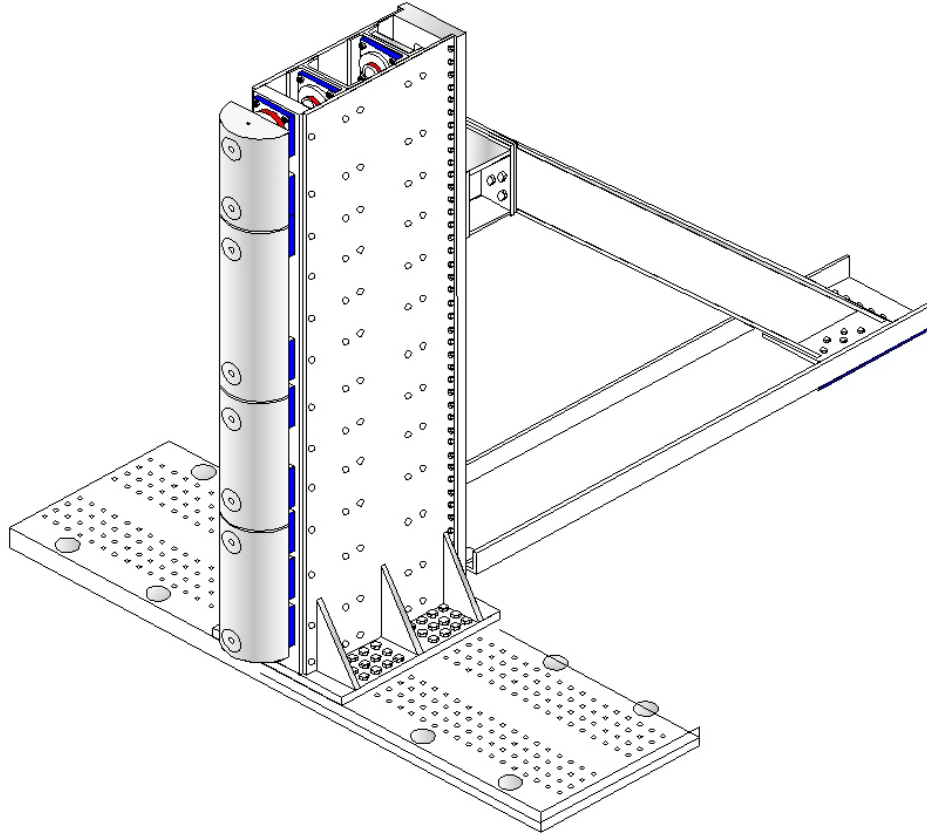
Reference: X - Test Vehicle Rear Bumper (+ forward)
Y - Test Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 7
RIGID POLE LOAD CELL DATA

Test Vehicle: 2018 Toyota Sienna Van
Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
Test Date: 5/10/18

FOIL 300K RIGID POLE



Load Cell Locations	
ID	Height From Top of Carrier (mm)
1	87
2	468
3	648
4	978
5	1168
6	1651
7	1816
8	2057

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

Test Vehicle: 2018 Toyota Sienna Van
Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
Test Date: 5/10/18

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	SCAB
Top of Head	SCAB
Left Side of Head	SCAB
Back of Head	SCAB
Left Shoulder	SAB
Upper Torso	Seatback bolster
Lower Torso	Seatback bolster
Left Hip	SAB, seat cushion bolster, door panel
Left Knee	Door panel

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 Systems 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

* Indicate "Yes", "No", or "NA".

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

* Indicate "Yes", "No", or "NA".

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	Good
Sill Separation	None
Windshield Damage	Completely shattered
Side Window Damage	Driver side window broken out
Other Notable Effects	None

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

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side (Driver)		Struck Side (Rear Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	No	N/A
Side Torso Airbag	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Unknown	No	N/A
Other	No	N/A	No	N/A

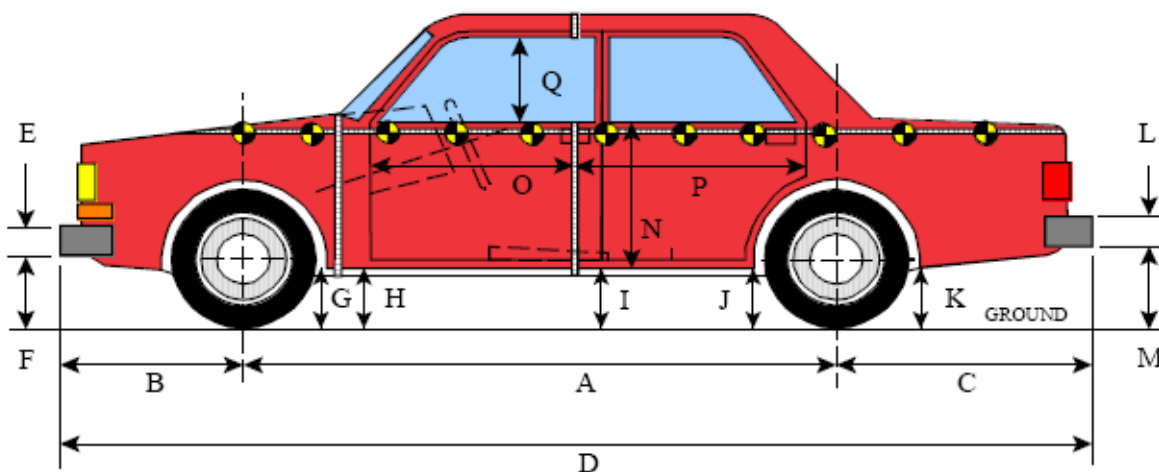
VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point)	mm		1011
Actual Impact Point (Aft of Front Axle)	mm		1014
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact point	-3
Angle Between Vehicle's Longitudinal Centerline and Line of Motion	degrees	75 +/- 3	75
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.20
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.23

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18



LEFT SIDE VIEW

All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3 mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

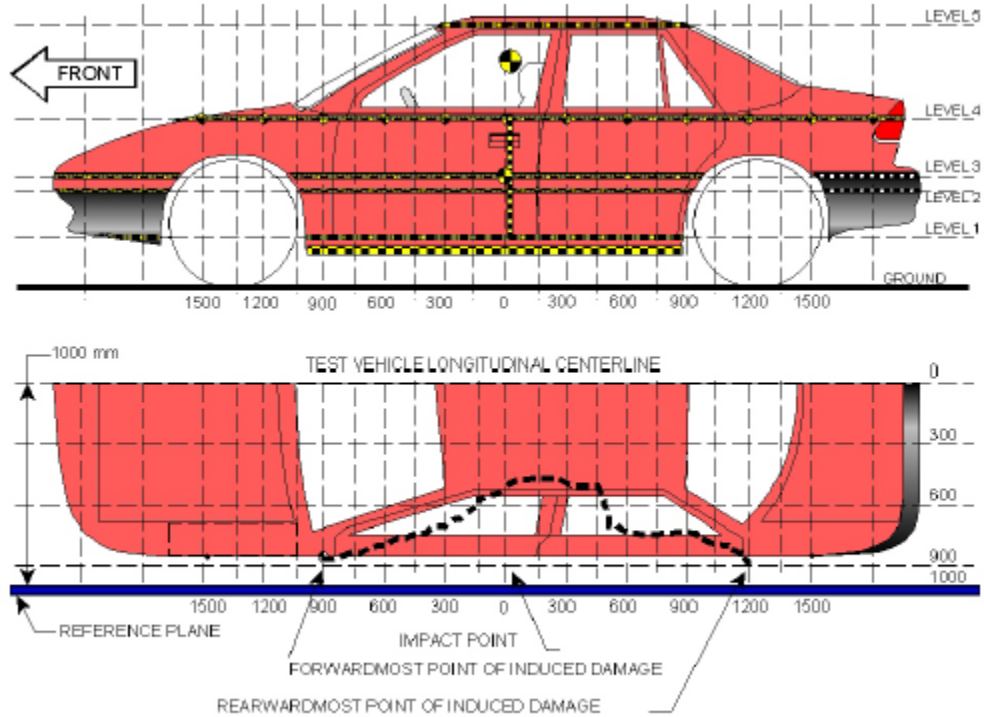
Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3020	2970	50
B	Front Axle to Front Surface of Vehicle	960	971	-11
C	Rear Axle to Rear Surface of Vehicle	1100	1152	-52
D	Total Length at Centerline	5080	5093	-13
E	Front Bumper Thickness	130	130	0
F	Front Bumper Bottom to Ground	446	483	-37
G	Sill Height at Front Wheel Well	219	230	-11
H	Sill Height at Front Door Leading Edge	219	230	-11
I	Sill Height at B-Pillar	267	292	-25
J1	Sill Height at Rear Wheel Well	225	259	-34
J2	Pinch Weld Height at Rear Wheel Well	225	257	-32
K	Sill Height Aft of Rear Wheel Well	271	303	-32
L	Rear Bumper Thickness	138	138	0
M	Rear Bumper Bottom to Ground	404	421	-17
N	Sill Height to Bottom of Front Window Sill	870	875	-5
O	Front Door Leading Edge to Impact CL	578	453	125
P	Rear Door Trailing Edge to Impact CL	1768	1710	58
Q	Front Window Opening	531	490	41
R	Right Side Length	5028	5005	23
S	Left Side Length	5028	4965	63
T ¹	Vehicle Width at B-Pillars	1981	1930	51

¹ Maximum width is not a B-Pillars; maximum width is 1990

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18



NOTE: All measurements are in millimeters (mm)

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Measurement Description	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	380	327	0
2	Occupant H-Point	711	378	0
3	Mid-Door	749	375	0
4	Window Sill	1038	346	0
5	Window Top	1647	142	150

NOTE: The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

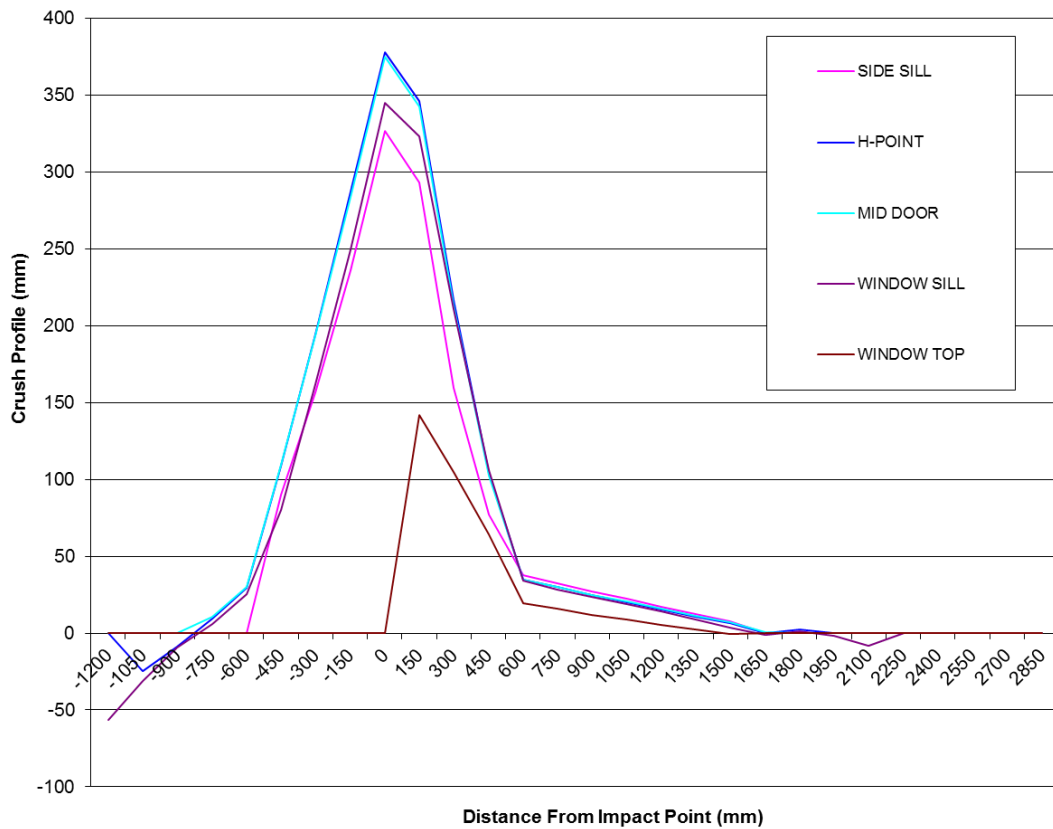
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1200	0	0	0	857	0	0	0	0	913	0	0	0	0	-56	0
-1050	0	993	0	892	0	0	1018	0	923	0	0	-25	0	-31	0
-900	0	993	0	911	0	0	1002	0	920	0	0	-9	0	-9	0
-750	0	991	993	917	0	0	982	982	911	0	0	9	11	6	0
-600	0	984	986	920	0	0	954	956	895	0	0	30	30	25	0
-450	962	983	983	924	0	872	874	873	844	0	90	109	110	80	0
-300	949	985	985	929	0	793	791	791	767	0	156	194	194	162	0
-150	949	987	986	935	0	713	699	702	686	0	236	288	284	249	0
0	956	988	987	943	0	629	610	612	597	0	327	378	375	346	0
150	964	990	988	949	687	671	644	646	626	545	293	346	342	323	142
300	965	990	989	955	712	806	774	776	744	608	159	216	213	211	104
450	964	991	990	960	719	887	887	887	854	655	77	104	103	106	64
600	963	991	990	964	724	925	957	955	930	705	38	34	35	34	19
750	962	991	989	954	727	930	961	959	926	710	32	30	30	28	17
900	962	990	988	970	726	935	965	963	946	714	27	25	25	24	12
1050	962	989	987	970	723	939	968	966	952	715	23	21	21	18	8
1200	957	987	985	971	721	940	972	969	957	715	17	15	16	14	6
1350	960	985	983	970	719	948	974	972	961	717	12	11	11	9	2
1500	971	983	982	969	716	964	977	975	965	717	7	6	7	4	-1
1650	0	986	988	968	0	0	986	987	969	0	0	0	1	-1	0
1800	0	994	0	967	0	0	991	0	966	0	0	3	0	1	0
1950	0	0	0	964	0	0	0	0	966	0	0	0	0	-2	0
2100	0	0	0	961	0	0	0	0	969	0	0	0	0	-8	0

NOTE: Pre-test measurements are taken when the vehicle is in the "As Tested" weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy's head.

DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2018 Toyota Sienna Van
Test Program: SPNCAP Side Impact

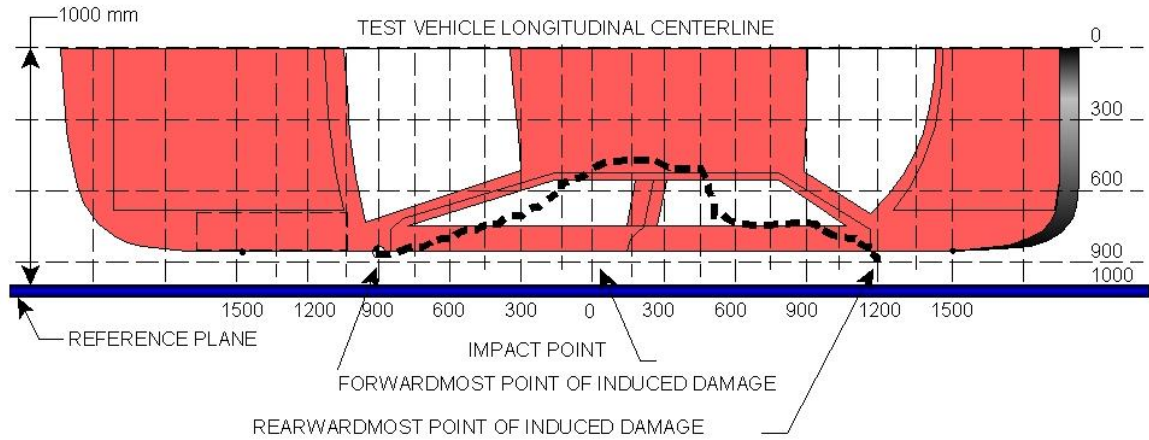
NHTSA No.: M20185108
Test Date: 5/10/18



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1 ¹	1800	2	991	994	0
2	1350	1	948	960	12
3	750	1	930	962	32
4	300	2	774	990	216
5	-300	2	791	985	194
		3	791	985	194
6 ¹	-750	3	982	993	0

¹ DPD 1 and 6 are defined as zero crush since the crush does not extend to the end of the vehicle.

DATA SHEET NO. 12

FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

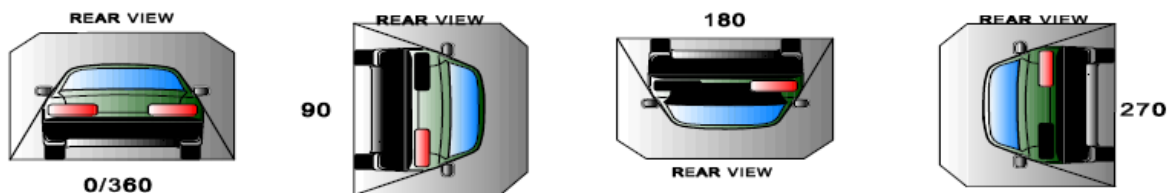
Test Vehicle: 2018 Toyota Sienna Van
 Test Program: SPNCAP Side Impact

NHTSA No.: M20185108
 Test Date: 5/10/18

Test Time: 14:41 Temperature: 21.2°C

- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum allowable is 1 ounce)
- B. For the 5 minute period after motion ceases: 0 oz.
 (Maximum allowable is 5 ounces)
- C. For the following 25 minutes: 0 oz.
 (Maximum allowable is 1 ounce/minute)
- D. Spillage Details: None

FMVSS 301 STATIC ROLLOVER DATA



ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0 to 90	90	330	420
90 to 180	90	330	840
180 to 270	90	330	1260
270 to 360	90	330	1680

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

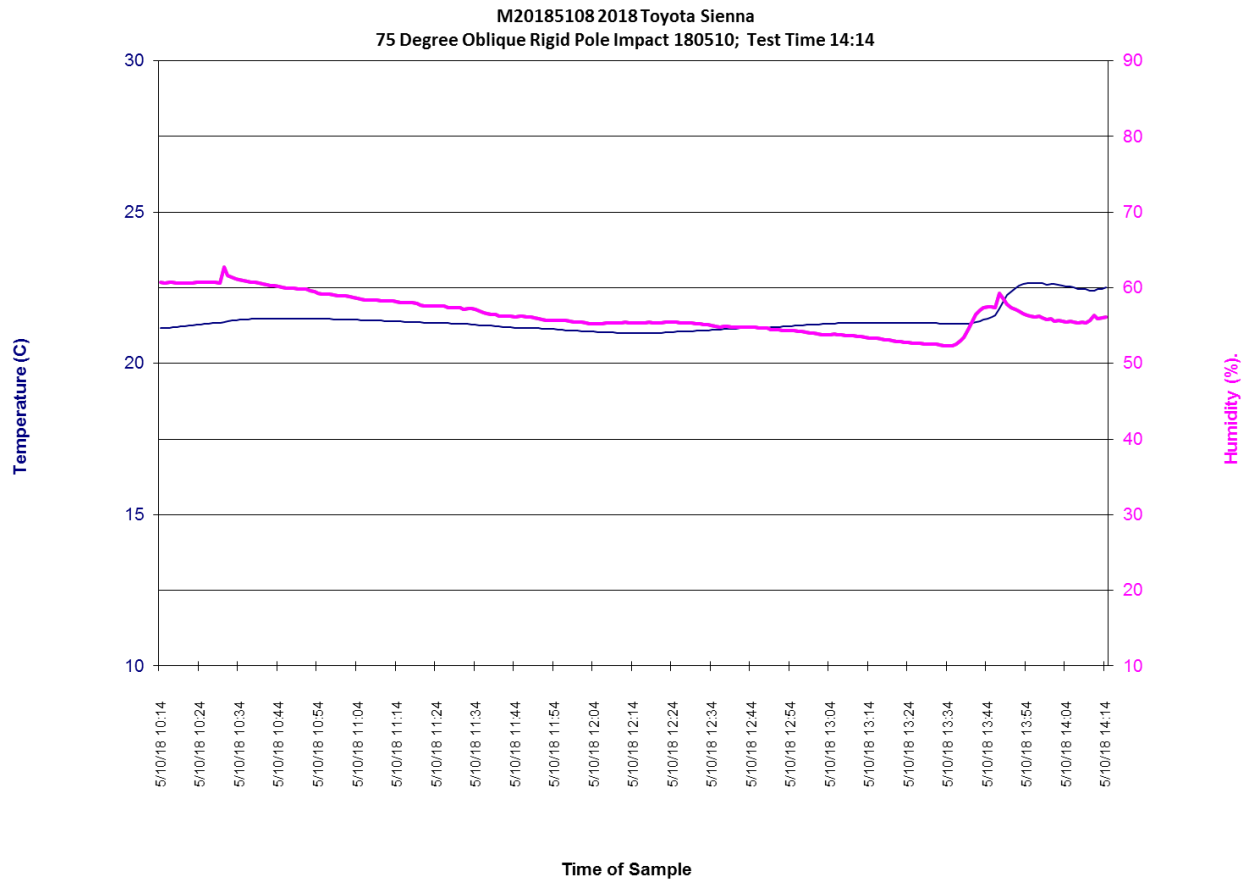
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0	0	0
90 to 180	0	0	0	0
180 to 270	0	0	0	0
270 to 360	0	0	0	0

ROLLOVER SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0 to 90	None
90 to 180	None
180 to 270	None
270 to 360	None

DATA SHEET NO. 13
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2018 Toyota Sienna Van NHTSA No.: M20185108
Test Program: SPNCAP Side Impact Test Date: 5/10/18



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

No.	Description	Page
1	As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-4
2	As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-4
3	Pre-Test Frontal View of Test Vehicle	A-5
4	Post-Test Frontal View of Test Vehicle	A-5
5	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
6	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-6
7	Pre-Test Left Side View of Test Vehicle	A-7
8	Post-Test Left Side View of Test Vehicle	A-7
9	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
10	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-8
11	Pre-Test Rear View of Test Vehicle	A-9
12	Post-Test Rear View of Test Vehicle	A-9
13	Pre-Test Right Side View of Test Vehicle	A-10
14	Post-Test Right Side View of Test Vehicle	A-10
15	Pre-Test Overhead View of Test Area	A-11
16	Post-Test Overhead View of Test Area	A-11
17	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-12
18	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-12
19	Pre-Test Close-Up View of Impact Point Target	A-13
20	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-13
21	Pre-Test Front Close-Up View of Dummy Head and Chest	A-14
22	Post-Test Front Close-Up View of Dummy	A-14
23	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-15
24	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-16
25	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-16
26	Pre-Test Front View of Seat Back Prior to Dummy Positioning	A-17
27	Pre-Test Front View of Dummy Head and Shoulders in Relation to Head Restraint	A-17
28	Pre-Test Front View of Seat Pan Prior to Dummy Positioning	A-18
29	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-18
30	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-19
31	Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level	A-19
32	Pre-Test Placement of Dummy's Feet	A-20
33	Pre-Test View of Belt Anchorage for Dummy	A-20
34	Pre-Test Left Side View of Steering Wheel	A-21
35	Pre-Test View of Disengaged Parking Brake	A-21

TABLE OF PHOTOGRAPHS (CONTINUED)

No.	Description	Page
36	Pre-Test View of Parking Brake	A-22
37	Pre-Test Close-Up Left Side View of Driver Seat Track	A-22
38	Pre-Test Close-Up Left Side View of Driver Seat Back	A-23
39	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-23
40	Pre-Test Dummy and Door Clearance View	A-24
41	Post-Test Dummy and Door Clearance View	A-24
42	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-25
43	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-25
44	Pre-Test Inner Driver Door Panel View	A-26
45	Post-Test Inner Driver Door Panel View Showing Dummy Contact Location	A-26
46	Post-Test Dummy Close-Up Head Contact with Vehicle Interior View	A-27
47	Post-Test Dummy Close-Up Head Contact with Side Airbag View	A-27
48	Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View	A-28
49	Post-Test Dummy Close-Up Torso Contact with Side Airbag View	A-28
50	Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-29
51	Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View	A-29
52	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-30
53	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-31
54	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-31
55	Close-Up View of Vehicle's Certification Label	A-32
56	Close-Up View of Vehicle's Tire Information Placard or Label	A-32
56a	Reduced Load Carrying Capacity Label	A-33
57	Pre-Test Pole Barrier Front View	A-34
58	Post-Test Pole Barrier Front View	A-34
59	Pre-Test Pole Barrier Side View	A-35
60	Post-Test Pole Barrier Side View	A-35
61	Pre-Test Ballast View	A-36
62	Post-Test Primary and Redundant Speed Trap Read-Out	A-36
63	FMVSS No. 301 Static Rollover 0 Degrees	A-37
64	FMVSS No. 301 Static Rollover 90 Degrees	A-37
65	FMVSS No. 301 Static Rollover 180 Degrees	A-38
66	FMVSS No. 301 Static Rollover 270 Degrees	A-38
67	FMVSS No. 301 Static Rollover 360 Degrees	A-39
68	Impact Event	A-39
69	Monroney Label	A-40
70	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-40
71	Post-Test View of Shattered Vehicle Inner Door Panel	A-41



No. 001 As Delivered Right Front $\frac{3}{4}$ View of Test Vehicle



No. 002 As Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle



No. 003 Pre-Test Frontal View of Test Vehicle



No. 004 Post-Test Frontal View of Test Vehicle



No. 005 Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



No. 006 Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



No. 007 Pre-Test Left Side View of Test Vehicle



No. 008 Post-Test Left Side View of Test Vehicle



No. 009 Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



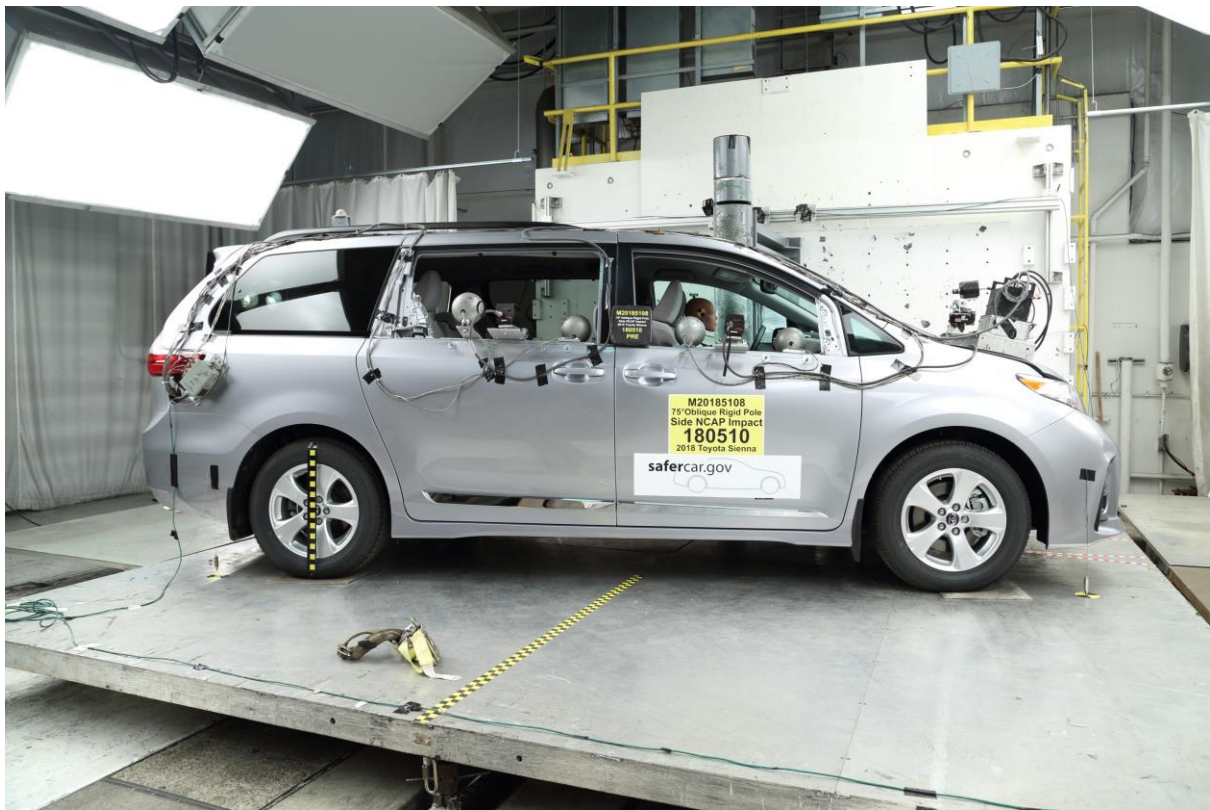
No. 010 Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



No. 011 Pre-Test Rear View of Test Vehicle



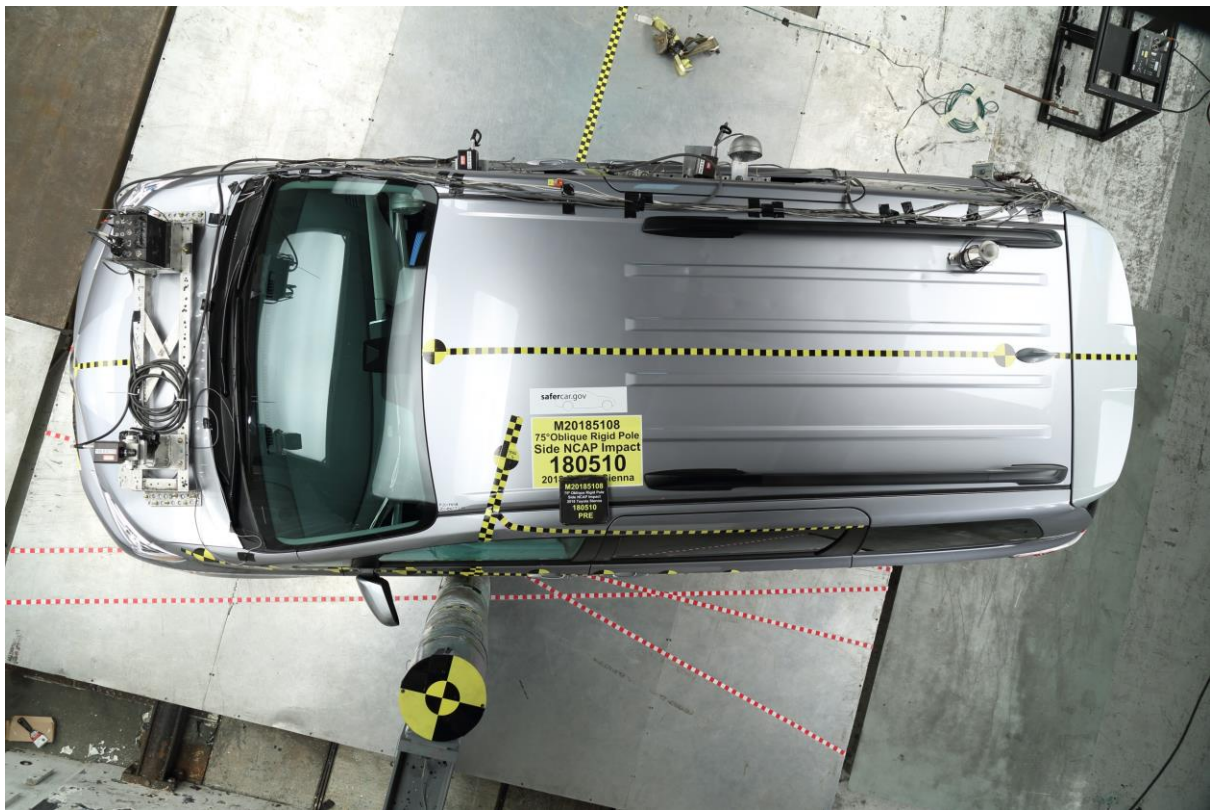
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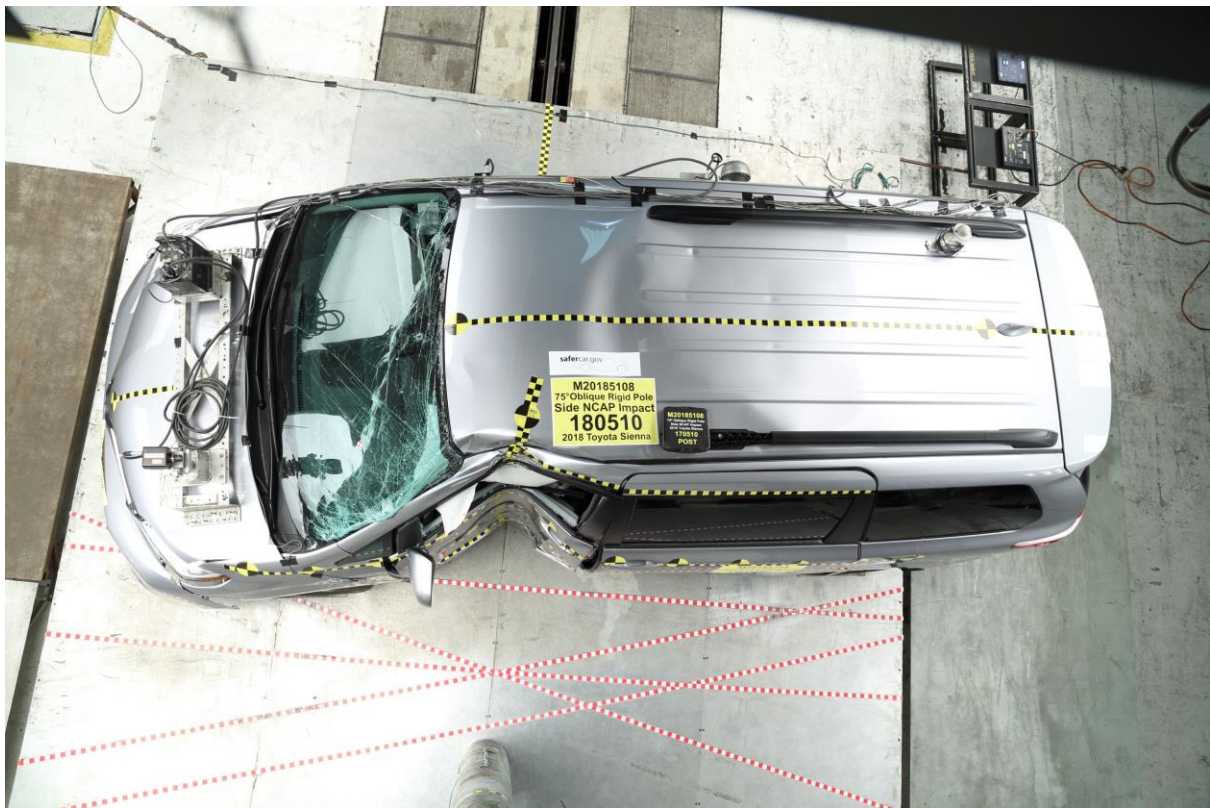
No. 013 Pre-Test Right Side View of Test Vehicle



No. 014 Post-Test Right Side View of Test Vehicle



No. 015 Pre-Test Overhead View of Test Area



No. 016 Post-Test Overhead View of Test Area



No. 017 Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



No. 018 Pre-Test Right Side View of Pole Positioned Against Side of Vehicle



No. 019 Pre-Test Close-Up View of Impact Point Target



No. 020 Post-Test Close-Up View of Impact Point Target Showing Impact Location



No. 021 Pre-Test Front Close-Up View of Dummy Head and Chest

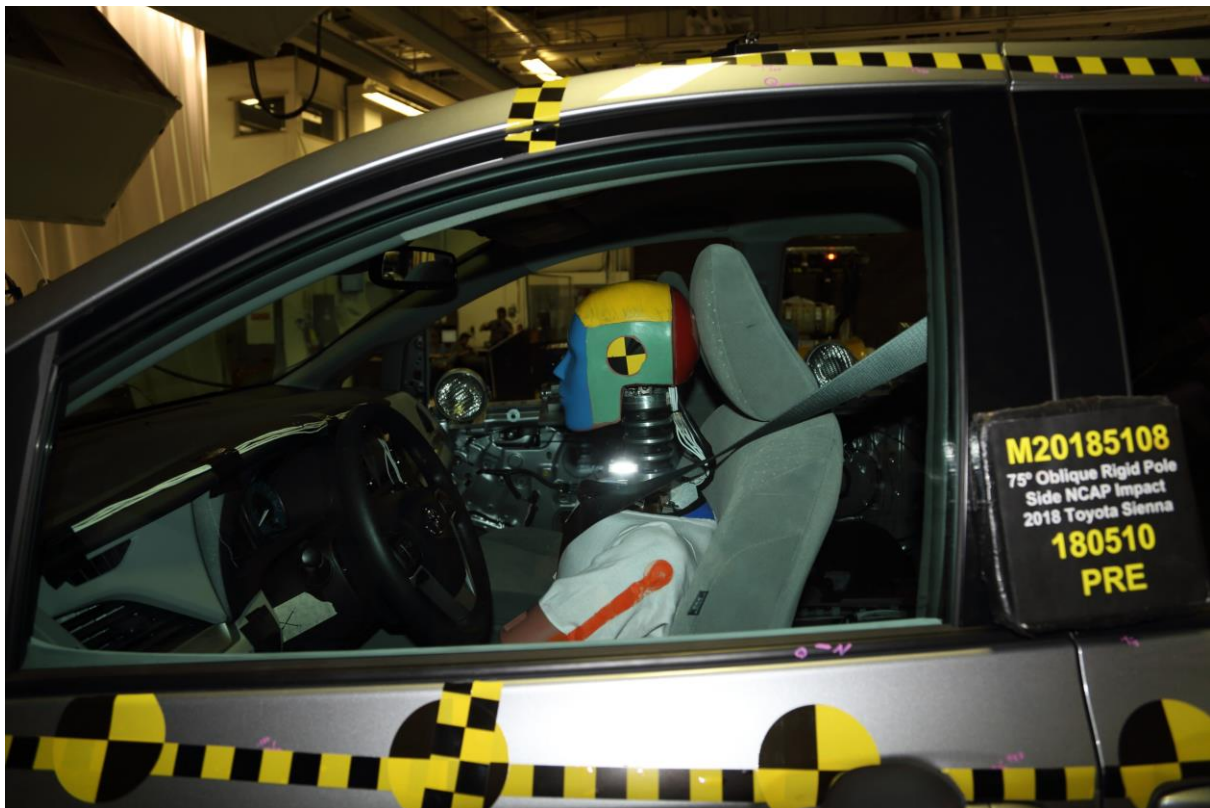


No. 022 Post-Test Front Close-Up View of Dummy



No. 023 Pre-Test Left Side View of Dummy Showing Belt and Chalking

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No. 024 Pre-Test Left Side View of Dummy Shoulder and Door Top View



No. 025 Post-Test Left Side View of Dummy Shoulder and Door Top View



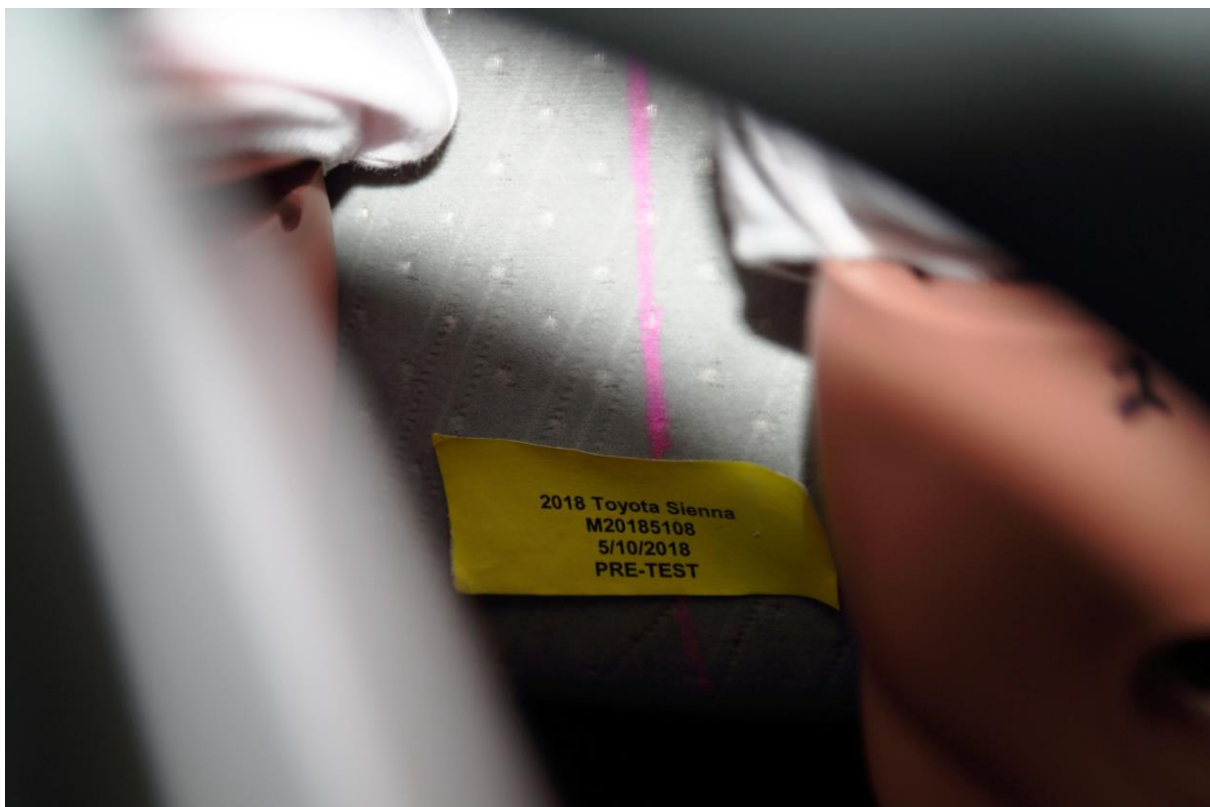
No. 026 Pre-Test Front View of Seat Back Prior to Dummy Positioning



No. 027 Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint



No. 028 Pre-Test Front View of Seat Pan Prior to Dummy Positioning



No. 029 Pre-Test Overhead View of Dummy Thighs on Seat Pan



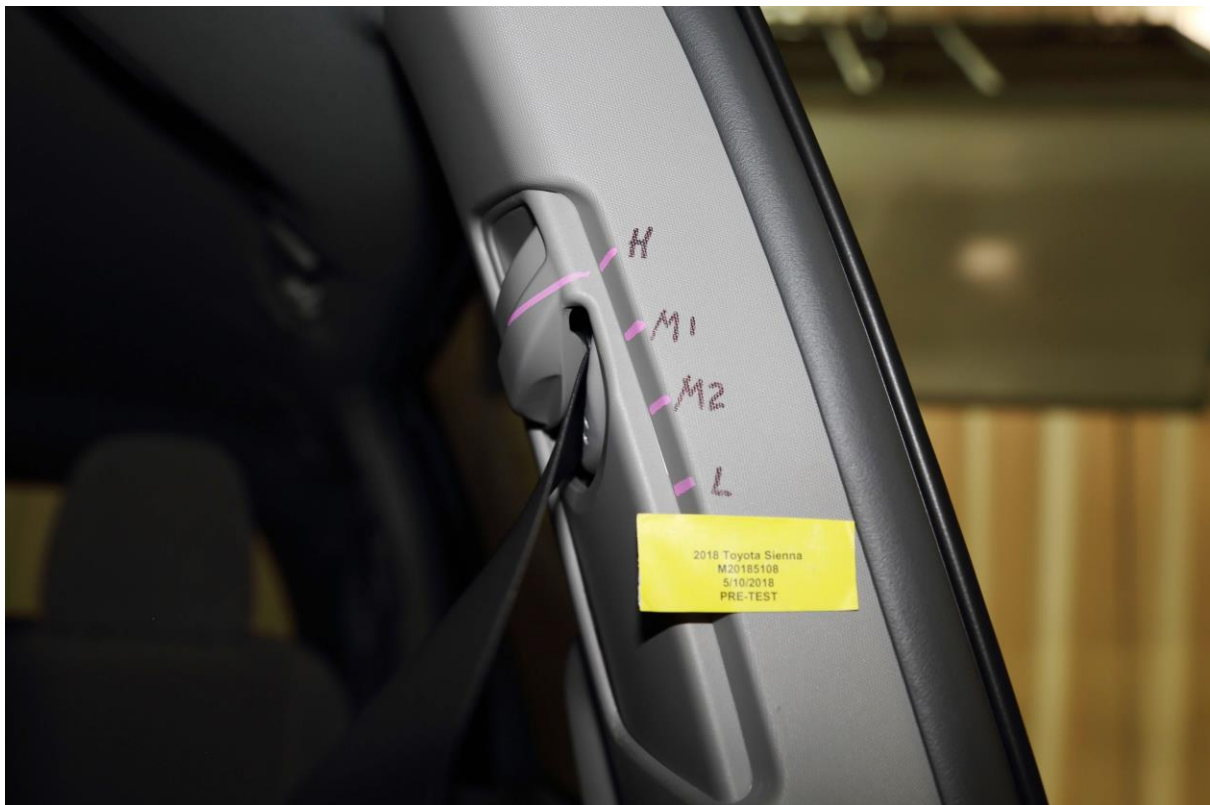
No. 030 Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket



No. 031 Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level



No. 032 Pre-Test Placement of Dummy Feet



No. 033 Pre-Test View of Belt Anchorage for Dummy



No. 034 Pre-Test Left Side View of Steering Wheel



No. 035 Pre-Test View of Disengaged Parking Brake



No. 036 Pre-Test View of Parking Brake



No. 037 Pre-Test Close-Up Left Side View of Driver Seat Track



No. 038 Pre-Test Close-Up Left Side View of Driver Seat Back



No. 039 Pre-Test Close-Up View of Driver Seat Back or Head Restraint



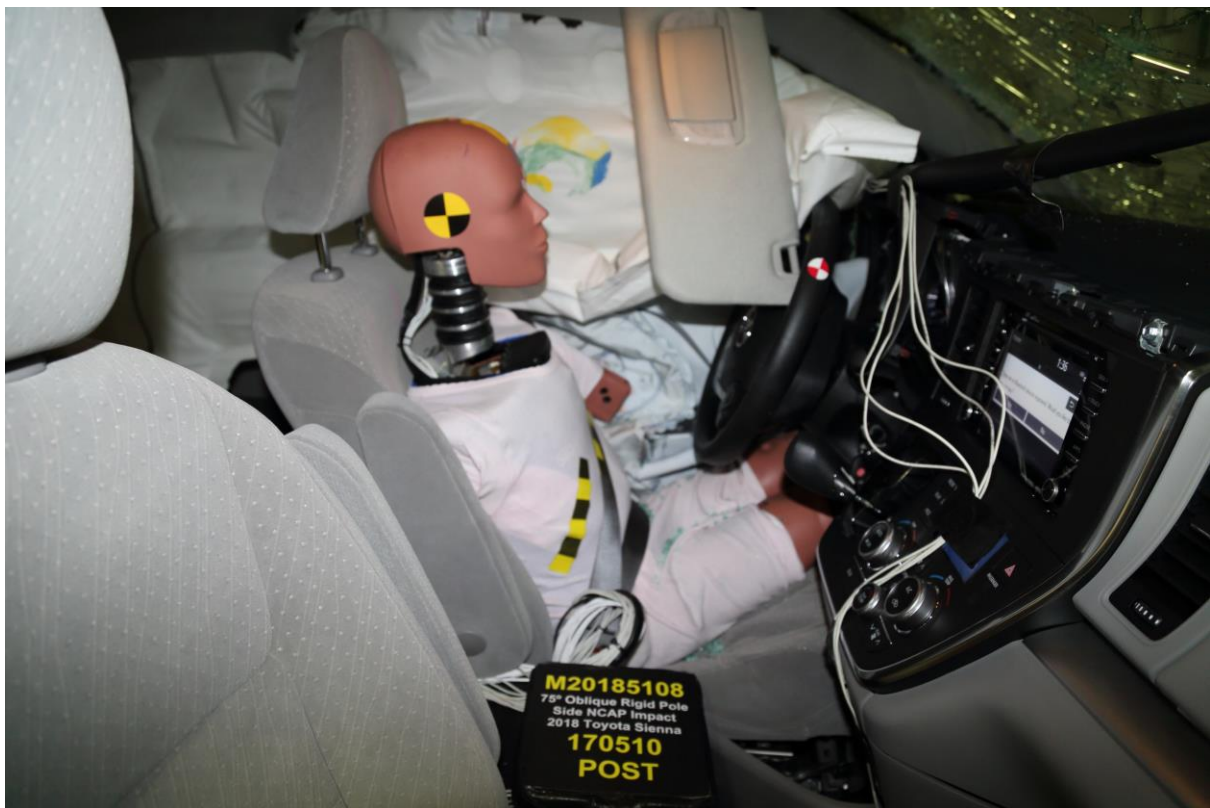
No. 040 Pre-Test Dummy and Door Clearance View



No. 041 Post-Test Dummy and Door Clearance View



No. 042 Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



No. 043 Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



No. 044 Pre-Test Inner Door Panel View



No. 045 Post-Test Inner Door Panel View Showing Dummy Contact Location

PHOTO NOT APPLICABLE

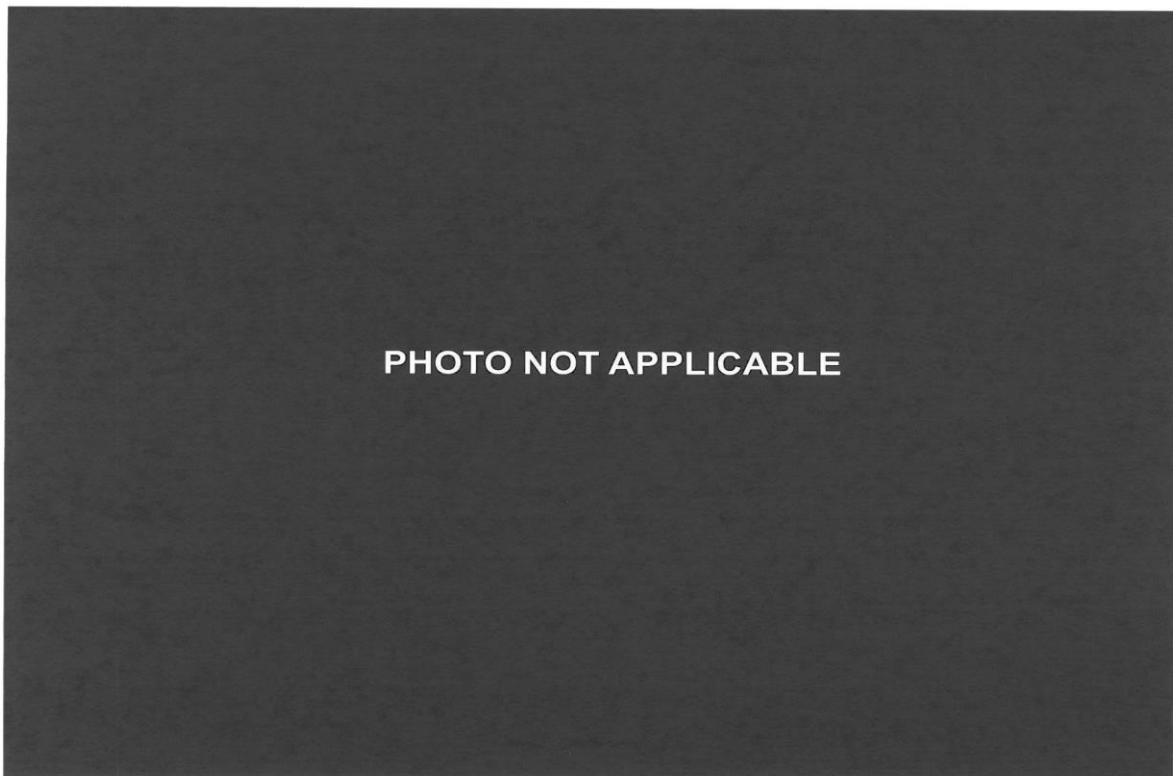
No. 046 Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



No. 047 Post-Test Dummy Close-Up Head Contact with Side Airbag View



No. 048 Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



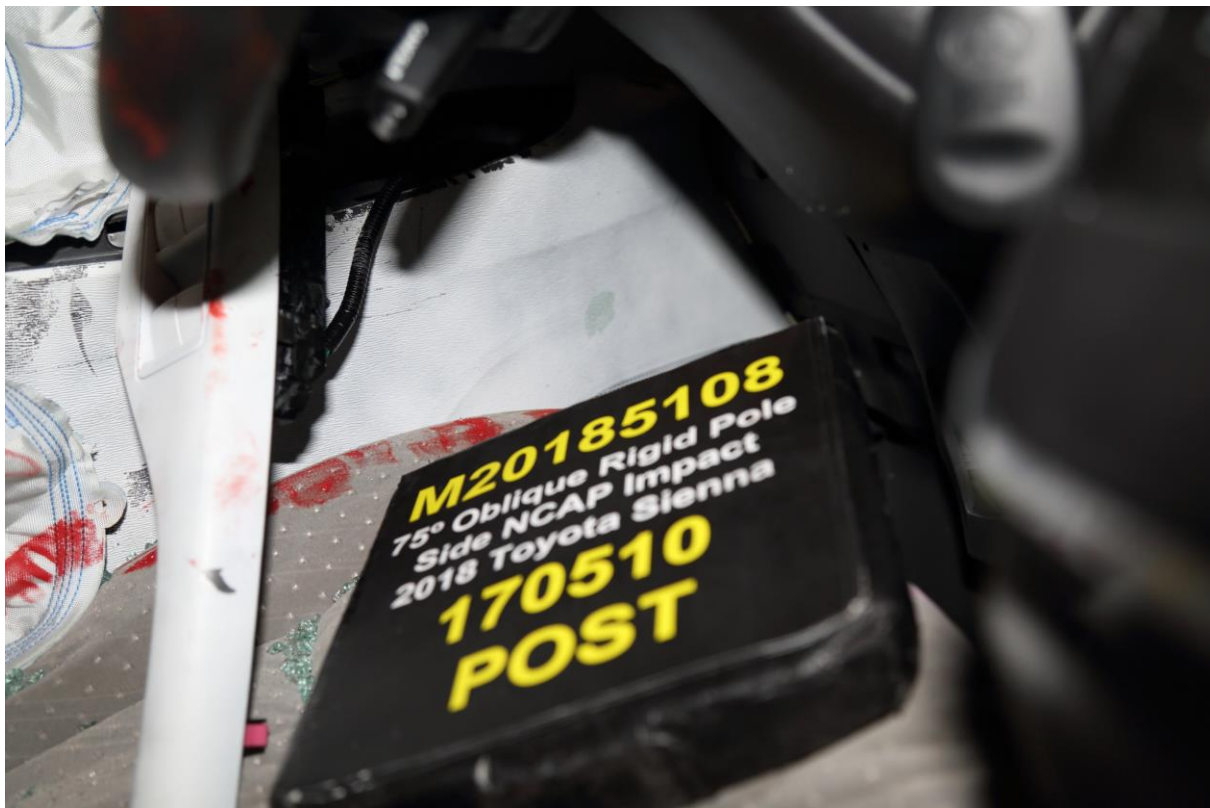
No. 049 Post-Test Dummy Close-Up Torso Contact with Side Airbag View



No. 050 Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



No. 051 Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



No. 052 Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View

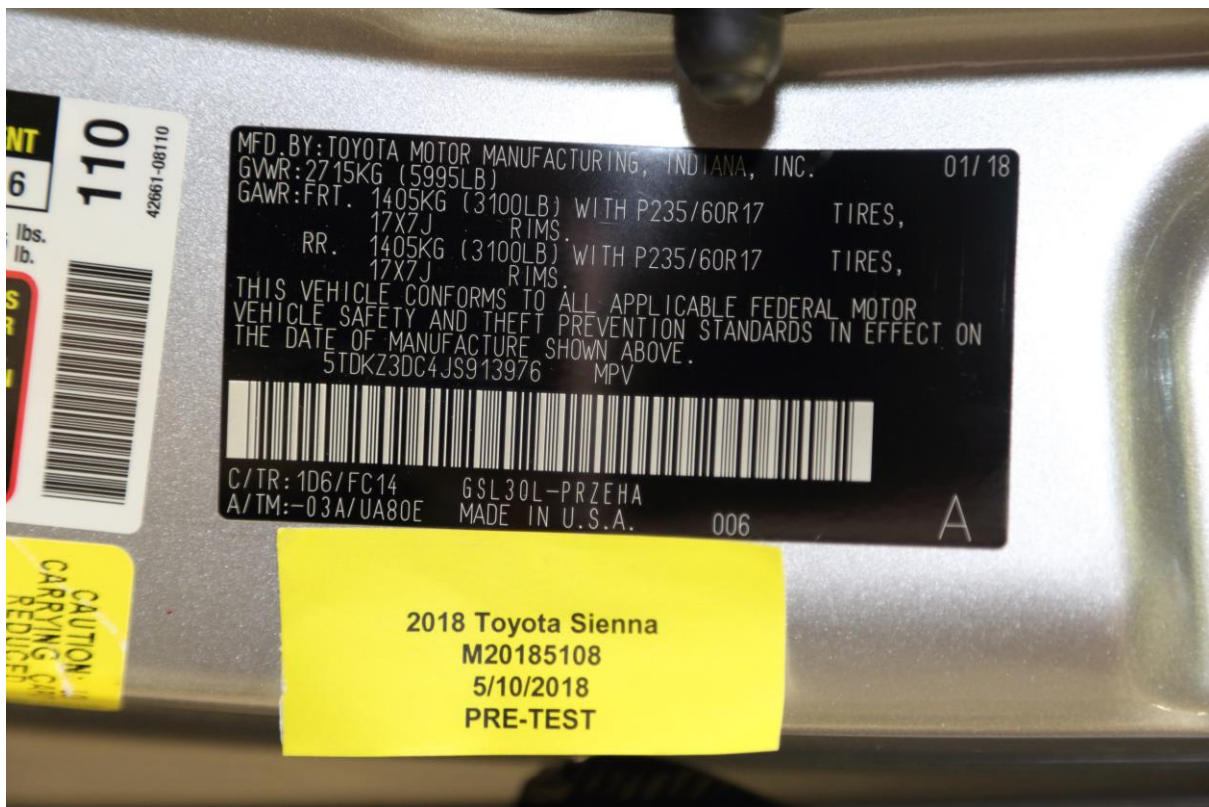
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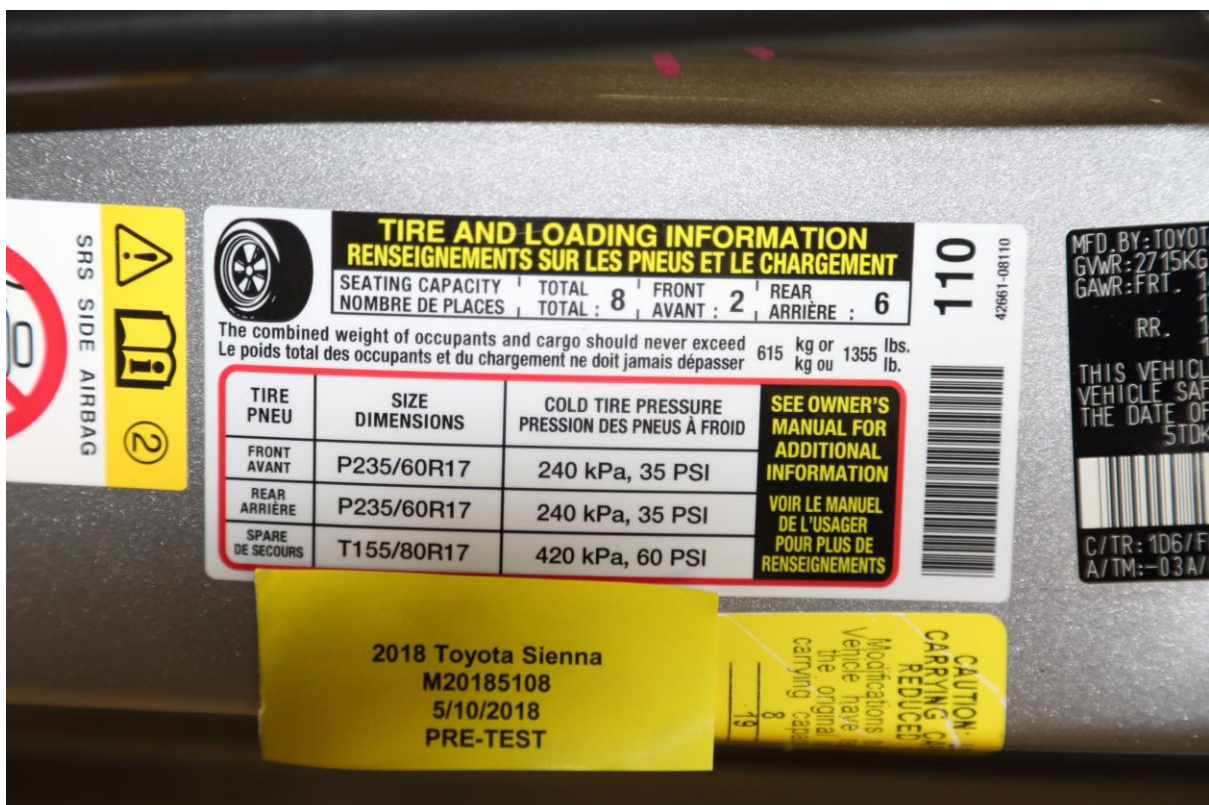
No. 053 Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



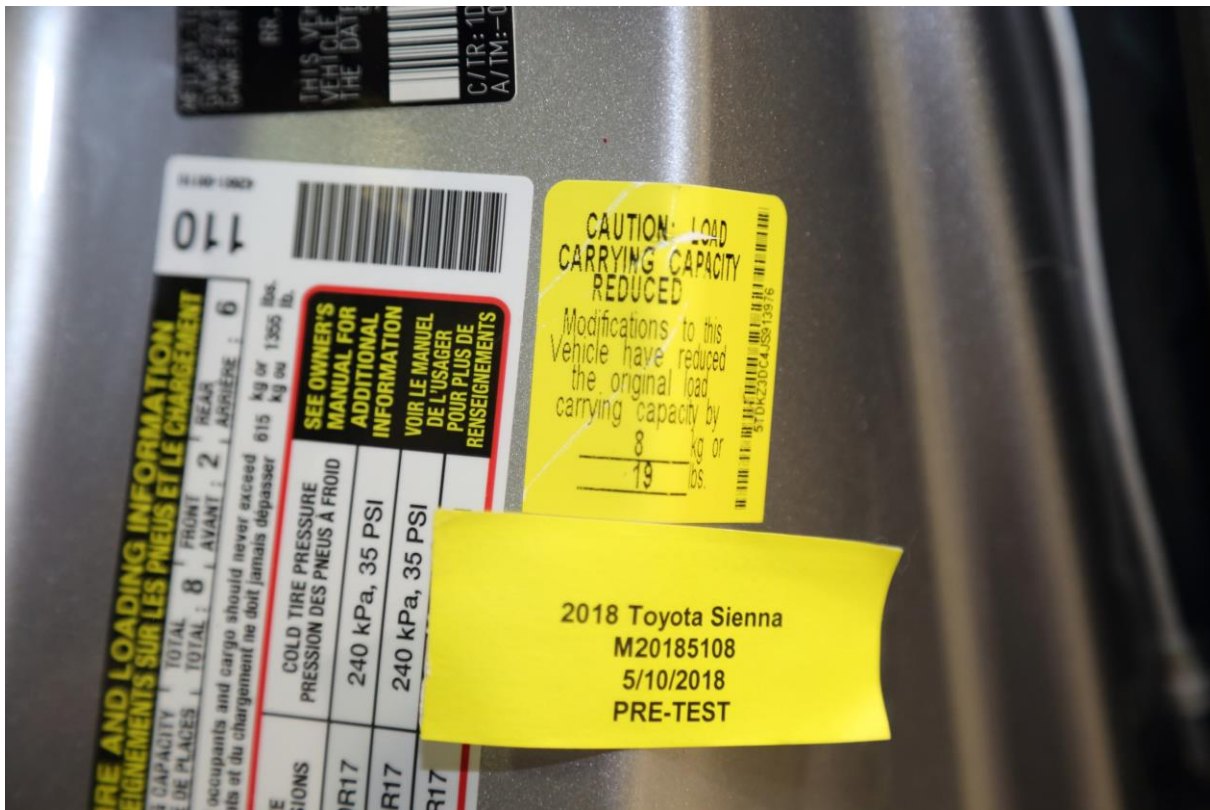
No. 054 Post-Test View of Fuel Filler Cap or Fuel Filler Neck



No. 055 Close-Up View of Vehicle Certification Label



No. 056 Close-Up View of Vehicle Tire Information Placard or Label



No. 056a Reduced Load Carrying Capacity Label

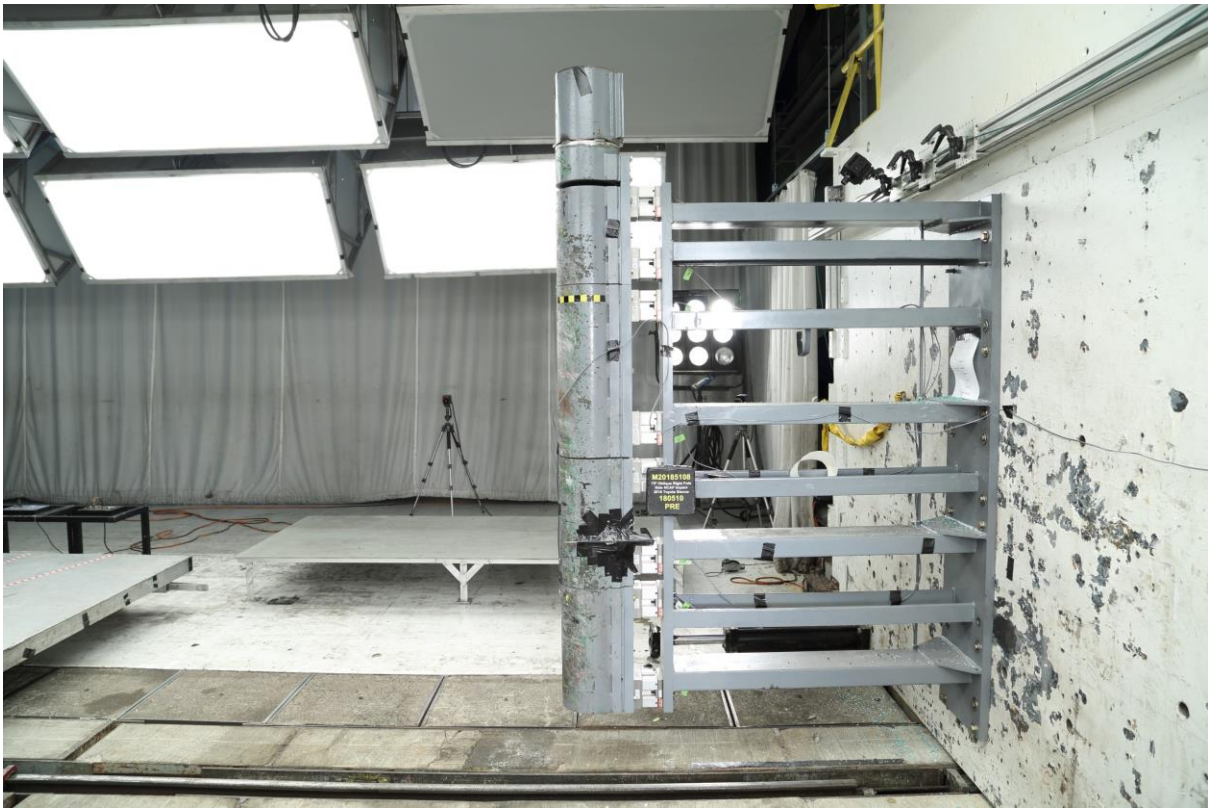
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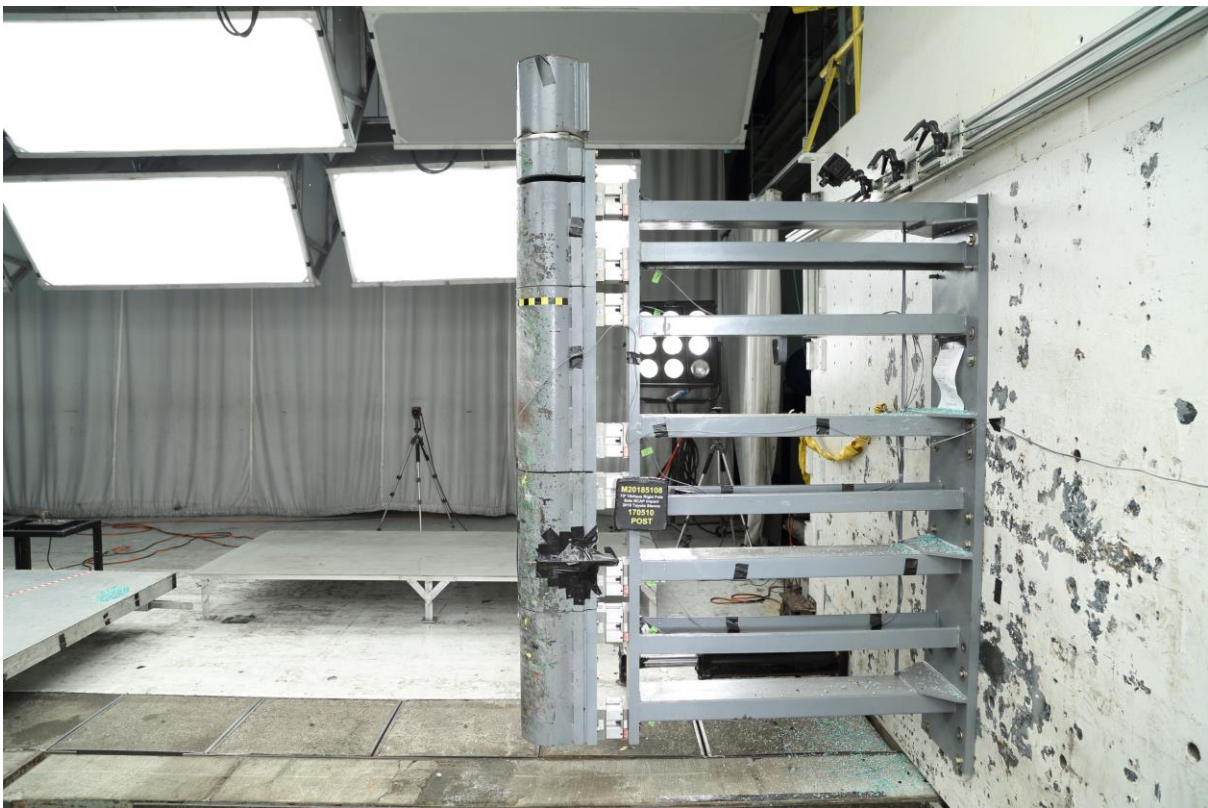
No. 057 Pre-Test Pole Barrier Front View



No. 058 Post-Test Pole Barrier Front View



No. 059 Pre-Test Pole Barrier Side View



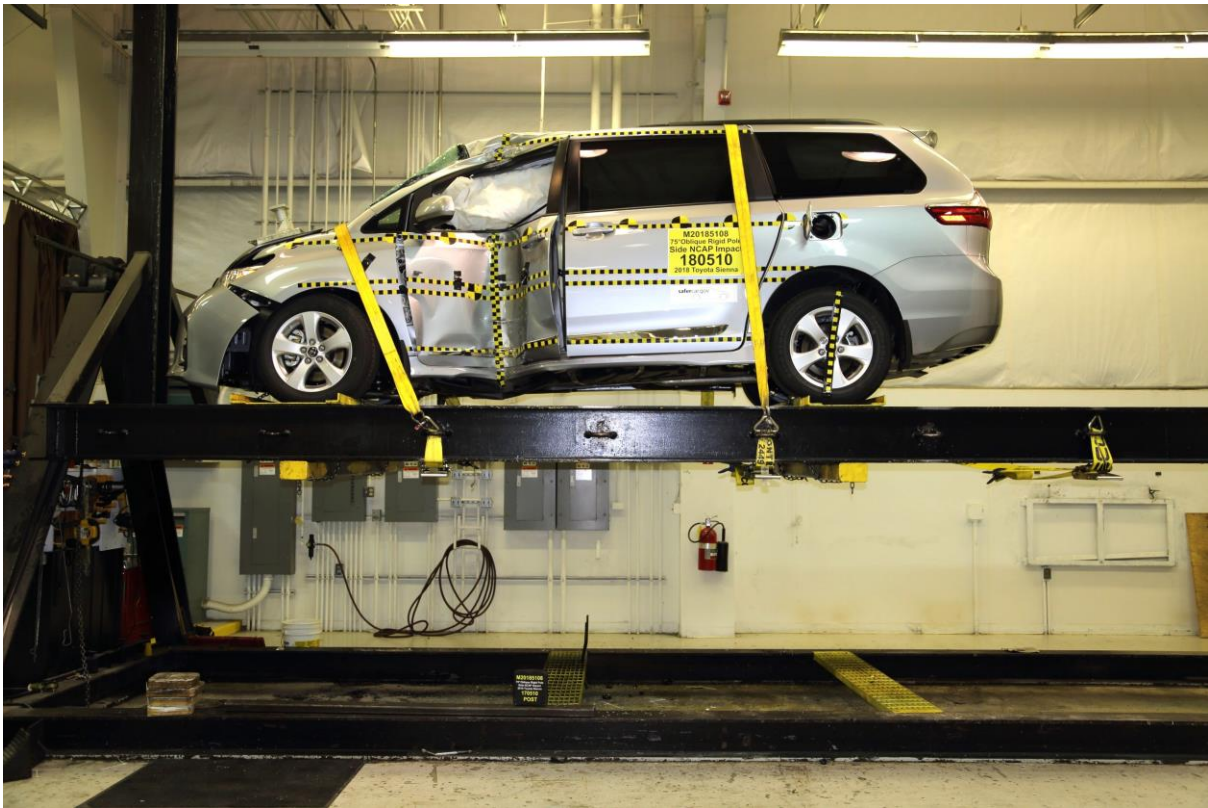
No. 060 Post-Test Pole Barrier Side View



No. 061 Pre-Test Ballast View



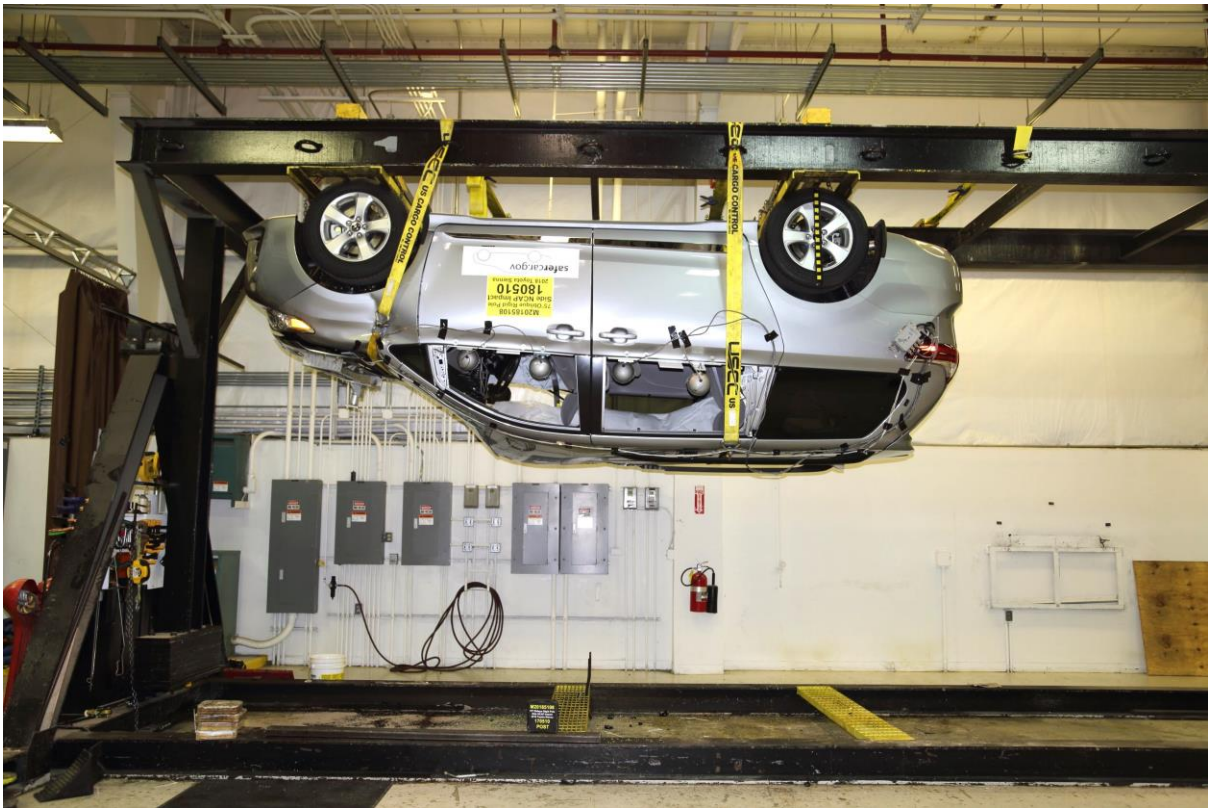
No. 062 Post-Test Primary and Redundant Speed Trap Read Out



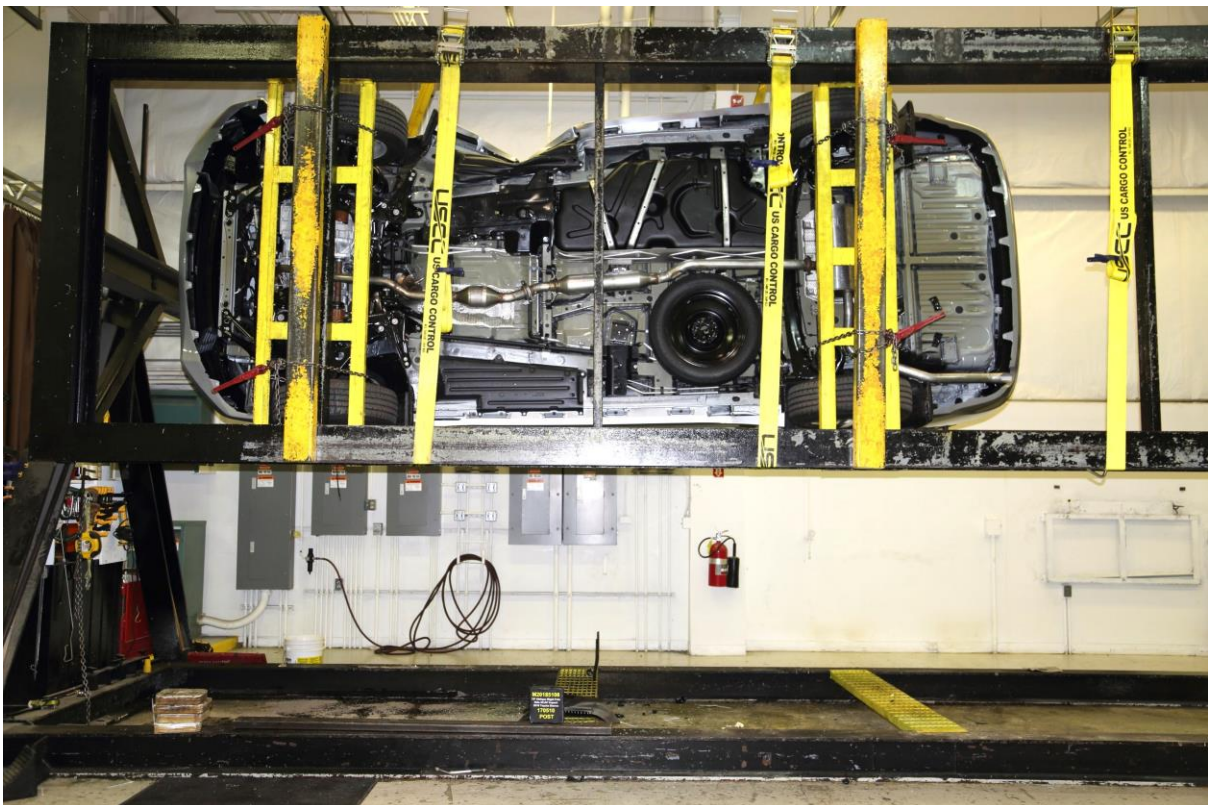
No. 063 FMVSS No. 301 Static Rollover 0 Degrees



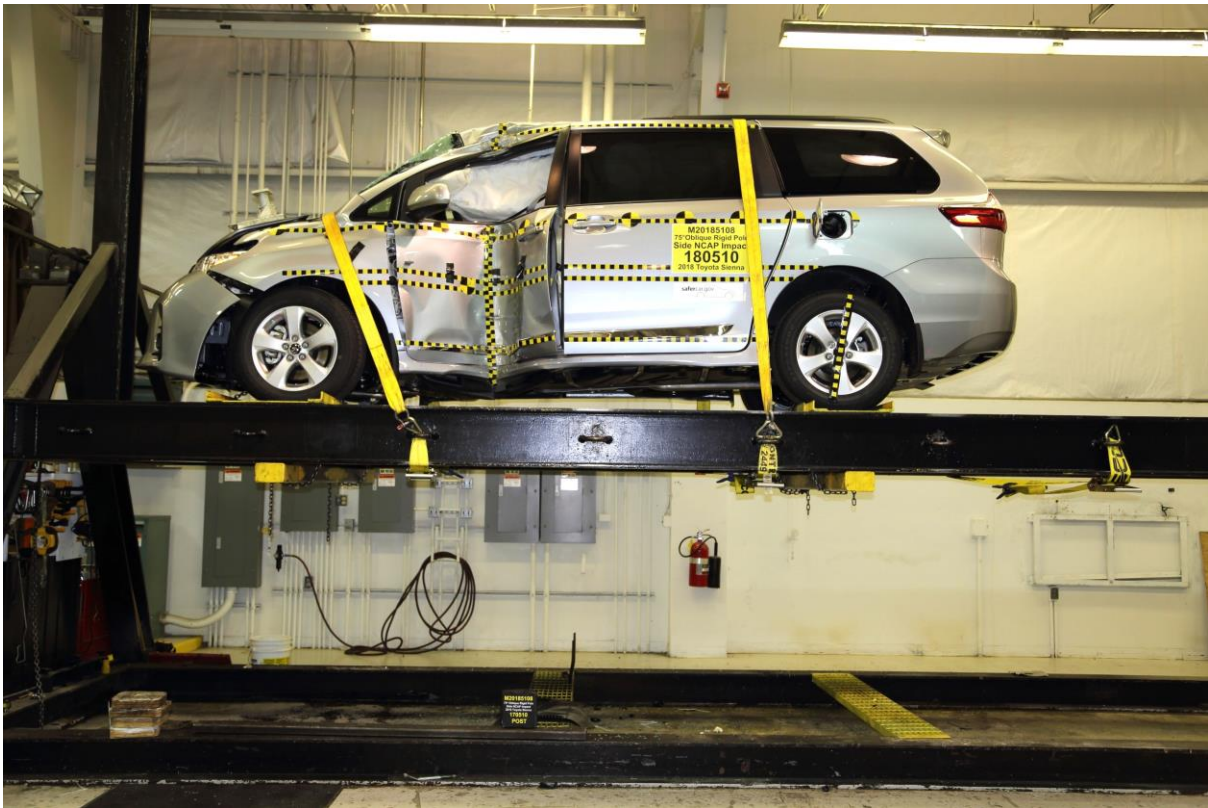
No. 064 FMVSS No. 301 Static Rollover 90 Degrees



No. 065 FMVSS No. 301 Static Rollover 180 Degrees



No. 066 FMVSS No. 301 Static Rollover 270 Degrees



No. 067 FMVSS No. 301 Static Rollover 360 Degrees



No. 068 Impact Event

TOYOTA
Let's Go Places

DESC: **SIENNA LE 3.5L** FWD 8 PSGR
VIN: **5TDKZ3DC4JS913976**
YR/MDL: 2018/5338A
CLR: SILVER SKY METALLIC/FC14 (01D6/14)
FINAL ASSEMBLY POINT: PRINCETON, INDIANA, U.S.A.

STANDARD EQUIPMENT

MECHANICAL & PERFORMANCE

- 3.5L V6 D-4D 24-valve D-4S Injection with Dual VVT-i
- Direct Shift 8-Speed Automatic Transmission with Intelligence (ECT-i)
- 17" Alloy Wheels with P235/90R17 Tires

SAFETY & CONVENIENCE

- Toyota Safety Sense (TSS) P (TSS-P): Pre-Collision System with Pedestrian Detection (PCS w/PD), Lane Departure Alert (LDA), with Steering Assist (SA), Auto High Beams (AHB), and Dynamic Radar Cruise Control (DRCC)
- Star Safety System: Enhanced Vehicle Stability Control, Traction Control, Anti-Lock Brake System, Electronic Brake-Force Distribution, Brake Assist & Smart Stop Technology
- LATCH locations: 2 in 2nd row and 2 in 3rd row

EXTERIOR

- Projector Beam Headlights w/Auto On/Off
- Dual Power Sliding Side Doors
- Daytime Running Lights
- Color Keyed Power Outside Mirrors with Integrated Blind Spot Mirrors

INTERIOR

- Easy Clean Fabric 8-Way Power Driver's Seat with Power Lumbar, 4-Way Front Passenger Seat
- Removable Easy Clean 2nd Row Captain's Chairs with Stowable Center Seat with Tip Up and Long Slide
- 60/40 Split and Stow 3rd Row Seat with One-Action Bow
- 9-Zone Automatic Climate Control: Driver, Passenger and Rear
- Entune 3.0 Audio Plus w/Connected Navigation, iPod, GPS, Link, App, T, Hi-Res Touch-Screen, AM/FM/CD/USB/AUX, Bluetooth, Sirius XM 3 Month Trial, HD Radio and Integrated Backup Camera Display
- **Full Tank of Gas**

OPTIONAL EQUIPMENT

FE	20 State Emissions	130.00
2T	All-Weather Floor Liners/Door Sill	65.00
WL	Alloy Wheel Locks	149.00
MF	Judge Guards	75.00
DS	Door Edge Guards	209.00
BM	Chrome Lower Door Moldings	

GOVERNMENT 5-STAR SAFETY RATINGS

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

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

EPA DOT Fuel Economy and Environment

Fuel Economy

22 MPG
combined city/hwy

19 city
27 highway

4.5 gallons per 100 miles

You spend \$1,500 more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$1,650

Fuel Economy & Greenhouse Gas Rating (Subject: 2018) Smog Rating (Subject: 2018)

1 4 10 5 9
Best

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs \$6,750 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.40 per gallon. 4800 to miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov
Calculate personalized estimates and compare vehicles

MANUFACTURER'S SUGGESTED RETAIL PRICE \$33,660.00

DELIVERY PROCESSING AND HANDLING FEE 995.00

TOTAL \$35,287.00

The New Vehicle Limited Warranty provides 3-year/50,000-mile basic coverage, 5-year/100,000-mile powertrain coverage, and 10-year/150,000-mile corrosion protection coverage. See Warranty and Maintenance Guide for details. Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. Gasoline, tires and other non-repairable items and their cost are not included in the manufacturer's suggested retail price. ToyotaCare, which covers all scheduled maintenance for two years or 25,000 miles, is included as part of the sales price of the vehicle for specific models. See participating dealer for eligibility and coverage details.

Delivered by Truck to: 31177
MAGUIRE TOYOTA
375 ELIABA ROAD
ITHACA NY 14850

No. 069 Monroney Label

3-3. Adjusting the seats 173

Head restraints

Head restraints are provided for all seats.

Front and second outside seats

- Up
- Down

Push the head restraint down while pressing the lock release button.

Second center* and third center seats

- Up
- Down

Push the head restraint down while pressing the lock release button.

* 8-passenger models only

Third outside seats

- To use
- To fold

Press the button.

Operation of each component

133SN011

Lock release button

133SN012a

Lock release button

133SN014

Lock release button

No. 070 Head Restraint Use and Adjustment Information from Vehicle Owner Manual

PHOTO NOT APPLICABLE

No. 071 Post-Test View of Shattered Vehicle Inner Door Panel

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

No.	Description	Page
1	Driver Head Acceleration (X) vs. Time	B-4
2	Driver Head Acceleration (Y) vs. Time	B-4
3	Driver Head Acceleration (Z) vs. Time	B-4
4	Driver Head Acceleration Resultant vs. Time	B-4
5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-5
6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-5
7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-5
8	Driver Lower Spine T12 Acceleration Resultant vs. Time	B-5
9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-6
10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-6
11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-6

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 (X) Redundant
Driver Head Acceleration (Y) Redundant
Driver Head Acceleration (Z) Redundant
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 (Y)
 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 (X)
Load Cell Pole Barrier #2 Force (X)
Load Cell Pole Barrier #3 Force (X)
Load Cell Pole Barrier #4 Force (X)
Load Cell Pole Barrier #5 Force (X)
Load Cell Pole Barrier #6 Force (X)
Load Cell Pole Barrier #7 Force (X)
Load Cell Pole Barrier #8 Force (X)

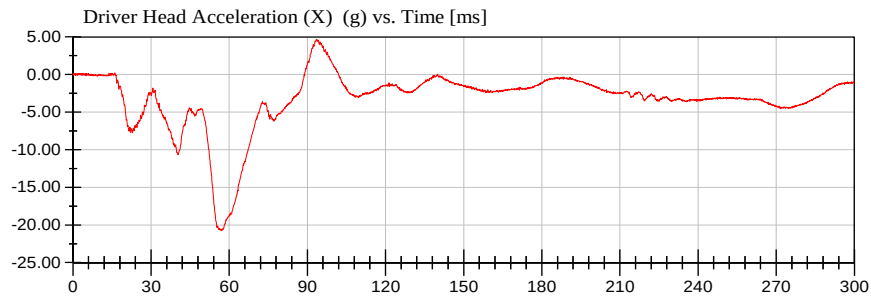
NHTSA

Test Lab: CTF

Test Number: 180510 (M20185108)

Position #1 SID IIs Dummy (297)

Test Date: 05/10/2018

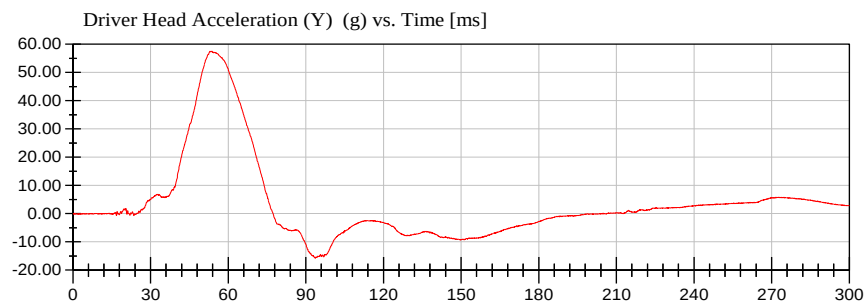


<Max>

4.59 g at 93.36 ms

<Min>

-20.75 g at 56.80 ms

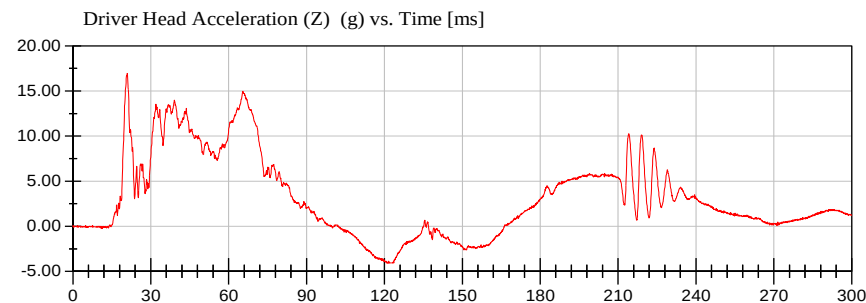


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57.51 g at 53.04 ms

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-15.79 g at 93.68 ms

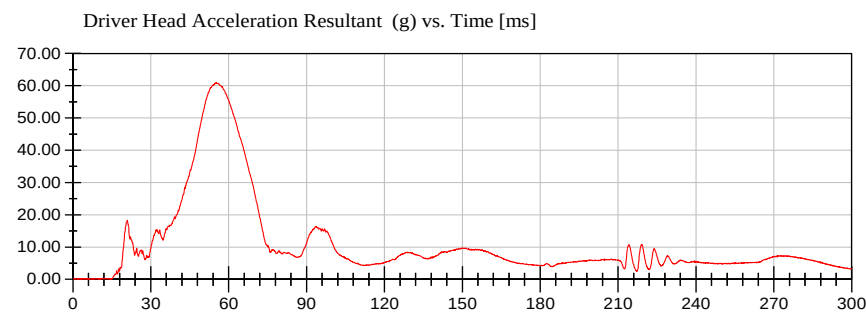


<Max>

16.95 g at 20.96 ms

<Min>

-4.12 g at 121.36 ms



<Max>

61.04 g at 55.28 ms

<Min>

0.04 g at 1.12 ms



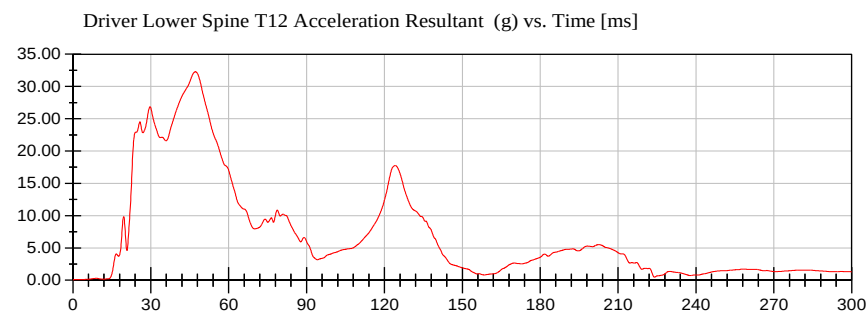
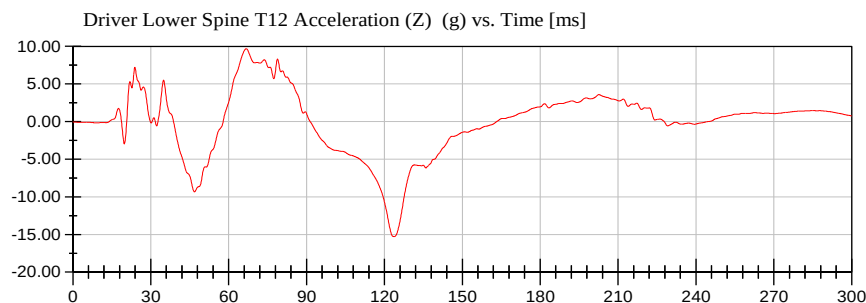
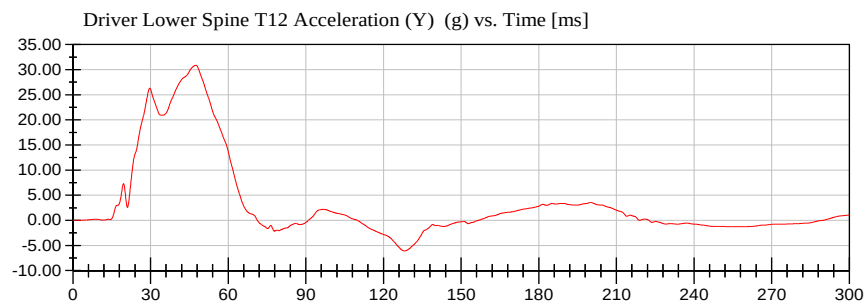
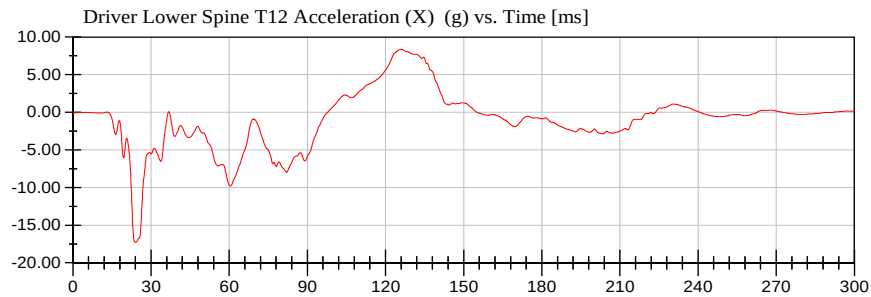
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Test Lab: CTF

Test Number: 180510 (M20185108)

Position #1 SID IIs Dummy (297)

Test Date: 05/10/2018



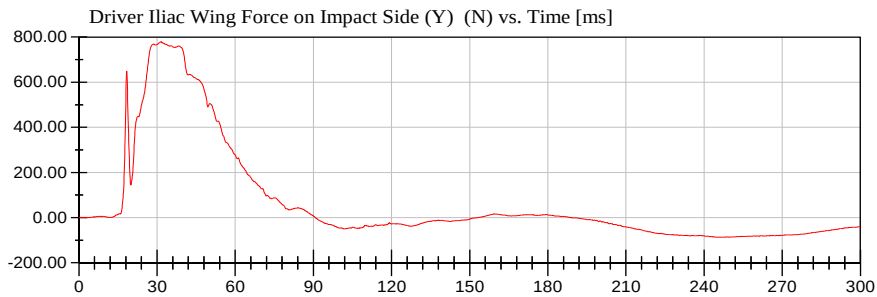
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Position #1 SID IIs Dummy (297)

Test Date: 05/10/2018

Test Lab: CTF

Test Number: 180510 (M20185108)

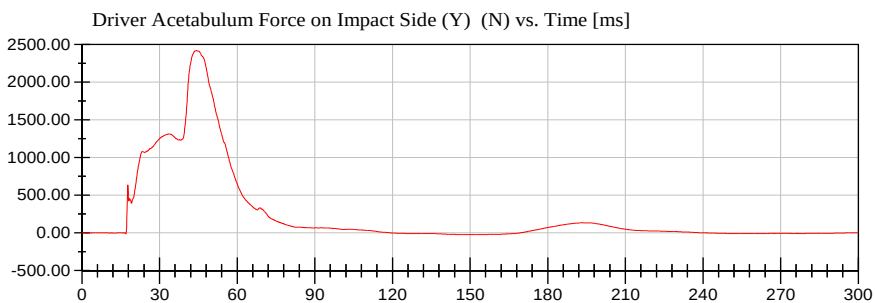


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778.60 N at 31.60 ms

<Min>

-87.20 N at 246.24 ms

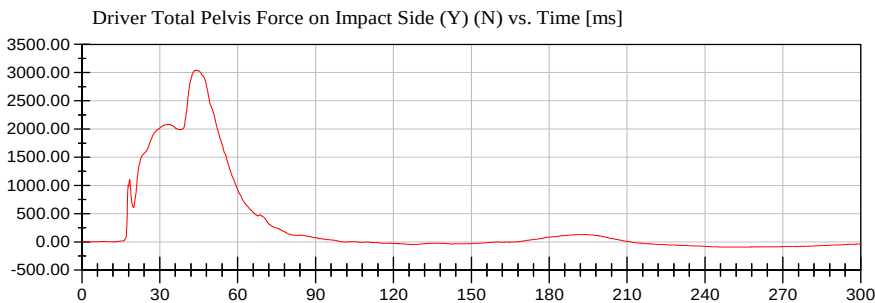


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2,419.44 N at 44.24 ms

<Min>

-23.16 N at 152.08 ms



<Max>

3,041.09 N at 43.60 ms

<Min>

-93.98 N at 250.00 ms



APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

TABLE OF CALIBRATION MEASUREMENTS AND PLOTS
SID-IIs (Driver) Dummy
Description

Table 1. External Measurements

Table 2. Head Drop Test

Resultant Head Acceleration (G's) vs. Time (ms)
Head (X) Acceleration (G's) vs. Time (ms)
Head (Y) Acceleration (G's) vs. Time (ms)
Head (Z) Acceleration (G's) vs. Time (ms)

Table 3. Lateral Neck Pendulum Test

Pendulum Velocity (m/s) vs. Time (ms)
Flexion Angle (°) vs. Time (ms)
Moment About Occipital Condyle (Nm) vs. Time (ms)

Table 4. Shoulder Impact Test

Impactor Acceleration (G's) vs. Time (ms)
Shoulder Displacement (mm) vs. Time (ms)
Upper Spine Acceleration (G's) vs. Time (ms)

Table 5. Thorax (With Arm) Impact Test

Impactor Acceleration (G's) vs. Time (ms)
Shoulder Displacement (mm) vs. Time (ms)
Upper Rib Displacement (mm) vs. Time (ms)
Middle Rib Displacement (mm) vs. Time (ms)
Lower Rib Displacement (mm) vs. Time (ms)
Upper Spine Acceleration (G's) vs. Time (ms)
Lower Spine Acceleration (G's) vs. Time (ms)

Table 6. Thorax (Without Arm) Impact Test

Impactor Acceleration (G's) vs. Time (ms)
Upper Rib Displacement (mm) vs. Time (ms)
Middle Rib Displacement (mm) vs. Time (ms)
Lower Rib Displacement (mm) vs. Time (ms)
Upper Spine Acceleration (G's) vs. Time (ms)
Lower Spine Acceleration (G's) vs. Time (ms)

Table 7. Abdomen Impact Test

Impactor Acceleration (G's) vs. Time (ms)
Upper Abdominal Rib Displacement (mm) vs. Time (ms)
Lower Abdominal Rib Displacement (mm) vs. Time (ms)
Lower Spine Acceleration (G's) vs. Time (ms)

Table 8. Pelvis Plug Quasi-Static Test (Optional*)

Table 9. Pelvis Acetabulum Impact Test

Impactor Acceleration (G's) vs. Time (ms)
Pelvis (Y) Acceleration (G's) vs. Time (ms)
Acetabulum Force (N) vs. Time (ms)

Table 10. Pelvis Iliac Impact Test

Impactor Acceleration (G's) vs. Time (ms)
Pelvis (Y) Acceleration (G's) vs. Time (ms)
Iliac Force (N) vs. Time (ms)

Pre-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 27

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	785	Yes
B	Shoulder Pivot Height	437.0 - 453.0	449	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	130	Yes
G	Head Breadth	140.0 - 148.0	147	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	183	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	527	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	200	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
P	Foot Length (left)	216.0 - 232.0	221	Yes
Q	Hip Breadth	313.0 - 323.0	319	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	347	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
W	Foot Width (left)	78.0 - 94.0	83	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	877	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Transportation Research Center Inc.

Left Lateral Head Drop

SID IIs Serial No. 297 Certification No. 27-1

Test Date: 5/4/2018

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	49 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	115.2 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-3.4 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Condition: Used

Comments:

Head Skin S/N: 1330

Skull S/N: 180/1001/C

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 9 of 31

05.04.2018 16:05:46 198

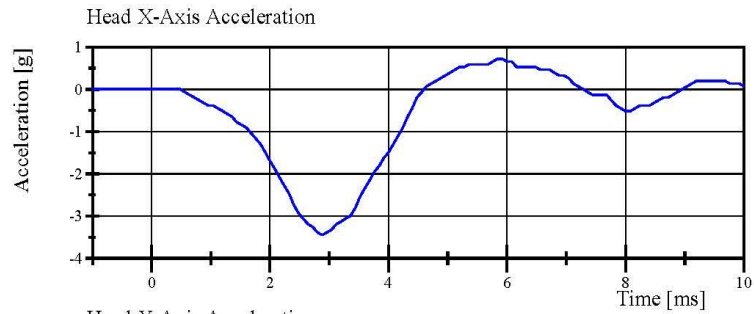


Transportation Research Center Inc.

Left Lateral Head Drop

SID IIs Serial No. 297 Certification No. 27-1

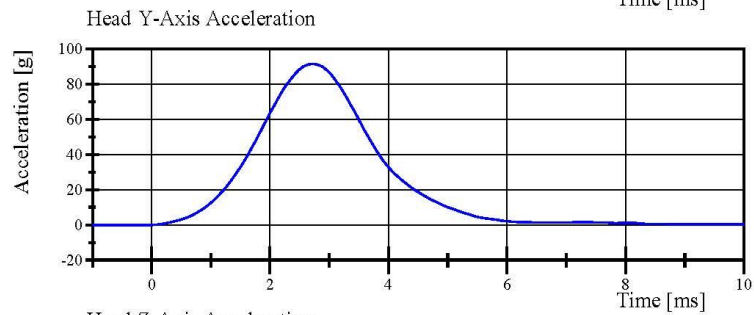
Test Date: 5/4/2018



Filter Class: CFC_1000

Max: 0.7 g at 5.8 ms

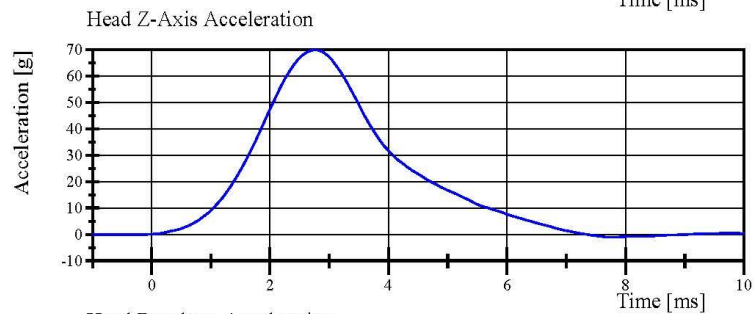
Min: -3.4 g at 2.9 ms



Filter Class: CFC_1000

Max: 91.6 g at 2.7 ms

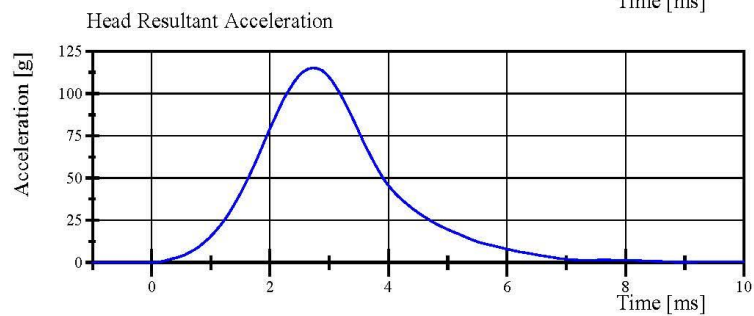
Min: -0.0 g at -1.0 ms



Filter Class: CFC_1000

Max: 69.9 g at 2.7 ms

Min: -1.1 g at 7.8 ms



Filter Class: CFC_1000

Max: 115.2 g at 2.7 ms

Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.04.2018 16:06:33 198



Transportation Research Center Inc.

Left Lateral Neck

SID IIs Serial No. 297 Certification No. 27-1

Test Date: 5/5/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.620 m/s	Yes
Pendulum Integrated Velocity			
Change at 10 ms	2.20 - 2.80 m/s	2.608 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.766 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	5.076 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.996 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	6.034 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-73.5 deg	Yes
Time of Peak	50 - 70 ms	59.8 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	40.7 N·m	Yes
Total Neck Occipital Condyles Moment			
Decay Time to 0 N·m	102 - 126 ms	123.1 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 779

Neck Cable S/N: N/A

Nodding Block S/N's:

- **Front** - 8505 3012

- **Rear** - N/A

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 11 of 31

05.05.2018 06:40:38 716

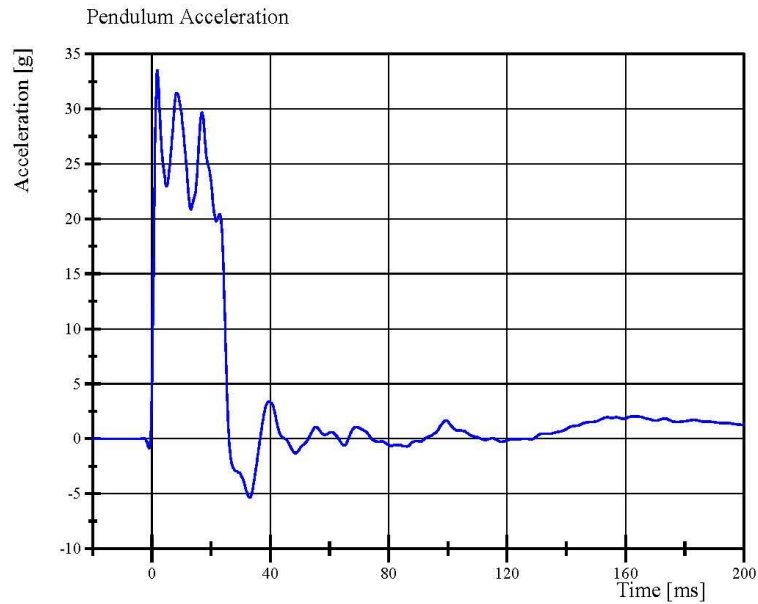


Transportation Research Center Inc.

Left Lateral Neck

SID IIS Serial No. 297 Certification No. 27-1

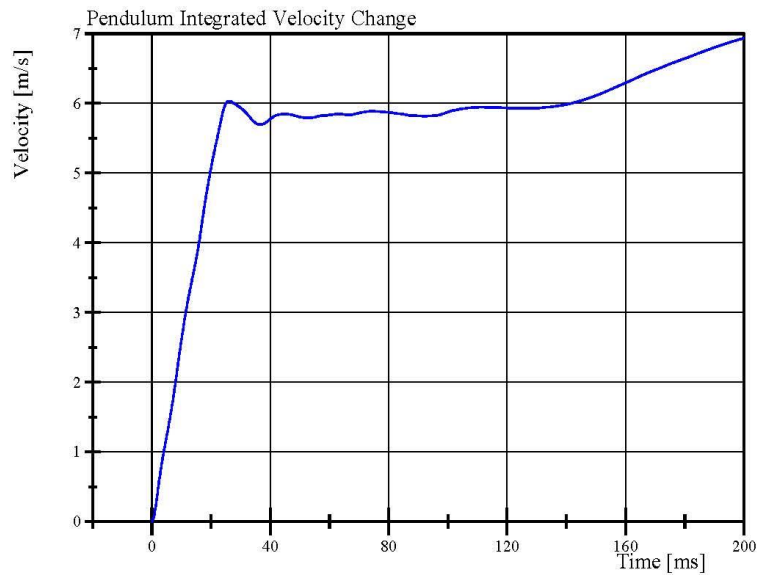
Test Date: 5/5/2018



Filter Class: CFC_180

Max: 33.5 g at 1.8 ms

Min: -5.4 g at 33.0 ms



Filter Class: CFC_180

Max: 6.9 m/s at 200.0 ms

Min: 0.0 m/s at 0.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

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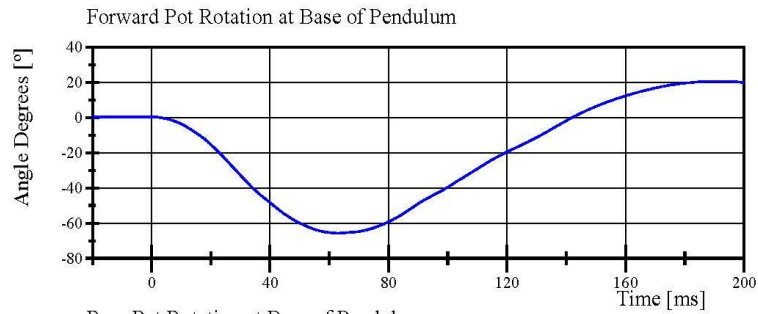


Transportation Research Center Inc.

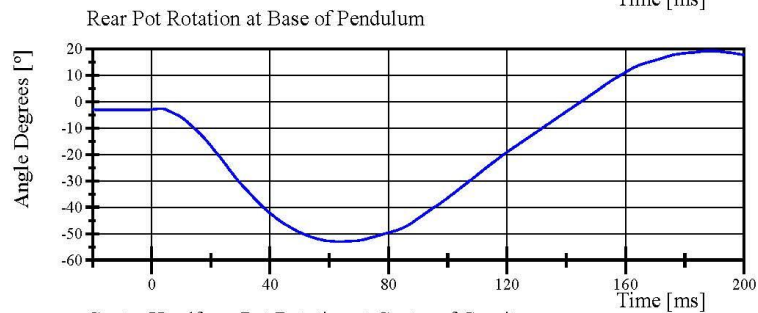
Left Lateral Neck

SID IIS Serial No. 297 Certification No. 27-1

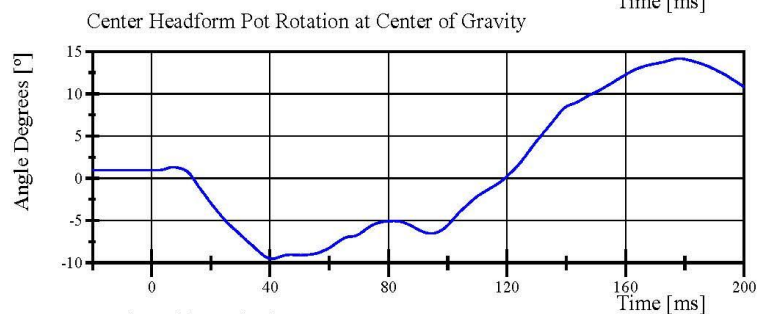
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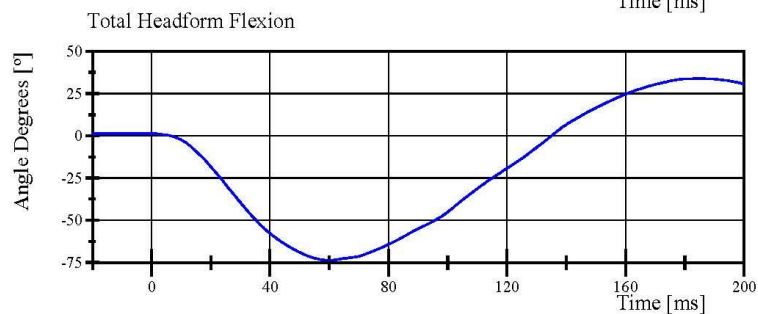
Filter Class: CFC_60
Max: 20.7 ° at 191.5 ms
Min: -65.6 ° at 63.0 ms



Filter Class: CFC_60
Max: 19.2 ° at 188.6 ms
Min: -53.0 ° at 63.4 ms



Filter Class: CFC_60
Max: 14.2 ° at 178.1 ms
Min: -9.5 ° at 40.6 ms



Filter Class: CFC_60
Max: 34.0 ° at 185.0 ms
Min: -73.5 ° at 59.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 06:41:41 716

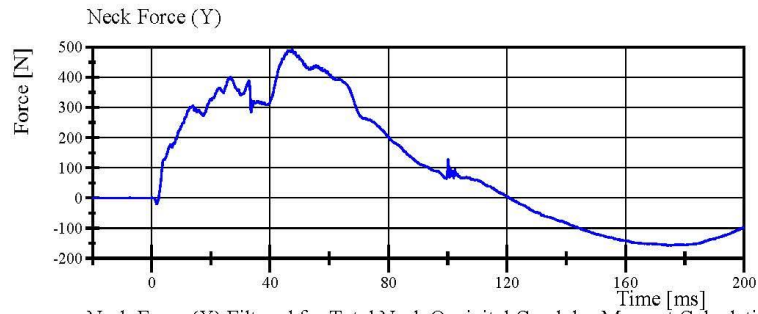


Transportation Research Center Inc.

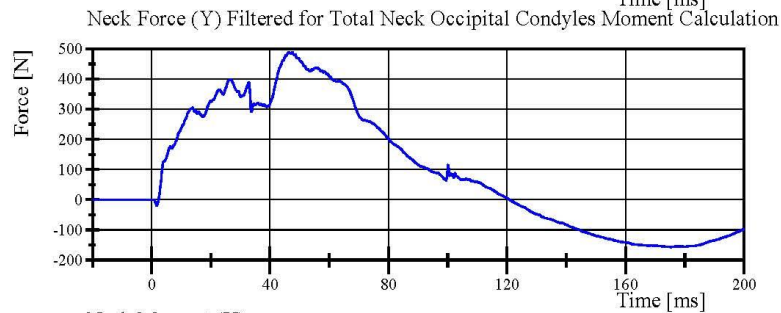
Left Lateral Neck

SID IIS Serial No. 297 Certification No. 27-1

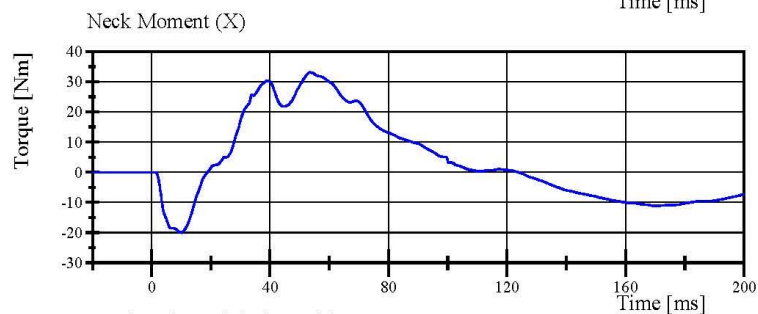
Test Date: 5/5/2018



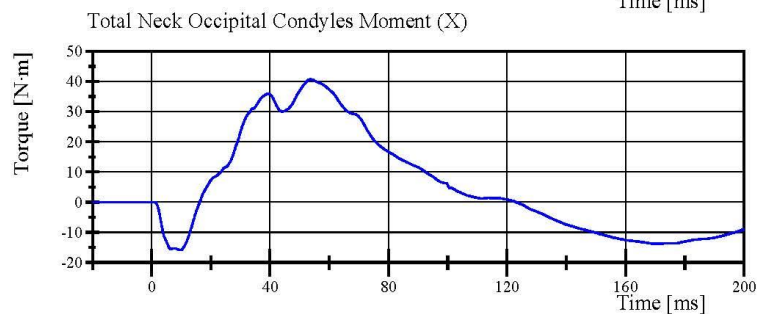
Filter Class: CFC_1000
Max: 491.1 N at 47.4 ms
Min: -156.4 N at 174.4 ms



Filter Class: CFC_600
Max: 490.0 N at 47.5 ms
Min: -156.0 N at 175.3 ms



Filter Class: CFC_600
Max: 33.1 Nm at 53.4 ms
Min: -20.0 Nm at 10.2 ms



Filter Class: Without_(Consta
Max: 40.7 N·m at 53.6 ms
Min: -15.8 N·m at 9.5 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 06:41:41 716



Transportation Research Center Inc.

Left Lateral Shoulder

SID IIs Serial No. 297 Certification No. 27-1

Test Date: 5/5/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.2 g	Yes
Shoulder Displacement	28 - 37 mm	30.7 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	18.9 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: 940L

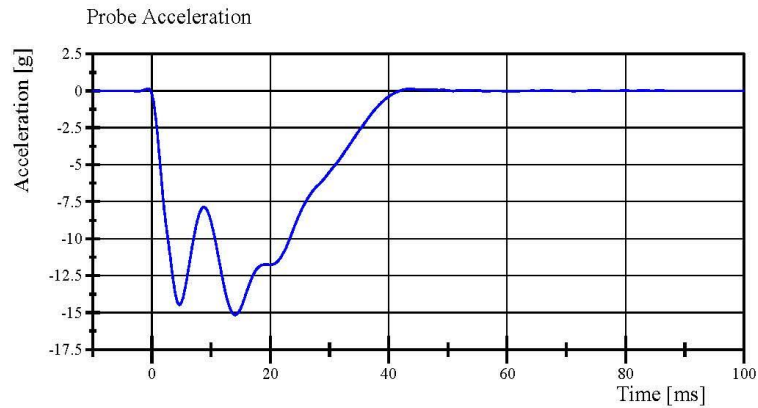
Shoulder Rib S/N: 180-3366 259

Transportation Research Center Inc.

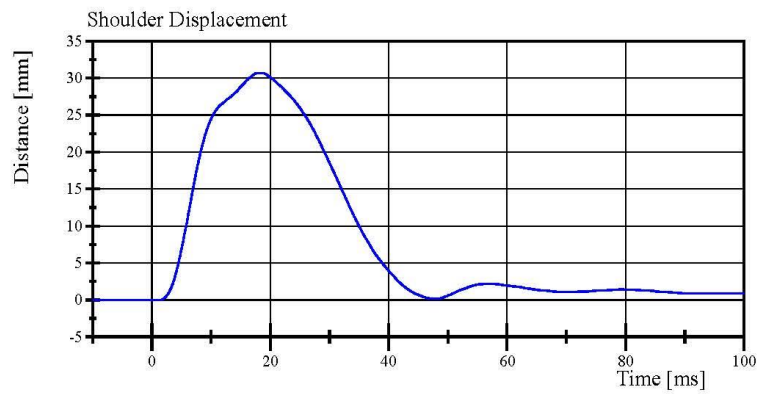
Left Lateral Shoulder

SID IIs Serial No. 297 Certification No. 27-1

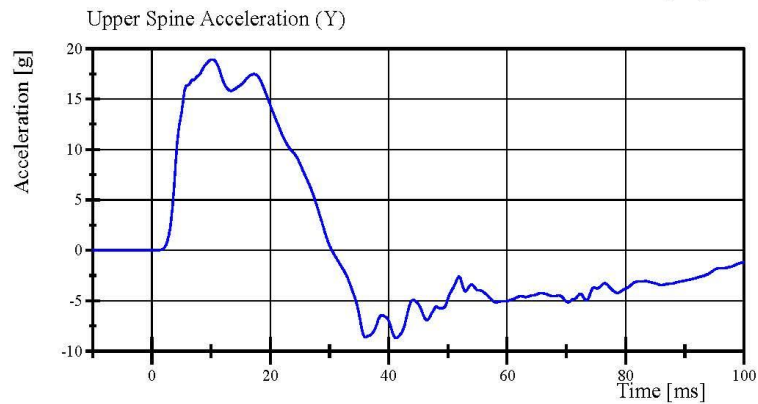
Test Date: 5/5/2018



Filter Class: CFC_180
Max: 0.1 g at -0.6 ms
Min: -15.2 g at 14.1 ms



Filter Class: CFC_600
Max: 30.7 mm at 18.2 ms
Min: -0.0 mm at 1.4 ms



Filter Class: CFC_180
Max: 18.9 g at 10.3 ms
Min: -8.7 g at 41.3 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 07:55:41 821



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 27-1
Test Date: 5/5/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.9 °C	Yes
Relative Humidity	10 - 70 %	44 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.738 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-33.2 g	Yes
Shoulder Displacement	31 - 40 mm	35.8 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.6 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	32.6 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	36.2 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	36.7 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	35.1 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: 940L

Shoulder Rib S/N: 180-3366 259

Upper Thorax Rib #1 S/N: 2009

MiddleThorax Rib #2 S/N: 2010

LowerThorax Rib #3 S/N: 2029

Thorax Pad S/N: N/A

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

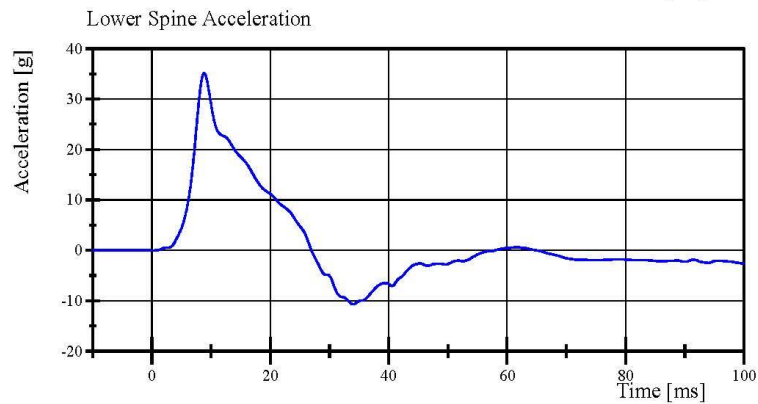
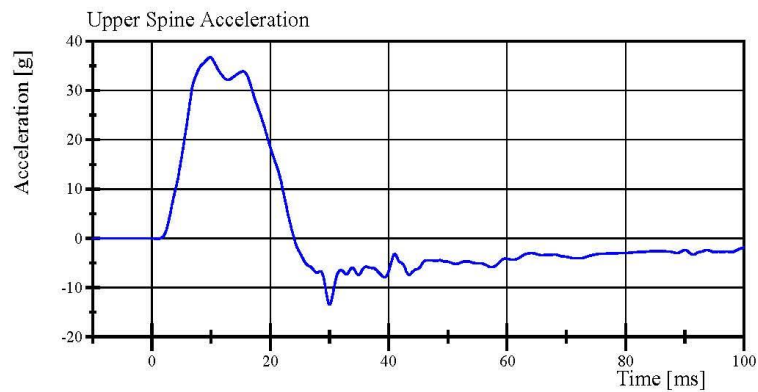
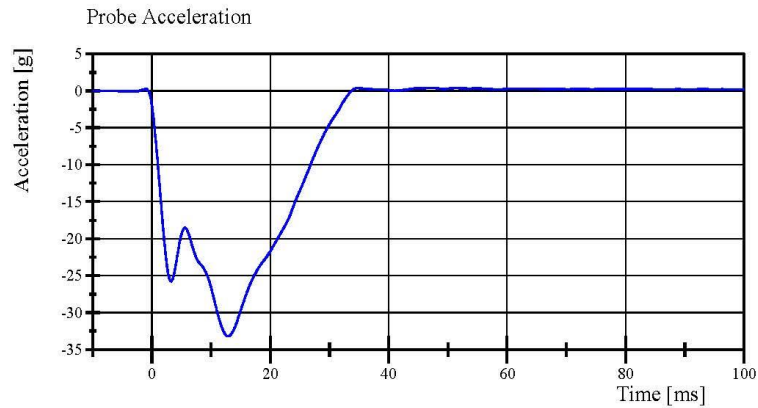
Page 17 of 31

05.05.2018 08:14:28 600



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 27-1
Test Date: 5/5/2018



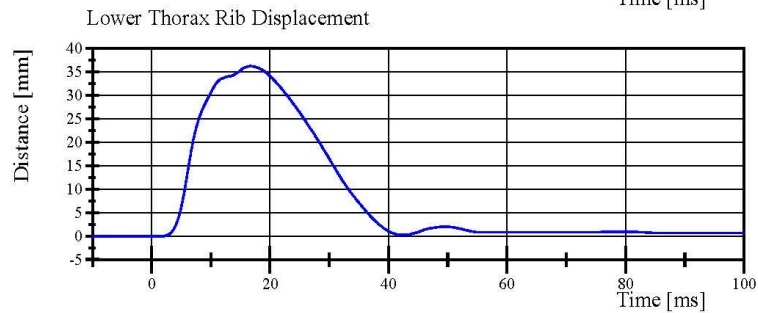
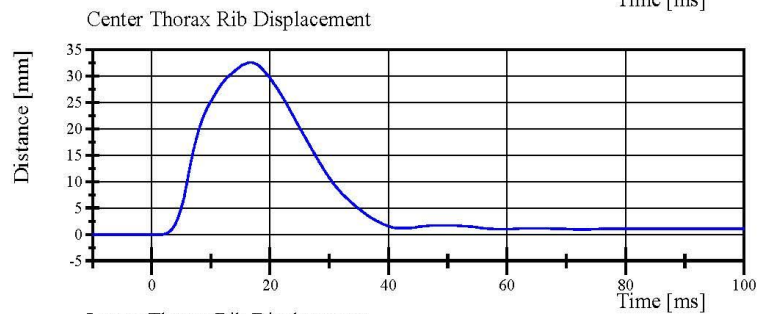
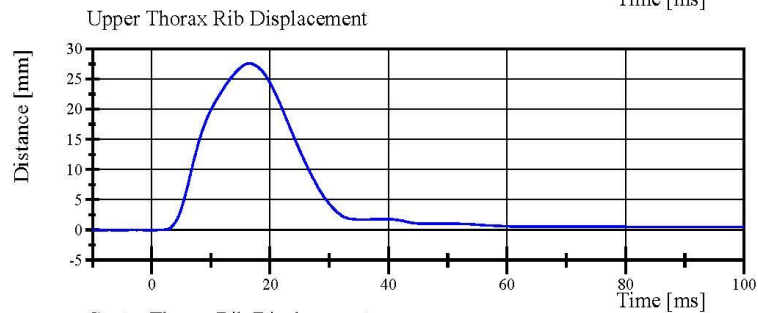
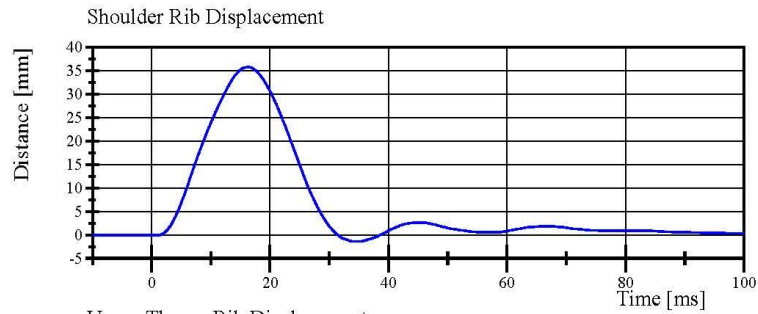
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 08:15:51 600



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 27-1
Test Date: 5/5/2018



Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 08:15:52 600



Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 27-1
Test Date: 5/5/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	47 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.327 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-16.1 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	34.2 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	41.5 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	41.1 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.2 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.9 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Thorax Rib #1 S/N: 2009

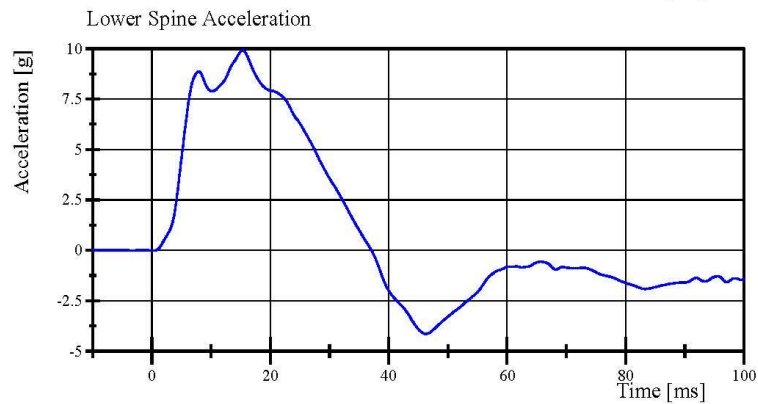
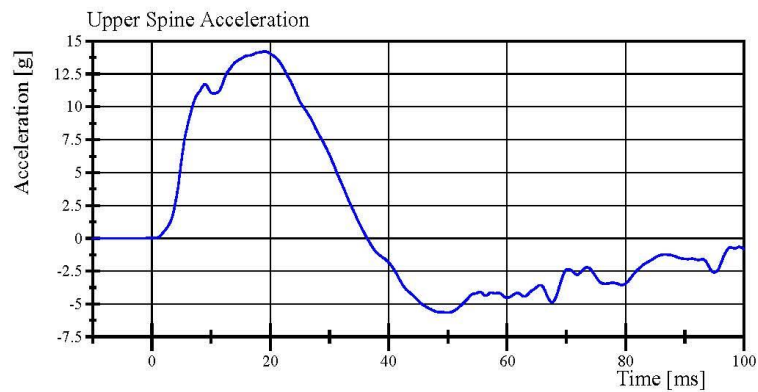
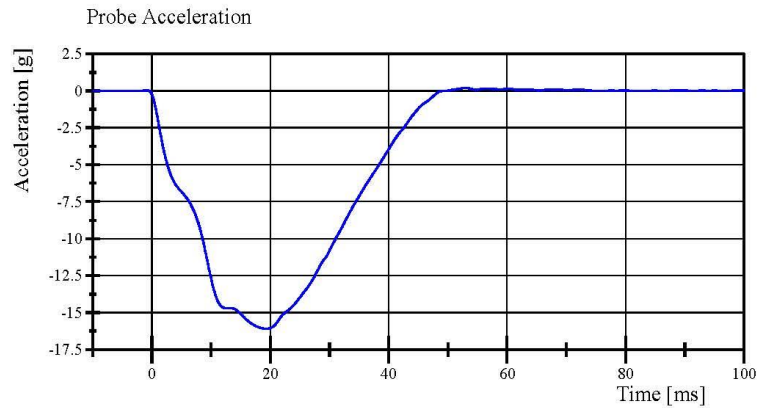
MiddleThorax Rib #2 S/N: 2010

LowerThorax Rib #3 S/N: 2029

Thorax Pad S/N: N/A

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 27-1
Test Date: 5/5/2018



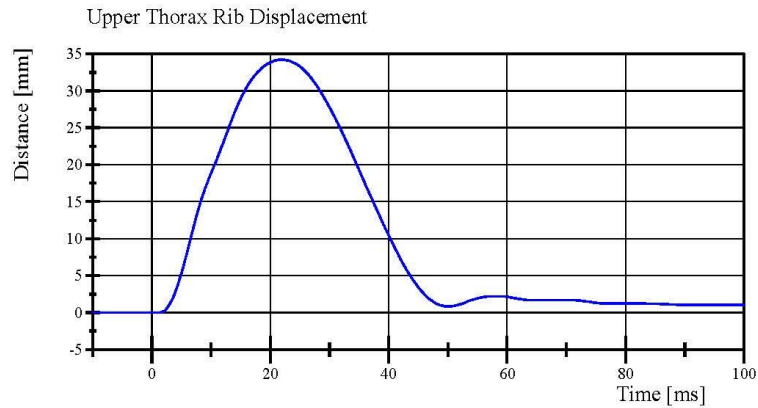
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 08:52:57 788

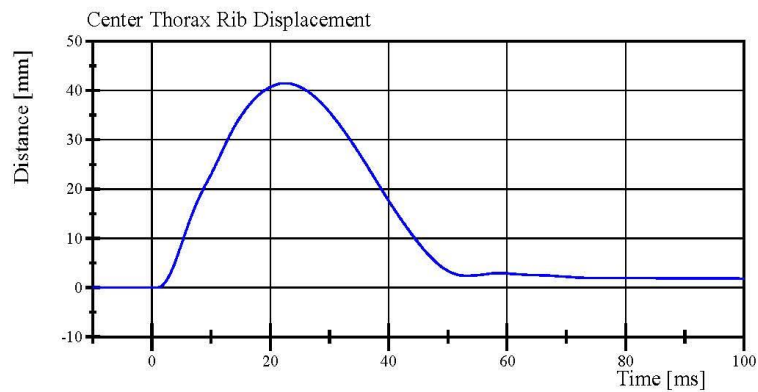


Transportation Research Center Inc.

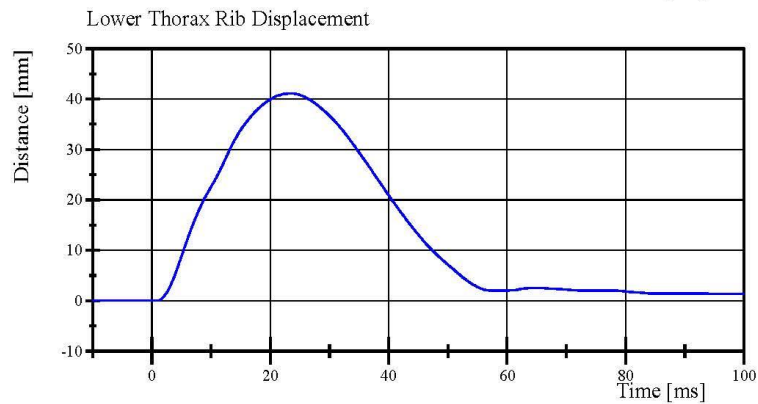
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 27-1
Test Date: 5/5/2018



Filter Class: CFC_600
Max: 34.2 mm at 21.9 ms
Min: -0.0 mm at 1.2 ms



Filter Class: CFC_600
Max: 41.5 mm at 22.6 ms
Min: -0.0 mm at 0.7 ms



Filter Class: CFC_600
Max: 41.1 mm at 23.8 ms
Min: -0.0 mm at 0.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 08:52:58 788



Transportation Research Center Inc.

Left Lateral Abdomen

SID IIs Serial No. 297 Certification No. 27-1

Test Date: 5/5/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.32 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.3 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	40.5 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	37.6 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.89 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Abdominal Rib S/N: 1747

Lower Abdominal Rib S/N: 1748

Abdominal Pad S/N: N/A

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 23 of 31

05.05.2018 09:02:41 663

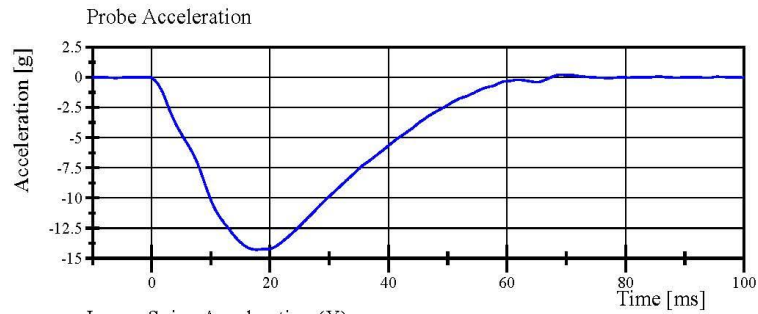


Transportation Research Center Inc.

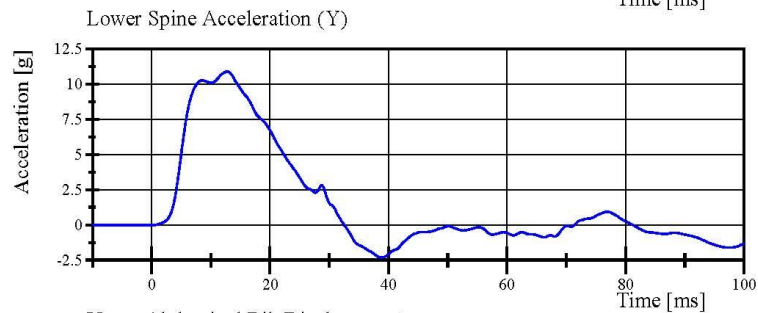
Left Lateral Abdomen

SID IIs Serial No. 297 Certification No. 27-1

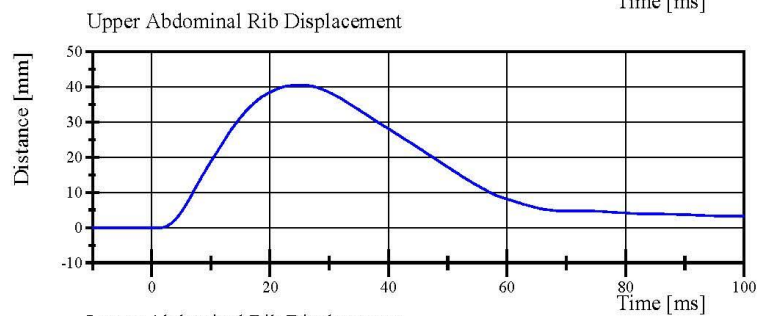
Test Date: 5/5/2018



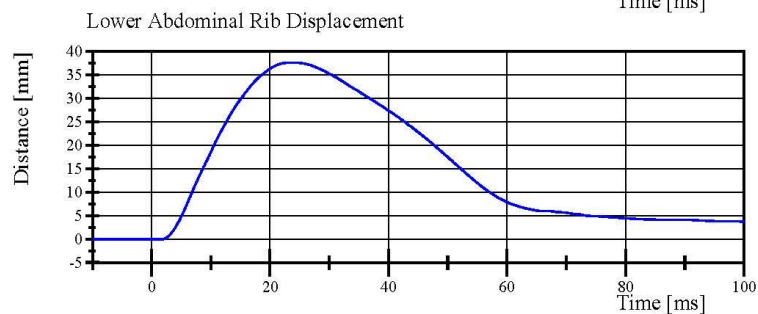
Filter Class: CFC_180
Max: 0.2 g at 69.0 ms
Min: -14.3 g at 17.8 ms



Filter Class: CFC_180
Max: 10.9 g at 12.8 ms
Min: -2.3 g at 38.7 ms



Filter Class: CFC_600
Max: 40.5 mm at 24.6 ms
Min: -0.0 mm at -8.1 ms



Filter Class: CFC_600
Max: 37.6 mm at 23.8 ms
Min: -0.0 mm at 1.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 09:03:46 663



Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 27-1
Test Date: 5/5/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	43 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.64 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-44.16 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	34.7 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,853.0 N	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: DY5517

Pelvis Plug Info:

Manufacturer: Saco

S/N: 10827

Cal Date: 20160315

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 27 of 31

05.05.2018 07:41:17 433

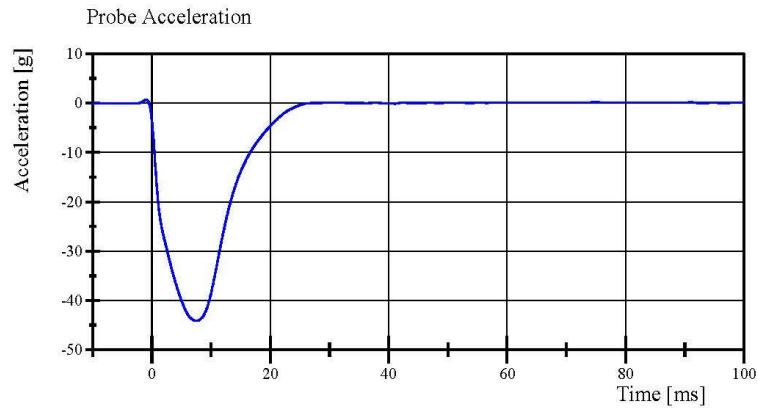


Transportation Research Center Inc.

Left Lateral Pelvis

SID IIs Serial No. 297 Certification No. 27-1

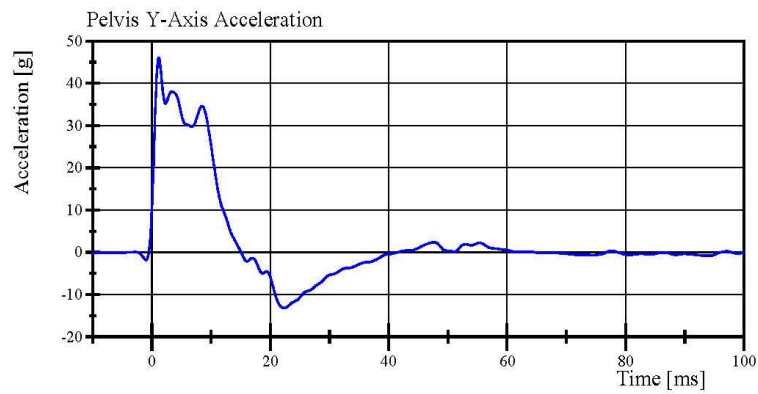
Test Date: 5/5/2018



Filter Class: CFC_180

Max: 0.7 g at -1.0 ms

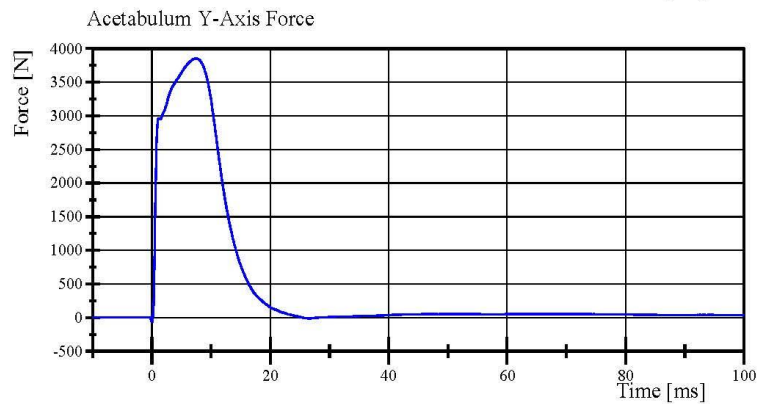
Min: -44.2 g at 7.5 ms



Filter Class: CFC_180

Max: 46.1 g at 1.2 ms

Min: -13.2 g at 22.4 ms



Filter Class: CFC_600

Max: 3,853.0 N at 7.4 ms

Min: -62.3 N at 0.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 07:43:16 433



Transportation Research Center Inc.

Left Lateral Iliac

SID IIs Serial No. 297 Certification No. 27-2

Test Date: 5/5/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	46 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.36 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-41.3 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	29.2 g	Yes
Iliac Force	4,100 - 5,100 N	4,709.2 N	Yes

Test meets specifications.

Condition: Used

Comments:

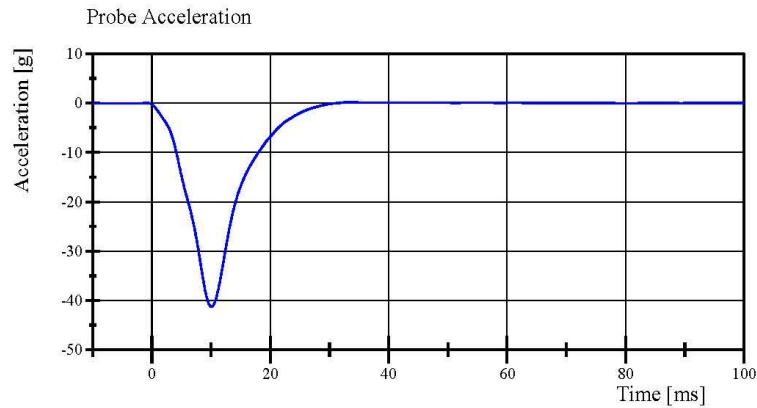
Pelvis Skin S/N: DY5517

Transportation Research Center Inc.

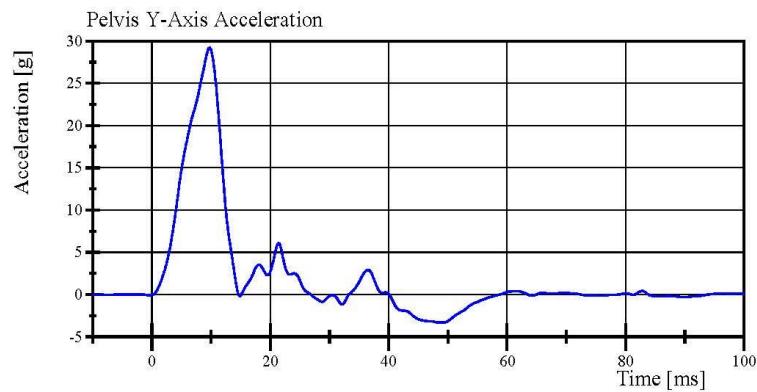
Left Lateral Iliac

SID IIs Serial No. 297 Certification No. 27-2

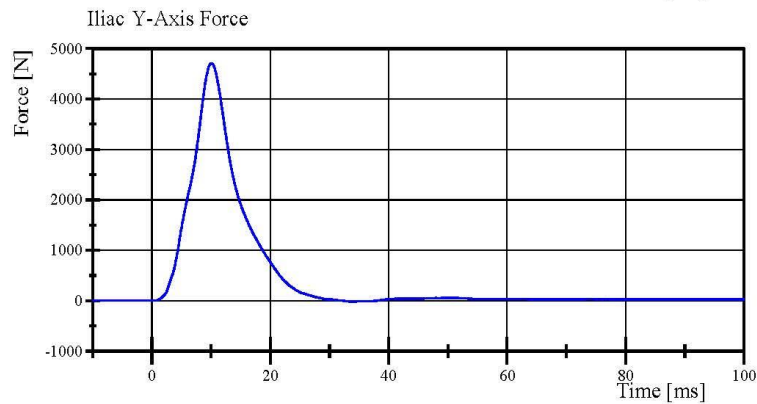
Test Date: 5/5/2018



Filter Class: CFC_180
Max: 0.2 g at 33.4 ms
Min: -41.3 g at 10.1 ms



Filter Class: CFC_180
Max: 29.2 g at 9.8 ms
Min: -3.3 g at 48.6 ms



Filter Class: CFC_600
Max: 4,709.2 N at 10.1 ms
Min: -14.2 N at 33.5 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.05.2018 12:18:06 607



Post-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 28

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	785	Yes
B	Shoulder Pivot Height	437.0 - 453.0	449	Yes
C	H-Point Height	79.0 - 89.0	85	Yes
D	H-Point from Seat Back	141.0 - 151.0	147	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	130	Yes
G	Head Breadth	140.0 - 148.0	147	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	183	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	527	Yes
L	Popliteal Height	343.0 - 369.0	353	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	400	Yes
N	Buttock Popliteal Length	416.0 - 442.0	430	Yes
O	Chest Depth without Jacket	195.0 - 211.0	200	Yes
P	Foot Length (right)	216.0 - 232.0	223	Yes
P	Foot Length (left)	216.0 - 232.0	221	Yes
Q	Hip Breadth	313.0 - 323.0	319	Yes
R	Arm Length	249.0 - 259.0	254	Yes
S	Knee Joint to seat Back	478.0 - 493.0	485	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	347	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
W	Foot Width (left)	78.0 - 94.0	83	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	877	Yes
Z	Waist Circumference	761.0 - 791.0	780	Yes

Transportation Research Center Inc.

Left Lateral Head Drop

SID IIs Serial No. 297 Certification No. 28-1

Test Date: 5/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	48 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	121.2 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-8.2 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Condition: Used

Comments:

Head Skin S/N: 1330

Skull S/N: 180/1001/C

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 9 of 31

05.11.2018 08:46:12 196

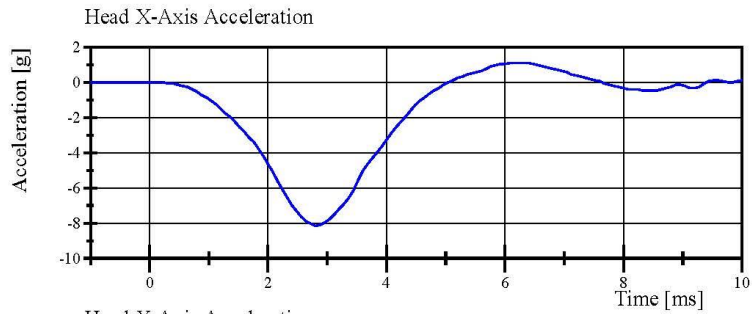


Transportation Research Center Inc.

Left Lateral Head Drop

SID IIs Serial No. 297 Certification No. 28-1

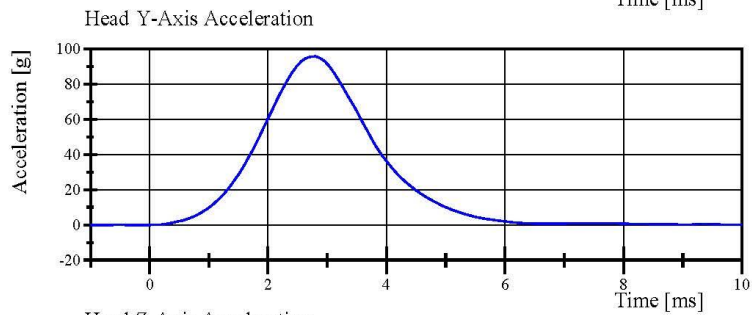
Test Date: 5/11/2018



Filter Class: CFC_1000

Max: 1.1 g at 6.1 ms

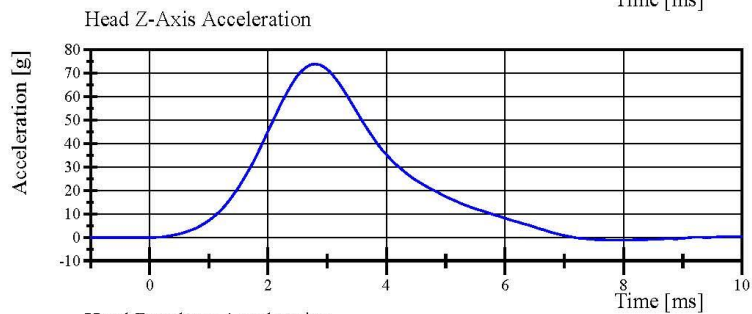
Min: -8.2 g at 2.8 ms



Filter Class: CFC_1000

Max: 95.7 g at 2.8 ms

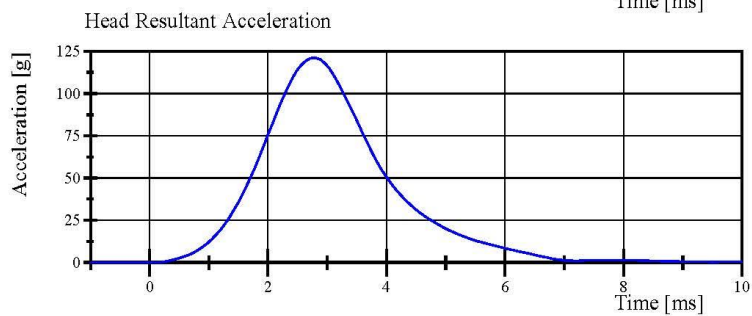
Min: -0.0 g at -1.0 ms



Filter Class: CFC_1000

Max: 73.9 g at 2.8 ms

Min: -1.2 g at 7.8 ms



Filter Class: CFC_1000

Max: 121.2 g at 2.8 ms

Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 08:47:39 196



Transportation Research Center Inc.

Left Lateral Neck

SID IIs Serial No. 297 Certification No. 28-2

Test Date: 5/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	22.0 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.615 m/s	Yes
Pendulum Integrated Velocity			
Change at 10 ms	2.20 - 2.80 m/s	2.403 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.509 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.683 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.621 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.991 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-72.3 deg	Yes
Time of Peak	50 - 70 ms	69.0 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	41.8 N·m	Yes
Total Neck Occipital Condyles Moment			
Decay Time to 0 N·m	102 - 126 ms	123.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:

Neck S/N: 779

Neck Cable S/N: N/A

Nodding Block S/N's:

- Front - 8505 3012

- Rear - N/A

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 11 of 31

05.11.2018 12:13:18 714

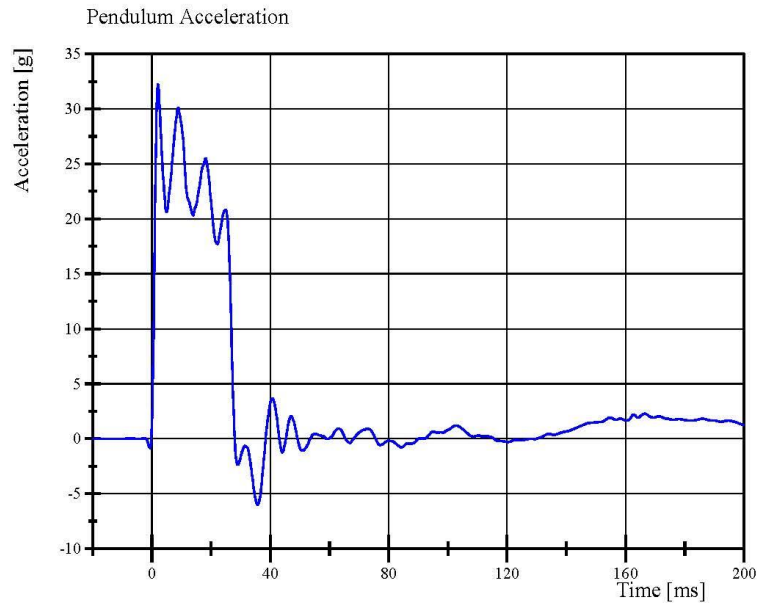


Transportation Research Center Inc.

Left Lateral Neck

SID IIS Serial No. 297 Certification No. 28-2

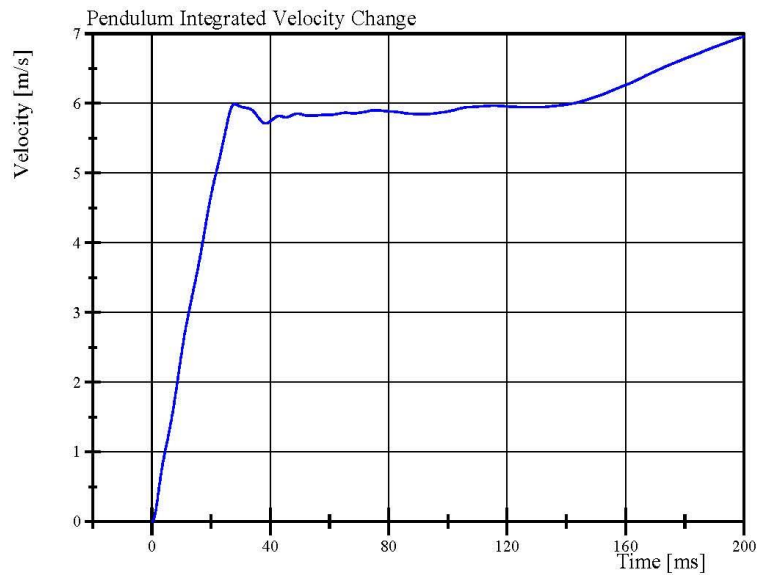
Test Date: 5/11/2018



Filter Class: CFC_180

Max: 32.2 g at 2.1 ms

Min: -6.0 g at 35.7 ms



Filter Class: CFC_180

Max: 7.0 m/s at 200.0 ms

Min: 0.0 m/s at 0.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 12:14:15 714

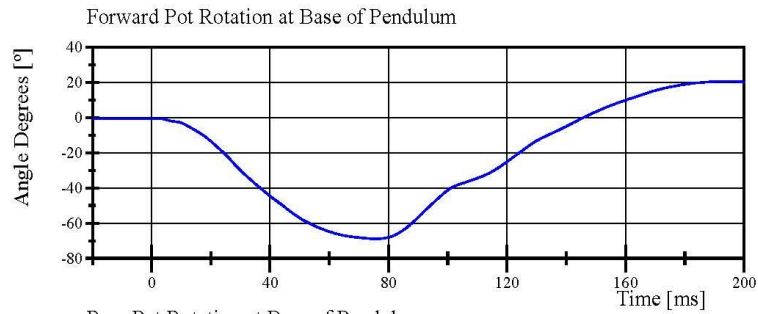


Transportation Research Center Inc.

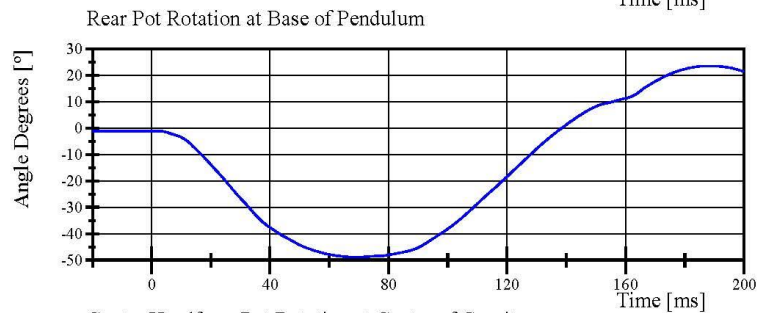
Left Lateral Neck

SID IIs Serial No. 297 Certification No. 28-2

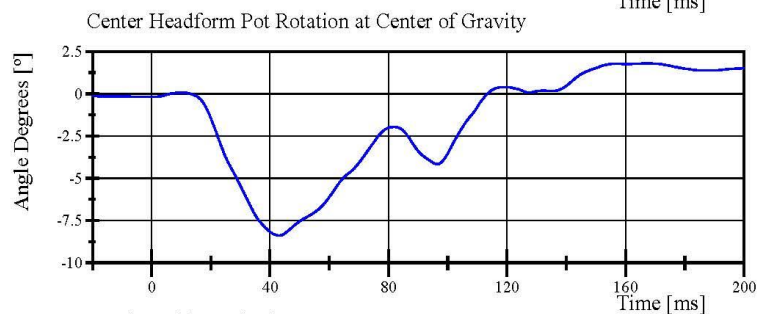
Test Date: 5/11/2018



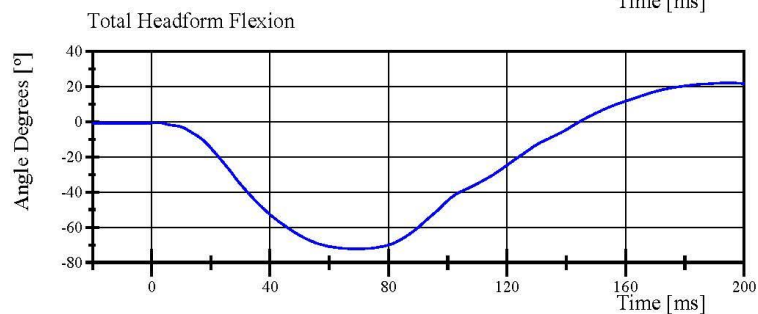
Filter Class: CFC_60
Max: 20.6 ° at 194.0 ms
Min: -68.8 ° at 75.8 ms



Filter Class: CFC_60
Max: 23.5 ° at 188.1 ms
Min: -48.8 ° at 69.2 ms



Filter Class: CFC_60
Max: 1.8 ° at 167.3 ms
Min: -8.4 ° at 43.0 ms



Filter Class: CFC_60
Max: 22.1 ° at 194.7 ms
Min: -72.3 ° at 69.0 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 12:14:16 714

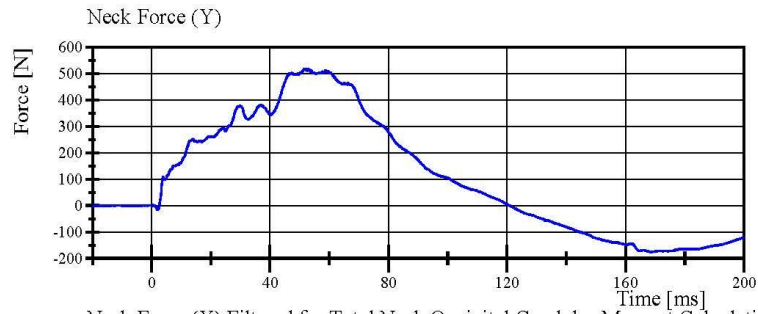


Transportation Research Center Inc.

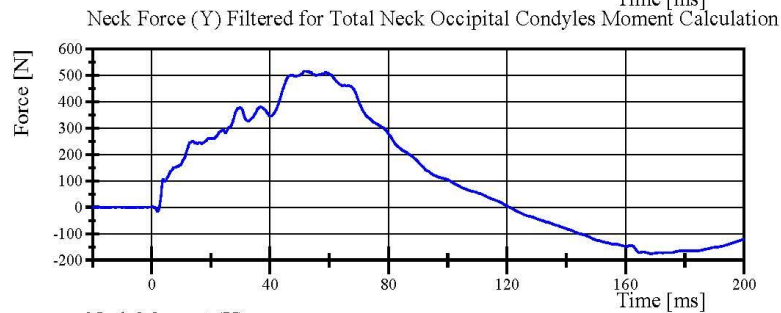
Left Lateral Neck

SID IIS Serial No. 297 Certification No. 28-2

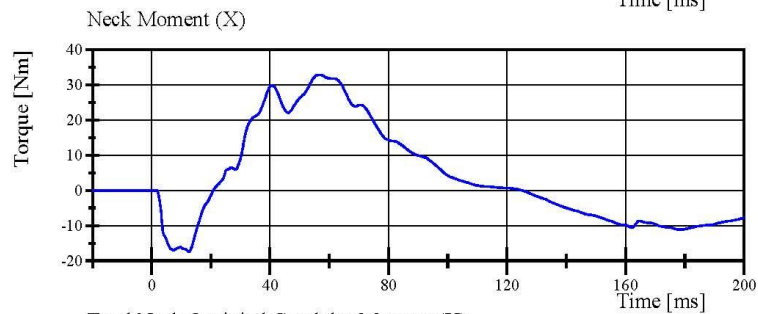
Test Date: 5/11/2018



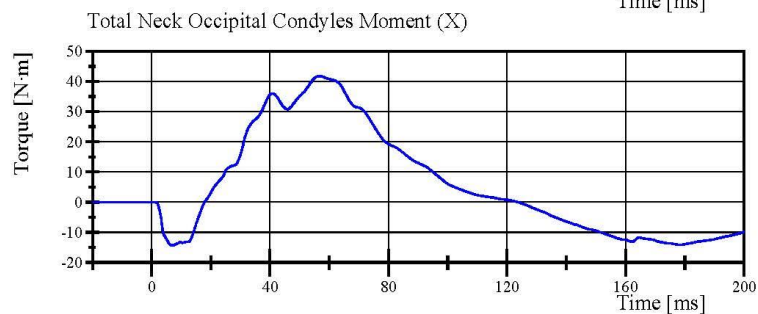
Filter Class: CFC_1000
Max: 518.4 N at 52.2 ms
Min: -175.6 N at 168.4 ms



Filter Class: CFC_600
Max: 516.5 N at 52.2 ms
Min: -175.3 N at 168.6 ms



Filter Class: CFC_600
Max: 32.9 Nm at 56.4 ms
Min: -17.4 Nm at 12.6 ms



Filter Class: Without_(Consta
Max: 41.8 N·m at 57.3 ms
Min: -14.3 N·m at 6.7 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 12:14:17 714



Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 28-1
Test Date: 5/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.3 g	Yes
Shoulder Displacement	28 - 37 mm	30.8 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	18.7 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: 940L

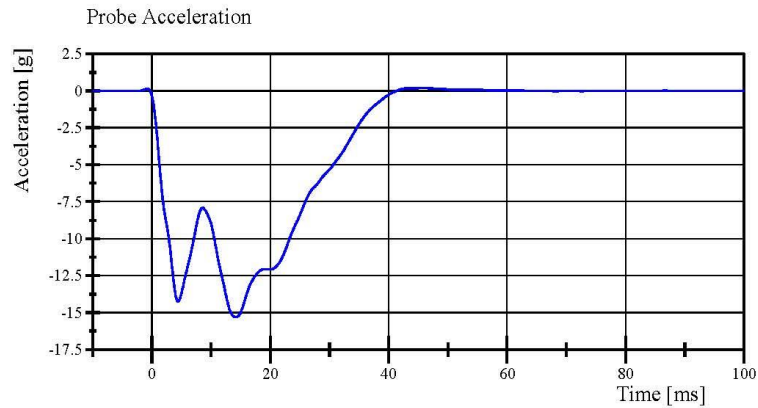
Shoulder Rib S/N: 180-3366 259

Transportation Research Center Inc.

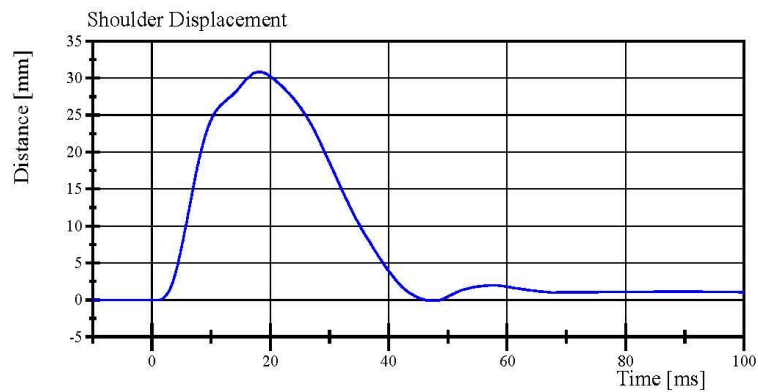
Left Lateral Shoulder

SID IIs Serial No. 297 Certification No. 28-1

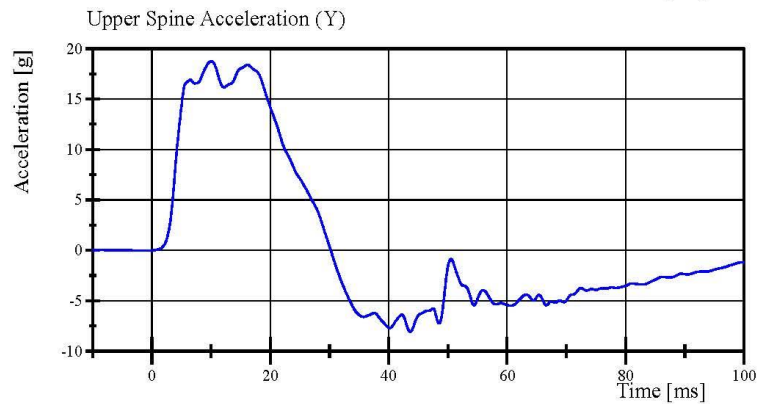
Test Date: 5/11/2018



Filter Class: CFC_180
Max: 0.2 g at 45.8 ms
Min: -15.3 g at 14.2 ms



Filter Class: CFC_600
Max: 30.8 mm at 18.2 ms
Min: -0.1 mm at 47.8 ms



Filter Class: CFC_180
Max: 18.7 g at 10.0 ms
Min: -8.1 g at 43.6 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 13:24:26 821



Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 28-1
Test Date: 5/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.740 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-32.8 g	Yes
Shoulder Displacement	31 - 40 mm	35.2 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.3 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.9 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	34.7 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	36.7 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	33.8 g	Yes

Test meets specifications.

Condition: Used

Comments:

Left Arm S/N: 940L

Shoulder Rib S/N: 180-3366 259

Upper Thorax Rib #1 S/N: 2009

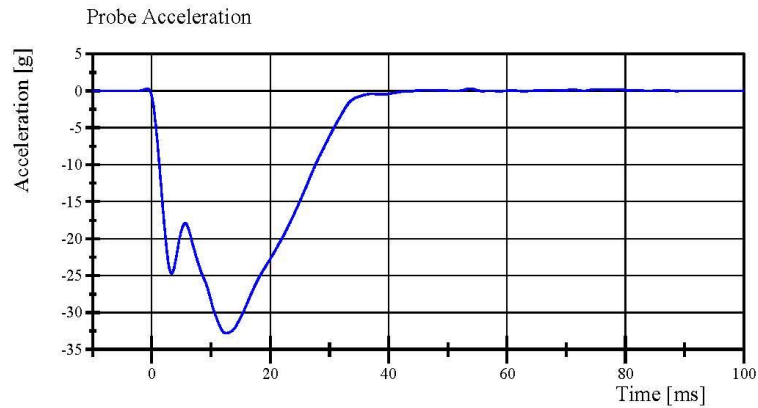
MiddleThorax Rib #2 S/N: 2010

LowerThorax Rib #3 S/N: 2029

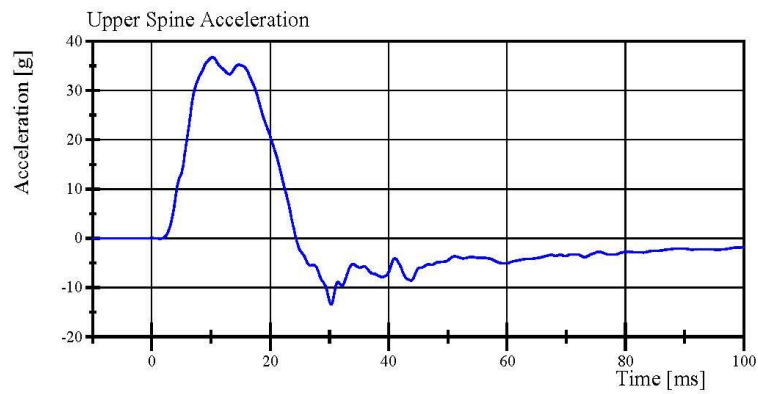
Thorax Pad S/N: N/A

Transportation Research Center Inc.

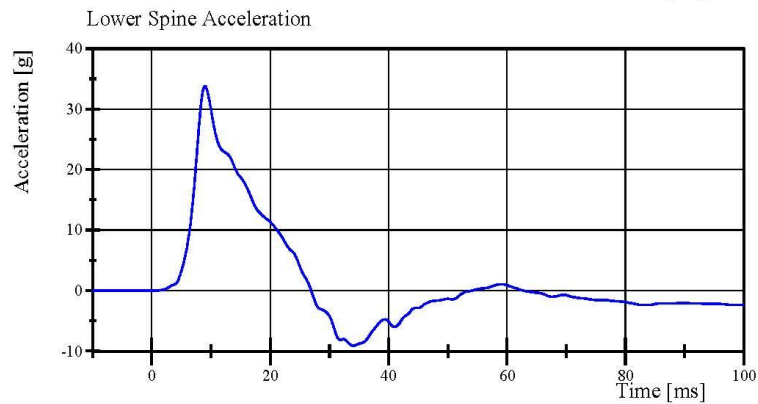
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 28-1
Test Date: 5/11/2018



Filter Class: CFC_180
Max: 0.3 g at 53.8 ms
Min: -32.8 g at 12.6 ms



Filter Class: CFC_180
Max: 36.7 g at 10.2 ms
Min: -13.4 g at 30.3 ms



Filter Class: CFC_180
Max: 33.8 g at 9.0 ms
Min: -9.1 g at 34.1 ms

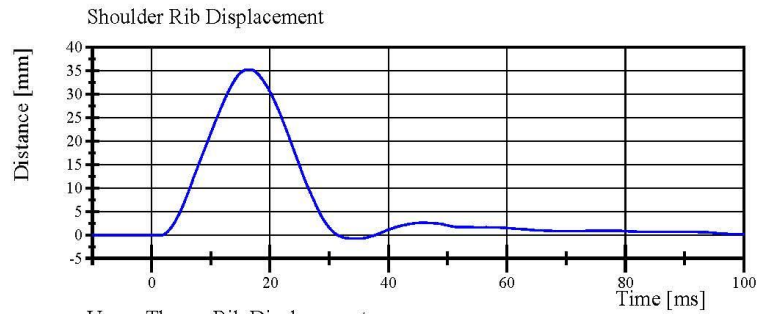
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 14:11:08 593

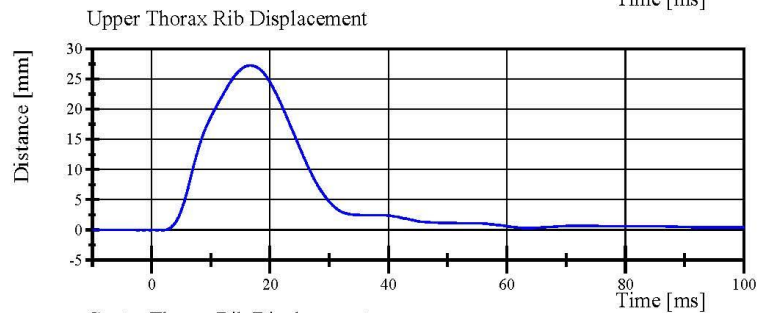


Transportation Research Center Inc.

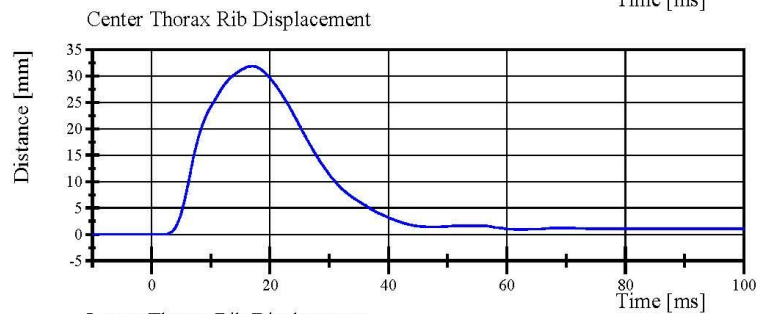
Left Lateral Thorax with Arm
SID IIS Serial No. 297 Certification No. 28-1
Test Date: 5/11/2018



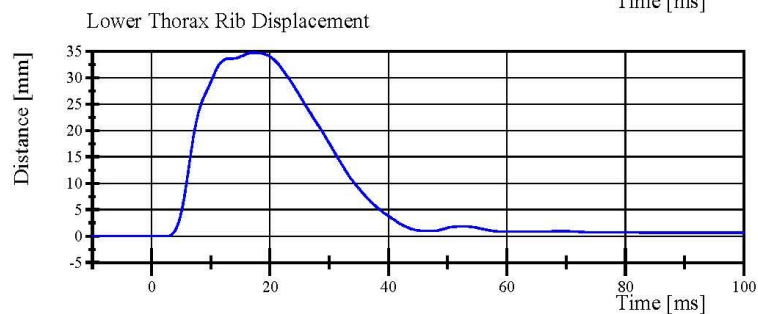
Filter Class: CFC_600
Max: 35.2 mm at 16.5 ms
Min: -0.7 mm at 35.3 ms



Filter Class: CFC_600
Max: 27.3 mm at 16.6 ms
Min: -0.0 mm at 2.1 ms



Filter Class: CFC_600
Max: 31.9 mm at 17.0 ms
Min: -0.0 mm at 2.1 ms



Filter Class: CFC_600
Max: 34.7 mm at 17.0 ms
Min: -0.0 mm at 2.7 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 14:11:09 593



Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 28-1
Test Date: 5/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.313 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.4 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	36.6 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	40.2 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	37.2 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	15.0 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	8.5 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Thorax Rib #1 S/N: 2009

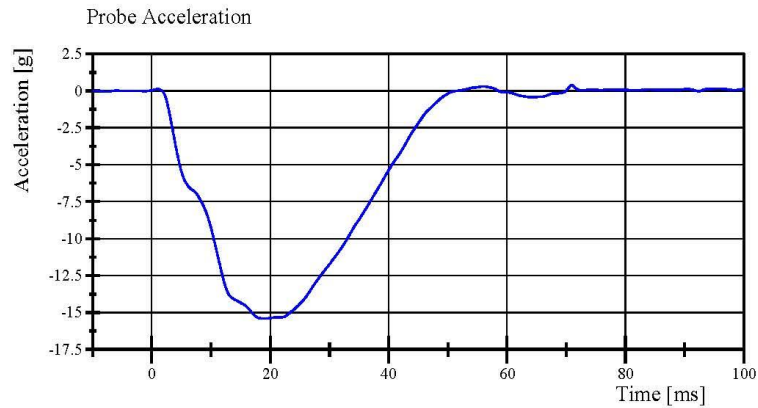
MiddleThorax Rib #2 S/N: 2010

LowerThorax Rib #3 S/N: 2029

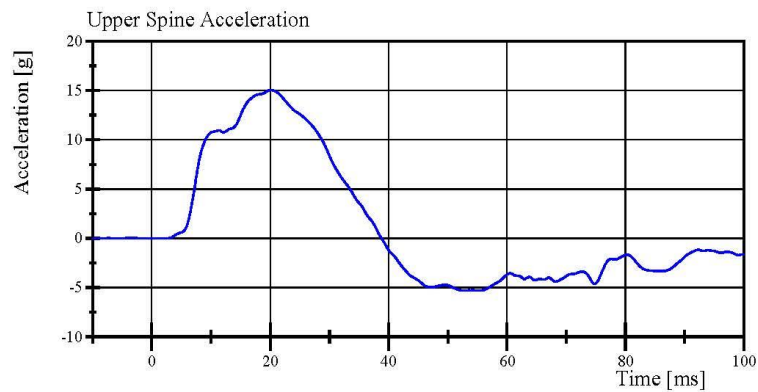
Thorax Pad S/N: N/A

Transportation Research Center Inc.

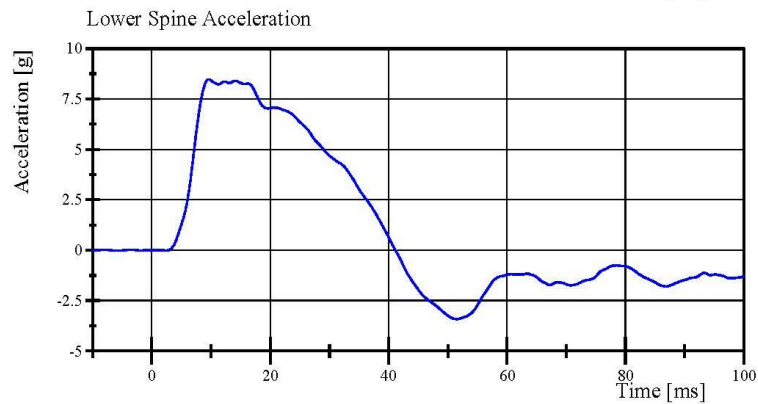
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 28-1
Test Date: 5/11/2018



Filter Class: CFC_180
Max: 0.4 g at 70.9 ms
Min: -15.4 g at 19.3 ms



Filter Class: CFC_180
Max: 15.0 g at 20.2 ms
Min: -5.3 g at 55.4 ms



Filter Class: CFC_180
Max: 8.5 g at 9.6 ms
Min: -3.4 g at 51.5 ms

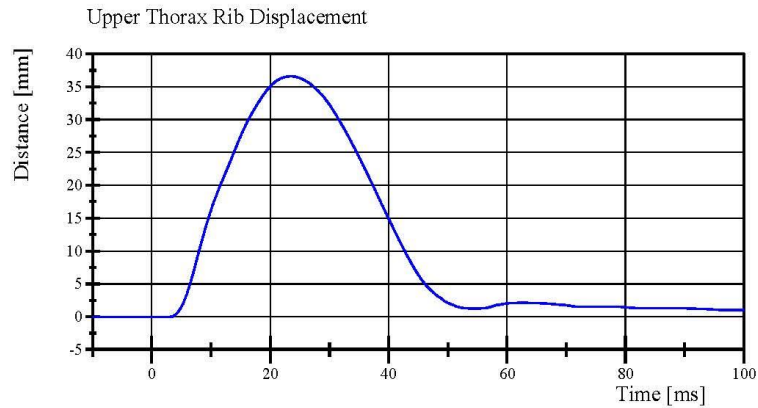
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 13:40:37 785

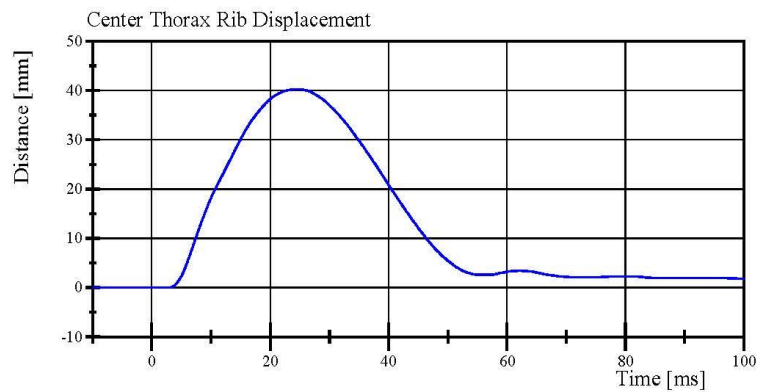


Transportation Research Center Inc.

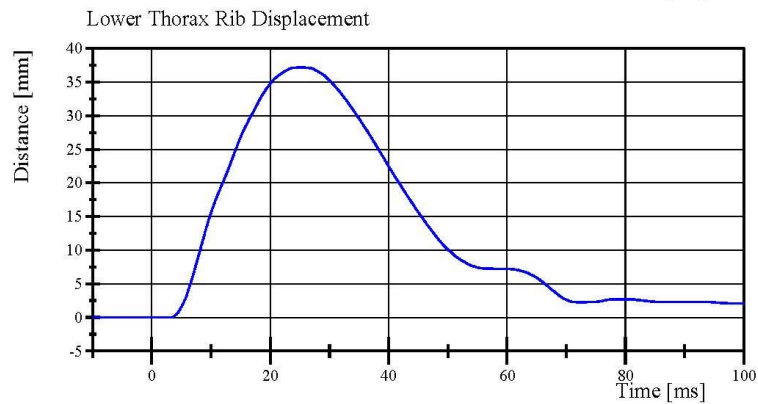
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 28-1
Test Date: 5/11/2018



Filter Class: CFC_600
Max: 36.6 mm at 23.4 ms
Min: -0.0 mm at 3.0 ms



Filter Class: CFC_600
Max: 40.2 mm at 24.4 ms
Min: -0.0 mm at 2.9 ms



Filter Class: CFC_600
Max: 37.2 mm at 25.2 ms
Min: -0.0 mm at 3.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 13:40:39 785



Transportation Research Center Inc.

Left Lateral Abdomen

SID IIs Serial No. 297 Certification No. 28-1

Test Date: 5/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.32 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.6 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	42.2 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	39.4 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.37 g	Yes

Test meets specifications.

Condition: Used

Comments:

Upper Abdominal Rib S/N: 1747

Lower Abdominal Rib S/N: 1748

Abdominal Pad S/N: N/A

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 23 of 31

05.11.2018 14:27:57 638

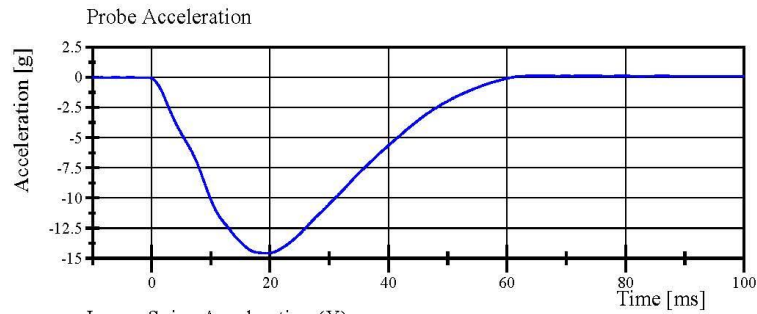


Transportation Research Center Inc.

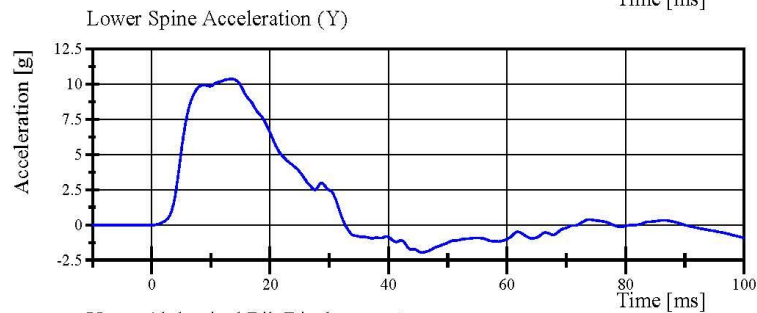
Left Lateral Abdomen

SID IIs Serial No. 297 Certification No. 28-1

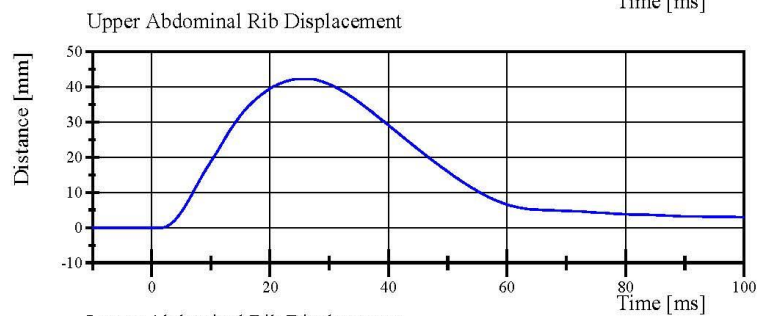
Test Date: 5/11/2018



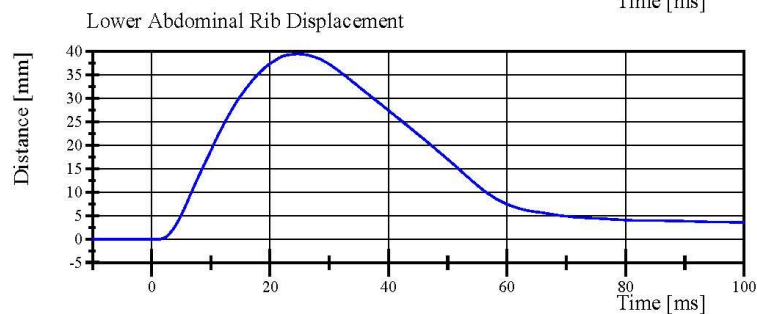
Filter Class: CFC_180
Max: 0.1 g at 66.1 ms
Min: -14.6 g at 19.4 ms



Filter Class: CFC_180
Max: 10.4 g at 13.5 ms
Min: -1.9 g at 45.6 ms



Filter Class: CFC_600
Max: 42.2 mm at 25.4 ms
Min: -0.0 mm at 1.5 ms



Filter Class: CFC_600
Max: 39.4 mm at 24.6 ms
Min: -0.0 mm at 1.1 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 14:29:17 638



Transportation Research Center Inc.

Left Lateral Pelvis

SID IIs Serial No. 297 Certification No. 28-2

Test Date: 5/11/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	42 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.66 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-45.35 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	37.4 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,810.8 N	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: DY5517

Pelvis Plug Info:

Manufacturer: Saco

S/N: 11499

Cal Date: 20160831

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 27 of 31

05.11.2018 15:08:27 424

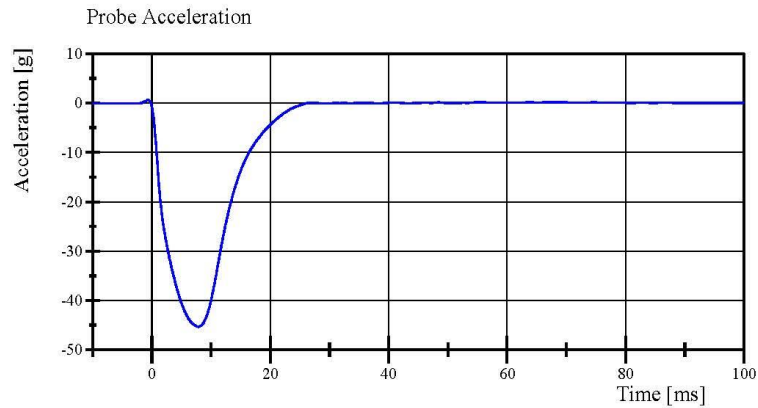


Transportation Research Center Inc.

Left Lateral Pelvis

SID IIs Serial No. 297 Certification No. 28-2

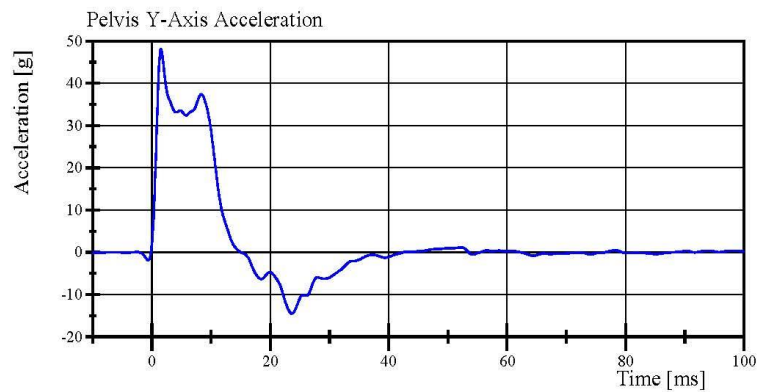
Test Date: 5/11/2018



Filter Class: CFC_180

Max: 0.6 g at -0.6 ms

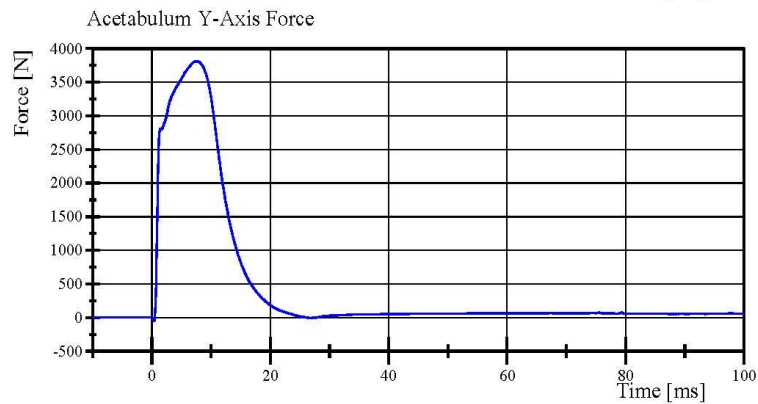
Min: -45.4 g at 7.8 ms



Filter Class: CFC_180

Max: 48.1 g at 1.5 ms

Min: -14.5 g at 23.6 ms



Filter Class: CFC_600

Max: 3,810.8 N at 7.6 ms

Min: -54.0 N at 0.4 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.11.2018 15:14:22 424



Transportation Research Center Inc.

Left Lateral Iliac

SID IIs Serial No. 297 Certification No. 28-1

Test Date: 5/12/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	20.9 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.40 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-39.4 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	28.1 g	Yes
Iliac Force	4,100 - 5,100 N	4,383.6 N	Yes

Test meets specifications.

Condition: Used

Comments:

Pelvis Skin S/N: DY5517

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

Page 25 of 31

05.12.2018 06:37:29 617

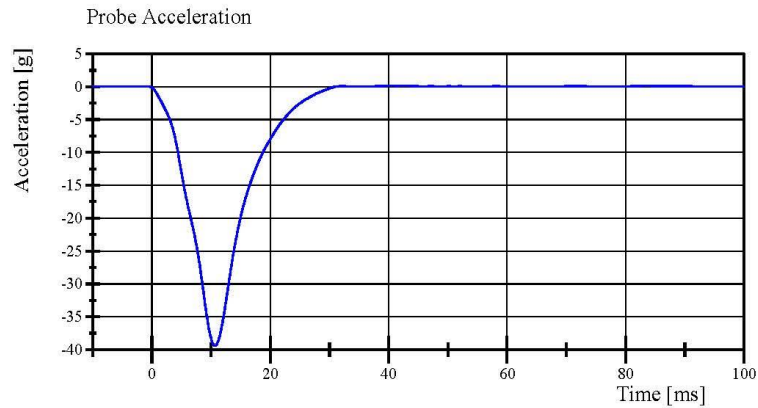


Transportation Research Center Inc.

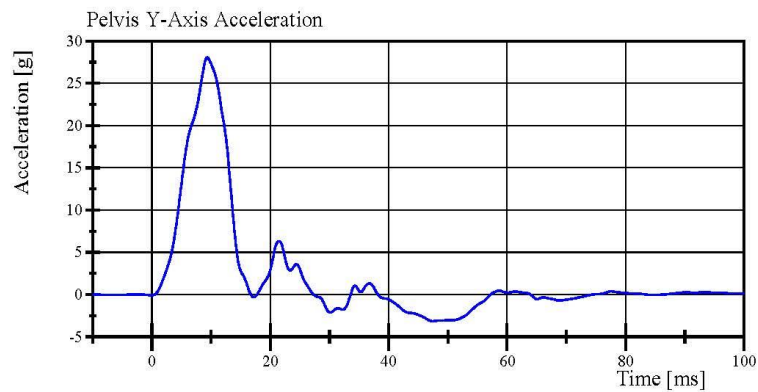
Left Lateral Iliac

SID IIs Serial No. 297 Certification No. 28-1

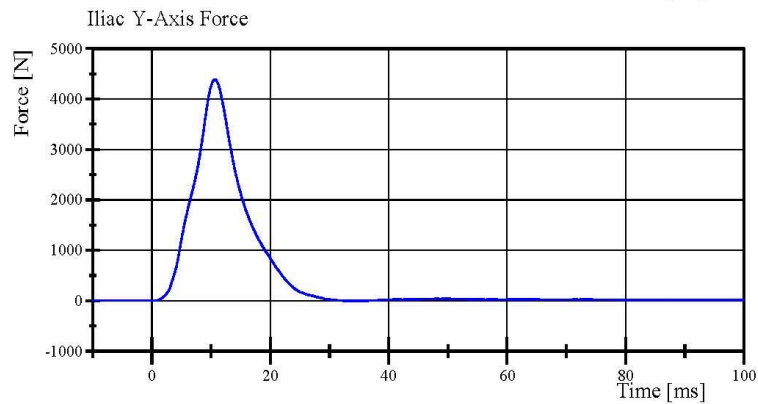
Test Date: 5/12/2018



Filter Class: CFC_180
Max: 0.2 g at 42.6 ms
Min: -39.4 g at 10.6 ms



Filter Class: CFC_180
Max: 28.1 g at 9.4 ms
Min: -3.2 g at 47.4 ms



Filter Class: CFC_600
Max: 4,383.6 N at 10.6 ms
Min: -6.2 N at 33.8 ms

Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

05.12.2018 06:38:10 617



APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 297			
				Serial Number	Manufacturer	Calibration Date	
Head Accelerometers				X	P93539	Endevco	9-Apr-2018
				Y	P93549	Endevco	9-Apr-2018
				Z	P93776	Endevco	9-Apr-2018
Displacement Potentiometers	Shoulder		Y	N/A	N/A	N/A	
	Thoracic Rib	Upper	Y	047	Servo	9-Apr-2018	
		Middle	Y	01815	Servo	9-Apr-2018	
		Lower	Y	043	Servo	9-Apr-2018	
	Abdominal Rib	Upper	Y	01811	Servo	9-Apr-2018	
		Lower	Y	051	Servo	9-Apr-2018	
Lower Spine Accelerometers (T12)				X	P94425	Endevco	9-Apr-2018
				Y	P91522	Endevco	9-Apr-2018
				Z	P91511	Endevco	9-Apr-2018
Acetabulum Load Cell				Y	235-FY	FTSS	9-Apr-2018
Iliac Wing Load Cell				Y	320-FY	FTSS	9-Apr-2018
Pelvis Plug (struck side)					11469	SACO	31-Aug-2016
Pelvis Plug (non-struck side)					36505	FTSS	24-Sep-2010

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	P87822	Endevco	16-Mar-2018
Vehicle Center of Gravity	Y	P88460	Endevco	16-Mar-2018
Vehicle Center of Gravity	Z	P94524	Endevco	16-Mar-2018
Left Floor Sill	Y	P87978	Endevco	13-Nov-2017
A-Pillar Sill	Y	P94489	Endevco	13-Apr-2018
A-Pillar Low	Y	P88038	Endevco	30-Apr-2018
A-Pillar Mid	Y	P94580	Endevco	30-Apr-2018
B-Pillar Sill	Y	P85719	Endevco	13-Apr-2018
B-Pillar Low	Y	P88455	Endevco	14-Mar-2018
B-Pillar Mid	Y	P87583	Endevco	14-Mar-2018
Driver Seat	Y	P93551	Endevco	20-Dec-2017
Engine Top	X	P91482	Endevco	30-Apr-2018
Engine Top	Y	P75239	Endevco	13-Apr-2018
Firewall	Y	P46075	Endevco	13-Apr-2018
Right Roof	Y	P73570	Endevco	30-Apr-2018
Right Floor Sill	Y	P73220	Endevco	13-Apr-2018
Rear Floor Pan	X	P89124	Endevco	8-Nov-2017
Rear Floor Pan	Y	P94424	Endevco	9-Nov-2017

TABLE 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DK7091S	Humanetics	20-Nov-2017
Load Cell 2	DK7120S	Humanetics	20-Nov-2017
Load Cell 3	DK7118S	Humanetics	20-Nov-2017
Load Cell 4	DK7124S	Humanetics	20-Nov-2017
Load Cell 5	DK7111S	Humanetics	20-Nov-2017
Load Cell 6	DK7126S	Humanetics	20-Nov-2017
Load Cell 7	DK7112S	Humanetics	20-Nov-2017
Load Cell 8	DK7074S	Humanetics	20-Nov-2017