FINAL REPORT NUMBER: SPNCAP-TRC-19-001

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

BAYERISCHE MOTOREN WERKE AG
2019 BMW X5 5-DR SUV
NHTSA NUMBER: M20194104

PREPARED BY:
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Report Date: March 15, 2019

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: March 15, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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15. Supplemental Notes		

16. Abstract

A 32.2 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject vehicle, a 2019 BMW X5 5-DR SUV, 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 January 8, 2019.

The impact velocity was 32.22 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 21.2° C. The test vehicle's post-test maximum crush was 344 mm at Level 2.

The test or target vehicle's performance is given below:

	Unit	Threshold	Front SID-IIs
Head Injury Criteria (HIC_{36}):	NA	1000	308
Resultant Lower Spine Acceleration:	g's	82	43.5
Total Pelvic Force: (sum of acetabular and iliac forces)	N	5525	3541.9
Maximum Thoracic Rib Deflection	mm	38*	20.6
Maximum Abdomen Rib Deflection	mm	45*	25.6

* 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.

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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SECTION 1
TEST PURPOSE AND PROCEDURE

TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY 2019 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 2019 BMW X5 5-DR SUV manufactured by BAYERISCHE MOTOREN WERKE AG. 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 2019 BMW X5 5-DR SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.22 km/h. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, OH, on January 8, 2019. 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 Trisxial 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	308
Lower Spine Acceleration Resultant	G	82	43.5
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3541.9
Maximum Thoracic Rib Deflection	mm	38*	20.6
Maximum Abdominal Rib Deflection	mm	45*	25.6

* Proposed IARV

Supplemental restraint information is given below:

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

GENERAL COMMENTS

The images have 5-DR Hatchback instead of SUV

Driver Head VX; No valid data throughout

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20194104
Model Year	2019
Make	BMW
Model	X5
Body Style	MPV
VIN	5UXCR6C50KLK80029
Body Color	Phytonic Blue Metallic
Odometer Reading (km/mi)	67 mi
Engine Displacement (L)	3.0
Type/No. Cylinders	Gas/6
Engine Placement	Longitudinal Front
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
Sunroof/T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

Does owner's manual provide instructions to turn off automatic door locks? No

DATA FROM CERTIFICATION LABEL

Manufactured By	BAYERISCHE MOTOREN WERKE AG
Date of Manufacturer	10/18
Vehicle Type	MPV

GVWR (kg)	2795
GAWR Front (kg)	1325
GAWR Rear (kg)	1640

VEHICLE SEATING AND WEIGHT CAPACITY DATA

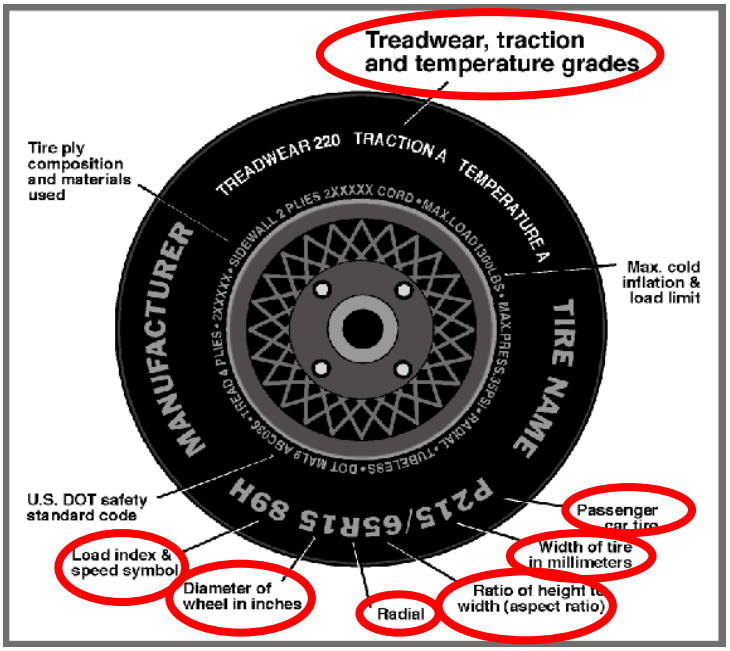
	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	N/A	5
Vehicle Capacity Weight (VCW) (kg)				385
DSC X 68.04 kg				340.2
Rated Cargo and Luggage Weight (RCLW) (kg)				44.8

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	N/A	N/A	Yes	Yes	Yes	N/A	N/A
Third row seat	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	340	340
Cold Pressure (kPa)	230	280
Recommended Tire Size	265/50R19 XL	265/50R19 XL
Tire Size on Vehicle	265/50R19	265/50R19
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Scorpion Zero	Scorpion Zero
Treadwear	500	500
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2	2
Tire Plies Body	5	5
Load Index/Speed Symbol	110 H	110 H
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	UN PE X118 1218	UN PE X118 2218
DOT Safety Code Right	UN PE X118 1218	UN PE X118 2218

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

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	265	265	280	280
Tire Placard	kPa	230	230	280	280
Owner's Manual	kPa	230	230	280	280
As Tested	kPa	230	230	280	280

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	527.0	551.8		537.4	595.2		551.6	546.8	
Right	kg	546.0	535.2		535.2	579.8		594.4	561.0	
Ratio	%	49.7	50.3		47.7	52.3		50.8	49.2	
Totals	kg	1073.0	1087.0	2160.0	1072.6	1175.0	2247.6	1146.0	1107.8	2253.8

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	2160.0	(A)
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	49.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	44.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	2253.8	(A+B+C)

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to 9 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	0	0	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	0	0	0.2	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	-0.2	-0.2	-0.3	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	0	0	0	Yes
Vehicle CG (Aft of Front Axle)	mm	1497	1555	1462	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	-1	+7	-21	

*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: None	0.0
Components Removed: Front fascia	17.8

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: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104

Test Program: SPNCAP Side Impact Test Date: 1/8/2019

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	21.4	13.3	17.3
Front Passenger Seat	21.0	12.9	16.4
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	N/A	N/A	16.3
Non-Struck Side Rear Seat	N/A	N/A	16.7
Rear Center Seat*	N/A	N/A	14.2

* 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	17.3	275	Max	298	304	311
			Mid	263	270	275
			Min	227	235	240
Front Passenger Seat	16.4	279	Max	295	303	311
			Mid	263	271	279
			Min	230	238	246
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	16.3	239	Max	N/A	N/A	N/A
			Mid	N/A	239	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	16.7	239	Max	N/A	N/A	N/A
			Mid	N/A	239	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	14.2	234	Max	N/A	N/A	N/A
			Mid	N/A	234	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: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

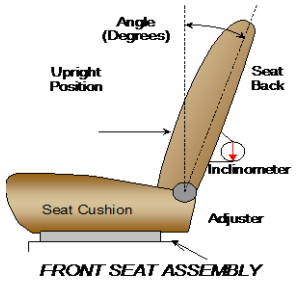
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	220	N/A	0	N/A
Front Passenger Seat	220	N/A	0	N/A
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	0	Fixed	N/A	N/A
Non-Struck Side Rear Seat	0	Fixed	N/A	N/A
Rear Center Seat*	0	Fixed	N/A	N/A

* 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	63.5	N/A	14.9	N/A
Front Passenger Seat	63.3	N/A	14.9	N/A
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	0	N/A	16.8	N/A
Non-Struck Side Rear Seat	0	N/A	16.8	N/A
Rear Center Seat*	0	N/A	16.8	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	Fixed	Fixed

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	70mm vertical; 6 notches fwd	Full down, full forward

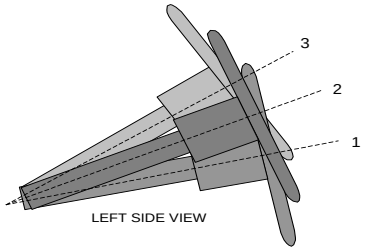
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

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	20.8	300
Geometric Center, Position No. 2	22.5	330
Uppermost, Position No. 3	24.2	360
Telescoping Steering Wheel Travel		60
Test Position	22.5	330

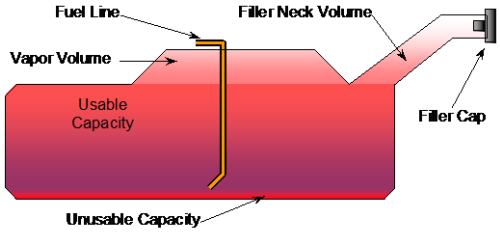


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

Fuel pump starts when ignition is on. The fuel pump will operate for 5 seconds. After pressure has been built up the fuel pump switches to sleep mode until the engine will be started or the pressure decreases.



VEHICLE FUEL TANK ASSEMBLY

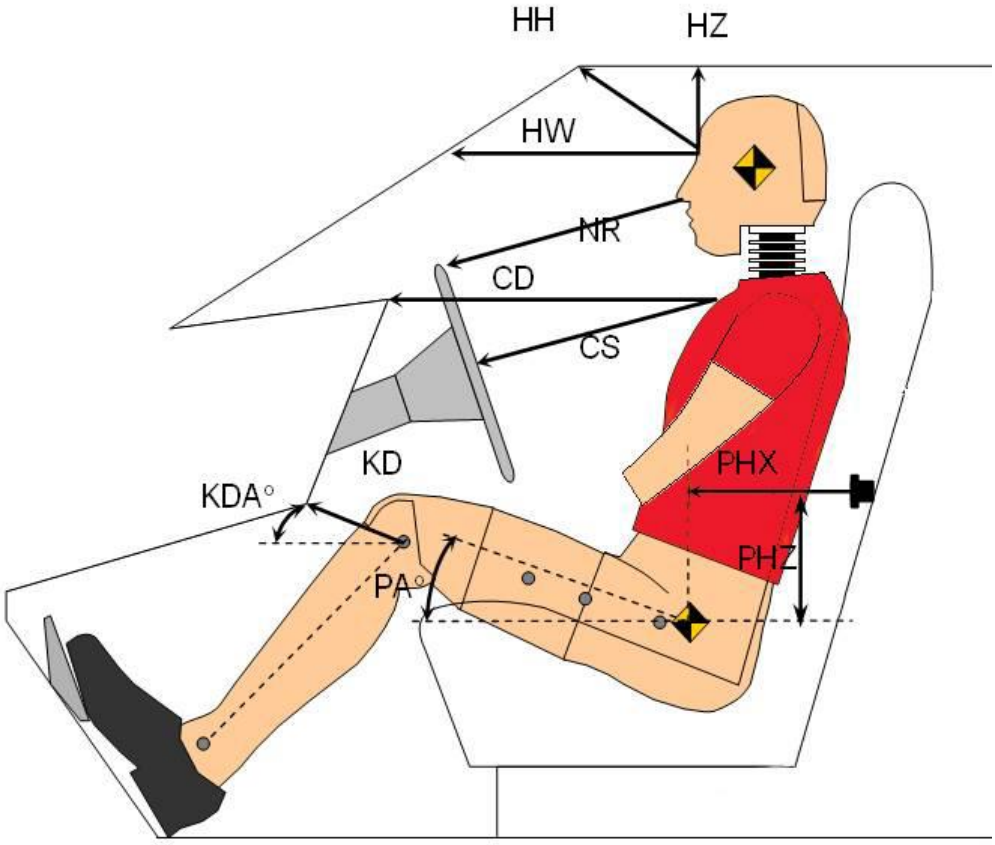
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	82.9
Usable Capacity of "Optional" Tank (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	82.9
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	77.2
Actual Amount of Solvent Used in Test	77.2
1/3 of Usable Capacity	27.6

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

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

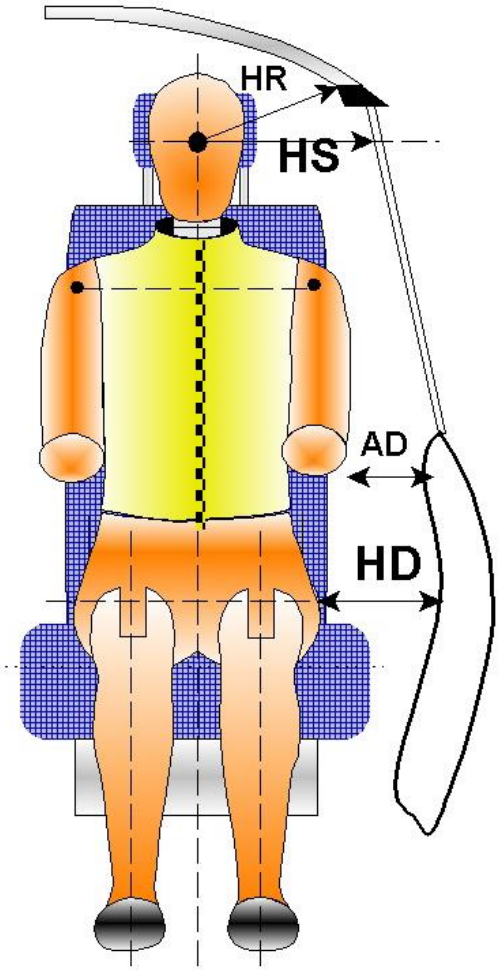
Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	377	
HW	Head to Windshield	674	
HZ	Head to Visor	253	
NR	Nose to Rim	287	
CD	Chest to Dashboard	449	
CS	Chest to Steering Wheel	223	
KDL/KDLA°	Left Knee to Dash	156	25.8
KDR/KDRA°	Right Knee to Dash	146	25.6
PAX°	Pelvic Tilt Angle (X-axis)		0.3
PAY°	Pelvic Tilt Angle (Y-axis)		19.7
PHX	Hip Point to Striker (X-Axis)	258	
PHZ	Hip Point to Striker (Z-Axis)	177	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

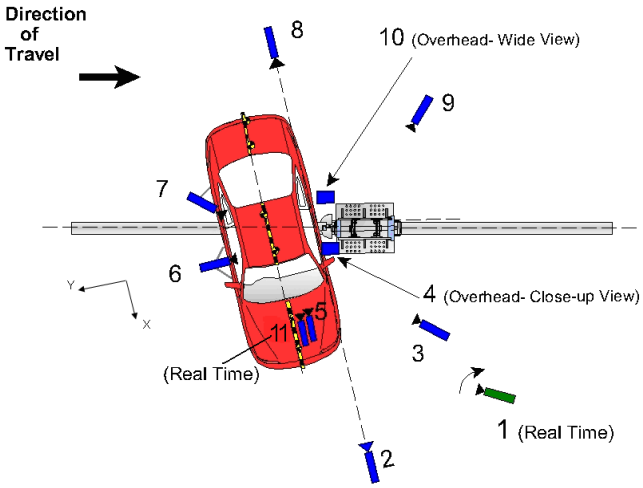
Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



Code	Measurement Description	Length (mm)
HR	Head to Side Header	264
HS	Head to Side Window	383
AD	Arm to Door	164
HD	Hip Point to Door	169

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



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	-1190	5274	-1421	20	1000
3	Impact side 45° – forward pole view	-1827	3954	-1429	20	1000
4	Overhead Close-up view of impact	0	4354	-5665	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	1540	-5473	-1331	20	1000
9	Impact side 45° – rearward pole view	-1169	-4258	-1341	20	1000
10	Overhead wide view of impact	0	4354	-5665	18.5	1000
11	Real time dummy front view				Zoom	30

All measurements accurate to +/- 6 mm.

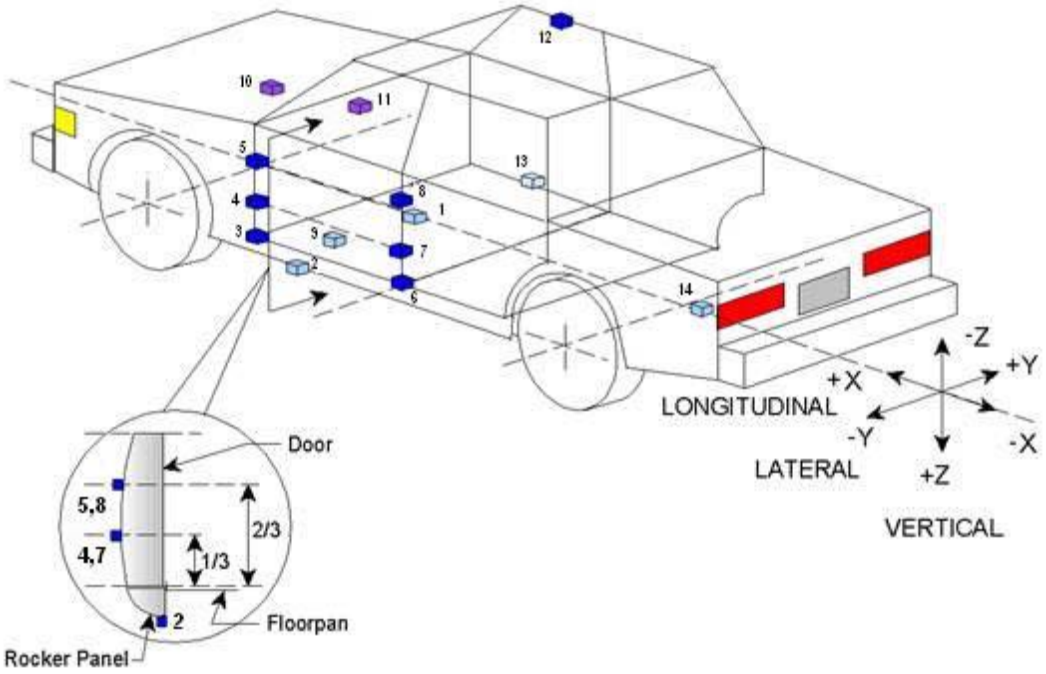
NOTE: Vehicle was at a 75° angle to the rigid pole.
If applicable, explain why camera(s) did not run: High speed camera system triggered approximately 2.3 seconds prior to the event resulting in loss of all high speed camera views.

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: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



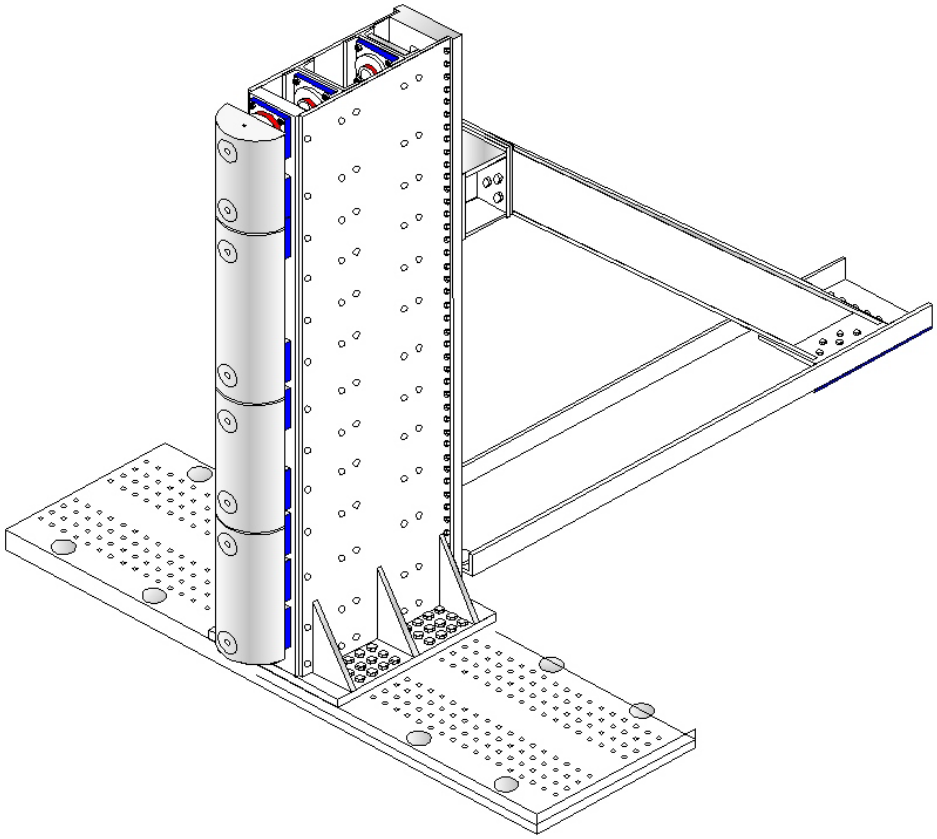
	Accelerometer/Sensor Location			
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3003	140	-550
2	Left Floor Sill	2930	-740	-513
3	A-Pillar Sill	3266	-835	-443
4	A-Pillar Low	3360	-862	-640
5	A-Pillar Mid	3350	-876	-997
6	B-Pillar Sill	2160	-820	-465
7	B-Pillar Low	2268	-882	-650
8	B-Pillar Mid	2230	-868	-1030
9	Driver Seat Track	2442	-590	-491
10	Engine Top	4244	30	-931
11	Firewall	3710	0	-1052
12	Right Roof	2170	670	-1780
13	Right Floor Sill	2905	740	-456
14	Rear Floorpan	640	0	-763

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: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

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: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

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, Head Restraint
Left Shoulder	SAB
Upper Torso	Seatback bolster
Lower Torso	Seatback bolster
Left Hip	SAB
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	N/A	No	N/A
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 window completely broken
Other Notable Effects	None

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

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

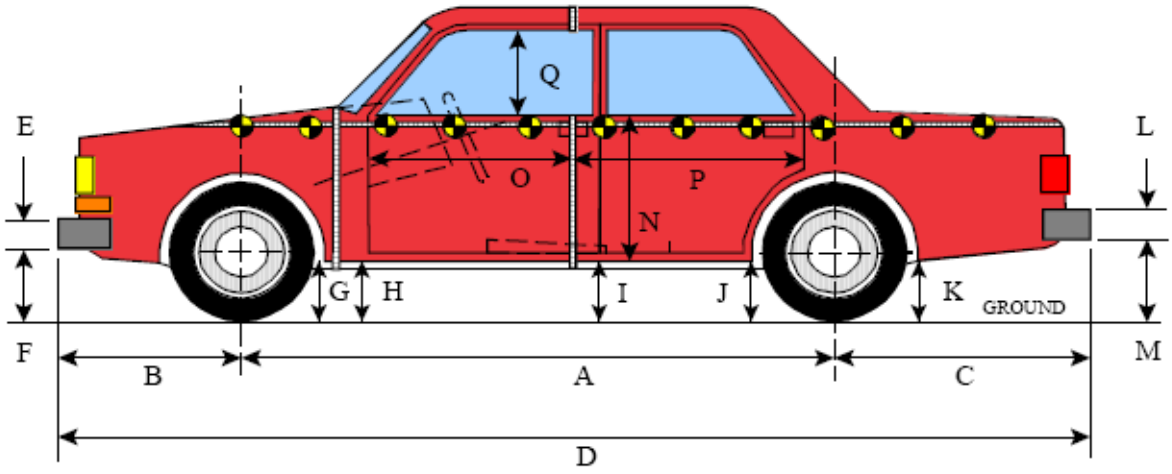
Restraint Type	Struck Side (Driver)		Struck Side (Rear Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No		
Knee Airbag	Yes	No		
Side Curtain Airbag	Yes	Yes	Yes	Yes
Side Torso/Pelvis Airbag	Yes	Yes	Yes	Yes
Side Torso Airbag	No	N/A	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	N/A
Seat Belt Load Limiter	Yes	Unknown	Yes	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		1404
Actual Impact Point (Aft of Front Axle)	mm		1410
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact point	-6
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	32.22
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.24

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

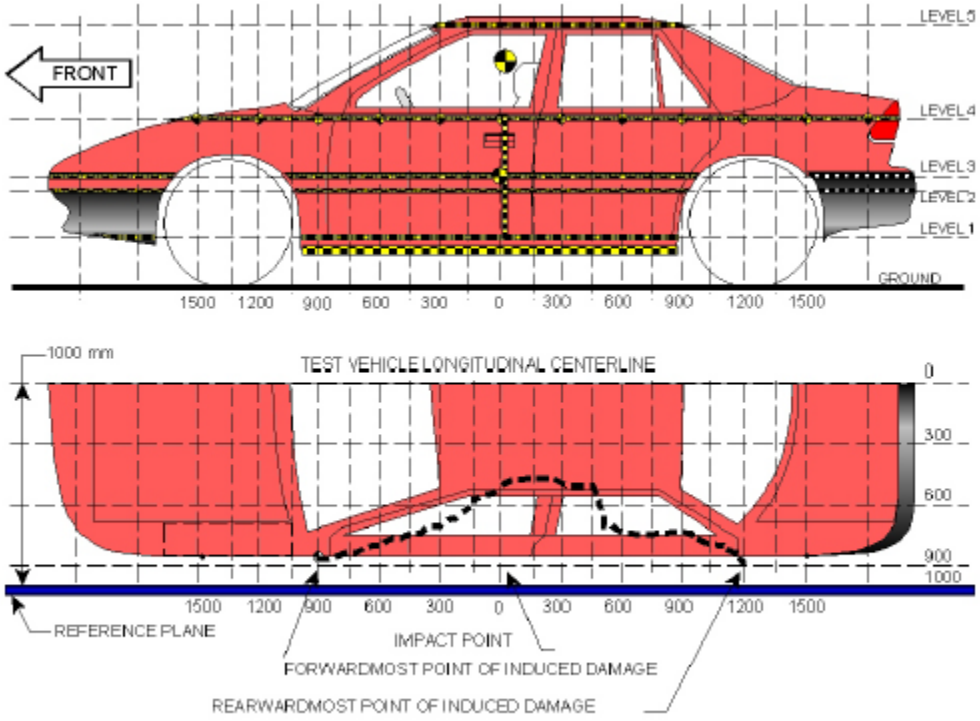
VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2975	2930	45
B	Front Axle to Front Surface of Vehicle	875	875	0
C	Rear Axle to Rear Surface of Vehicle	1050	1050	0
D	Total Length at Centerline	4900	4930	-30
E	Front Bumper Thickness	100	100	0
F	Front Bumper Bottom to Ground	510	510	0
G	Sill Height at Front Wheel Well	260	248	12
H	Sill Height at Front Door Leading Edge	280	270	10
I	Sill Height at B-Pillar	293	300	-7
J1	Sill Height at Rear Wheel Well	290	325	-35
J2	Pinch Weld Height at Rear Wheel Well	226	250	-24
K	Sill Height Aft of Rear Wheel Well	355	357	-2
L	Rear Bumper Thickness	175	175	0
M	Rear Bumper Bottom to Ground	400	395	5
N	Sill Height to Bottom of Front Window Sill	808	805	3
O	Front Door Leading Edge to Impact CL	740	660	80
P	Rear Door Trailing Edge to Impact CL	1520	1442	78
Q	Front Window Opening	508	461	47
R	Right Side Length	4795	4750	45
S	Left Side Length	4794	4840	-46
T[1]	Vehicle Width at B-Pillars	1945	1830	115

[1] Maximum width is not a B-Pillars; maximum width is 2010

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



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	1694	300	150
2	Occupant H-Point	1091	344	150
3	Mid-Door	801	340	150
4	Window Sill	775	312	150
5	Window Top	443	80	300

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

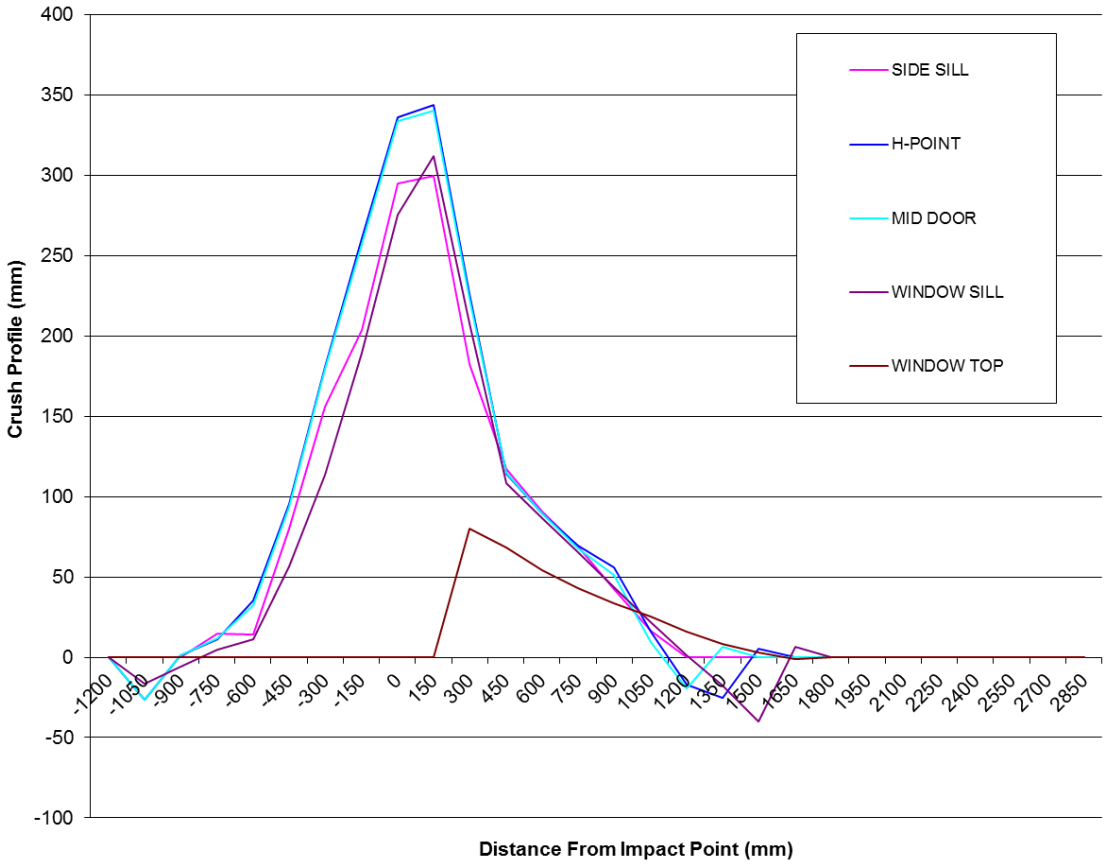
Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1050	0	978	985	856	0	0	1005	1012	873	0	0	-27	-27	-17	0
-900	963	971	971	865	0	984	970	970	871	0	-21	1	1	-6	0
-750	947	968	967	874	0	932	957	956	869	0	15	11	11	5	0
-600	946	968	966	883	0	932	933	934	872	0	14	35	32	11	0
-450	949	969	967	892	0	869	874	874	836	0	80	95	93	56	0
-300	950	971	969	900	0	794	790	789	786	0	156	181	180	114	0
-150	950	971	969	906	0	747	710	712	717	0	203	261	257	189	0
0	948	971	969	913	0	653	635	636	637	0	295	336	333	276	0
150	947	971	969	917	0	647	627	629	605	0	300	344	340	312	0
300	946	972	970	921	637	764	746	747	713	557	182	226	223	208	80
450	945	969	968	923	645	827	855	853	814	576	118	114	115	109	69
600	943	968	966	923	647	853	879	877	837	593	90	89	89	86	54
750	942	968	966	925	648	873	898	899	860	605	69	70	67	65	43
900	946	969	968	927	647	903	913	917	884	613	43	56	51	43	34
1050	953	973	973	934	645	937	957	963	913	620	16	16	10	21	25
1200	0	981	981	947	640	0	998	1000	945	624	0	-17	-19	2	16
1350	0	987	991	919	630	0	1012	984	936	621	0	-25	7	-17	9
1500	0	1003	0	931	615	0	998	0	971	612	0	5	0	-40	3
1650	0	0	0	924	593	0	0	0	918	594	0	0	0	6	-1

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.

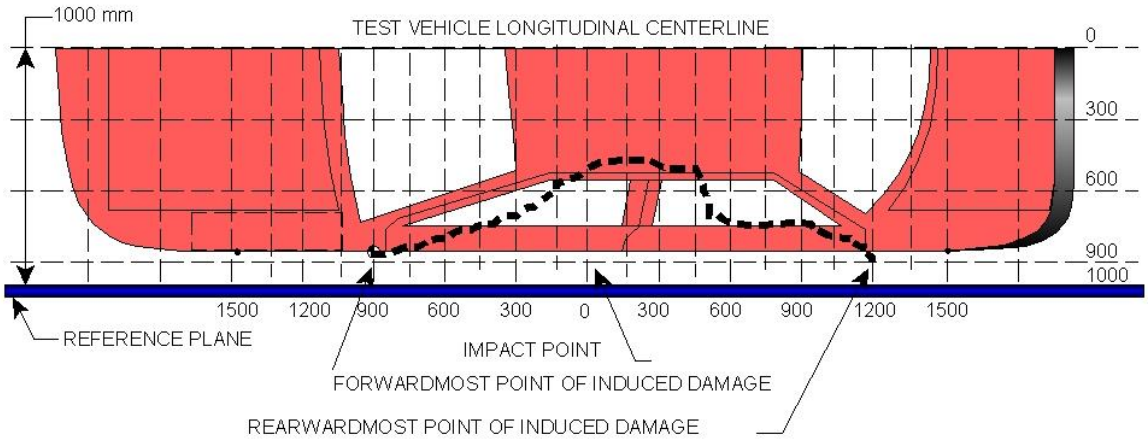
DATA SHEET NO. 10 (CONTINUED)
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



DATA SHEET NO. 11
VEHICLE DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1[1]	1650	4	918	924	6
2	1200	5	624	640	16
3	600	1	853	943	90
4	150	2	627	971	344
5	-450	2	874	969	95
6[1]	-900	2	970	971	0
	-900	3	970	971	0

[1] DPD 6 is defined as zero crush since the crush does not extend to the end of the vehicle.

DATA SHEET NO. 12

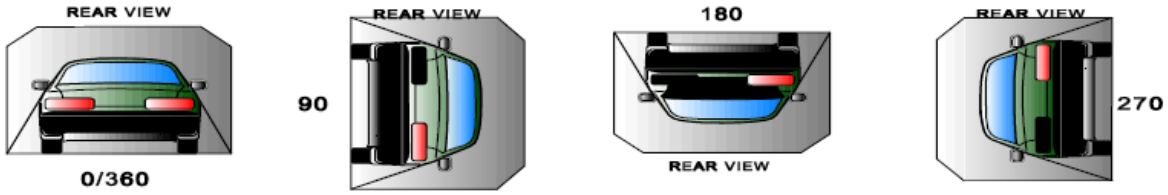
FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019

Test Time: 16:56 **Temperature:** 21.3ºC

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

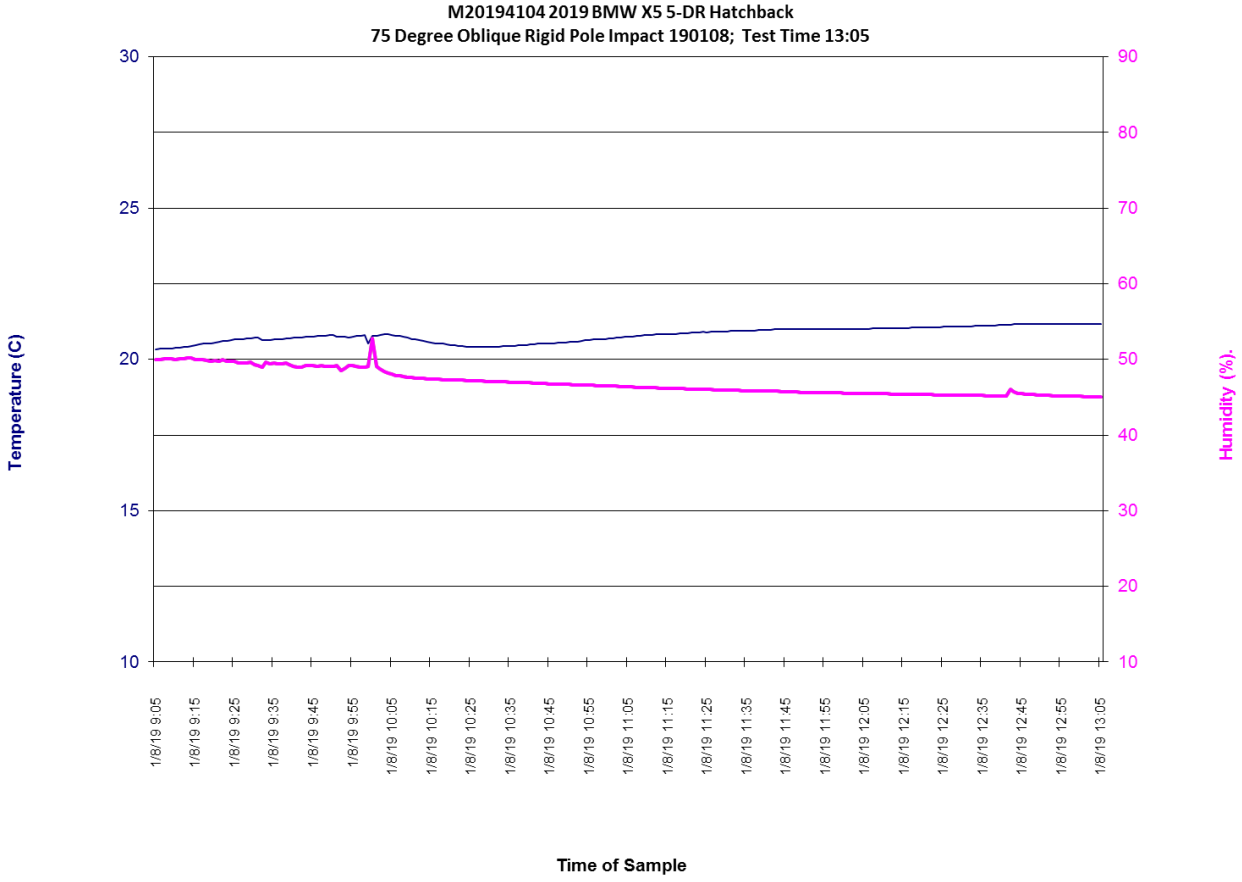
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0	0	0
90 to 180	0	0	0	0
180 to 270	0	0	0	0
270 to 360	0	0	0	0

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: 2019 BMW X5 5-DR SUV NHTSA No.: M20194104
Test Program: SPNCAP Side Impact Test Date: 1/8/2019



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

TABLE OF PHOTOGRAPHS (CONTINUED)

No. 001 As Delivered Right Front ¾ View of Test Vehicle

No. 002 As Delivered Left Rear ¾ 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 ¾ View of Test Vehicle

No. 006 Post-Test Left Front ¾ View of Test Vehicle

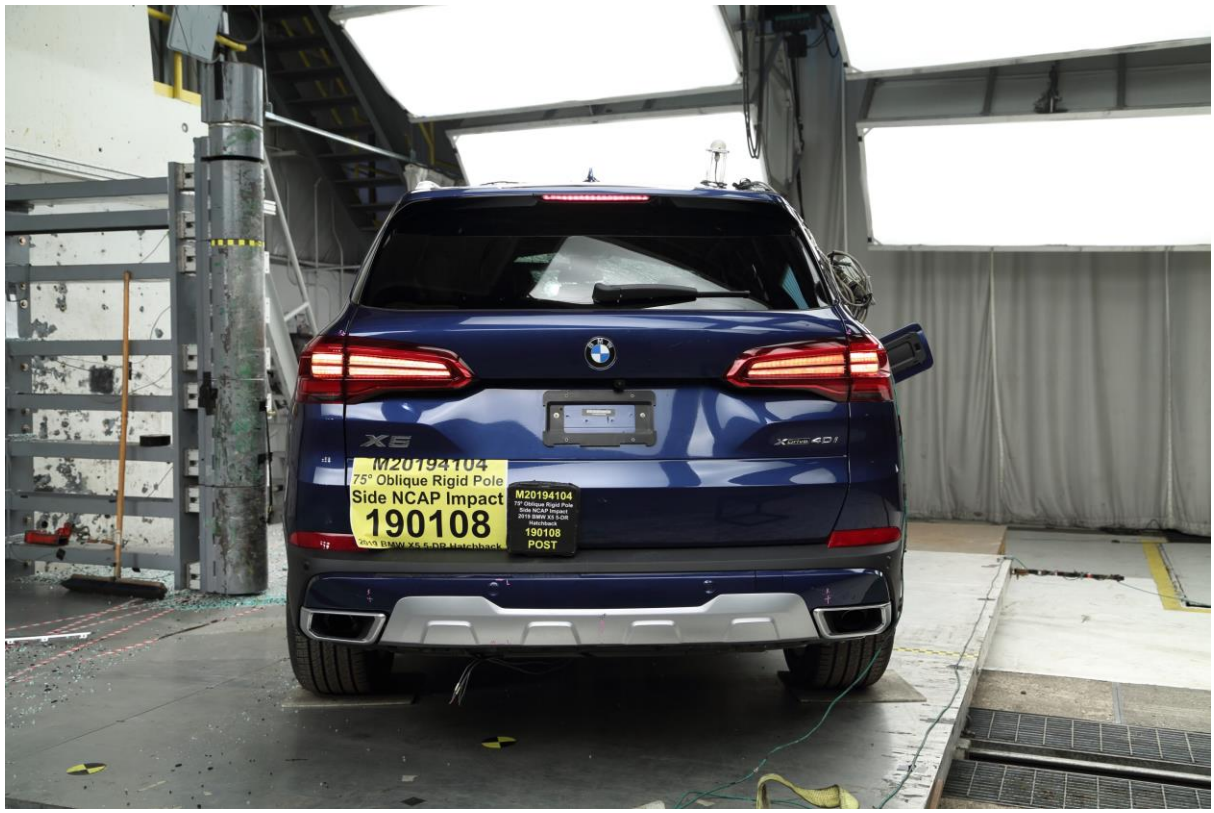
No. 007 Pre-Test Left Side View of Test Vehicle

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

No. 009 Pre-Test Left Rear ¾ View of Test Vehicle

No. 010 Post-Test Left Rear ¾ View of Test Vehicle

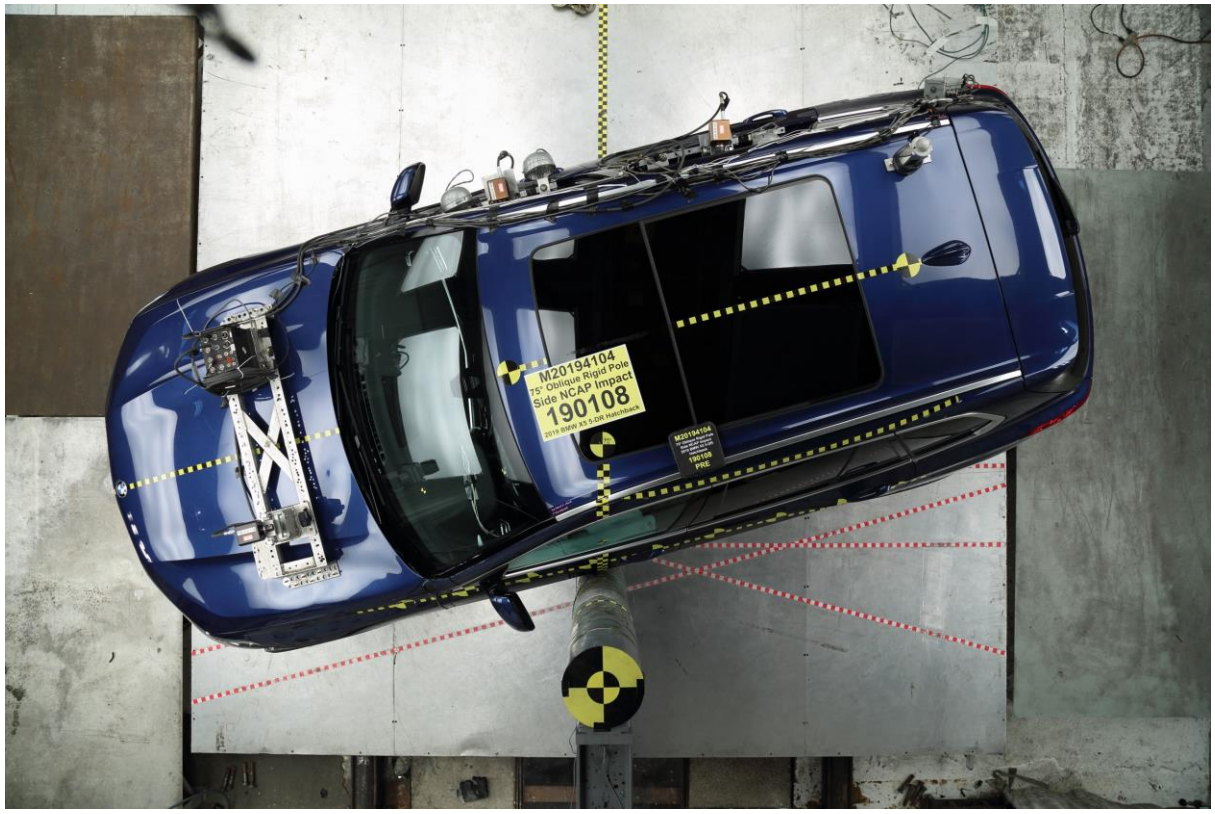
No. 011 Pre-Test Rear View of Test Vehicle



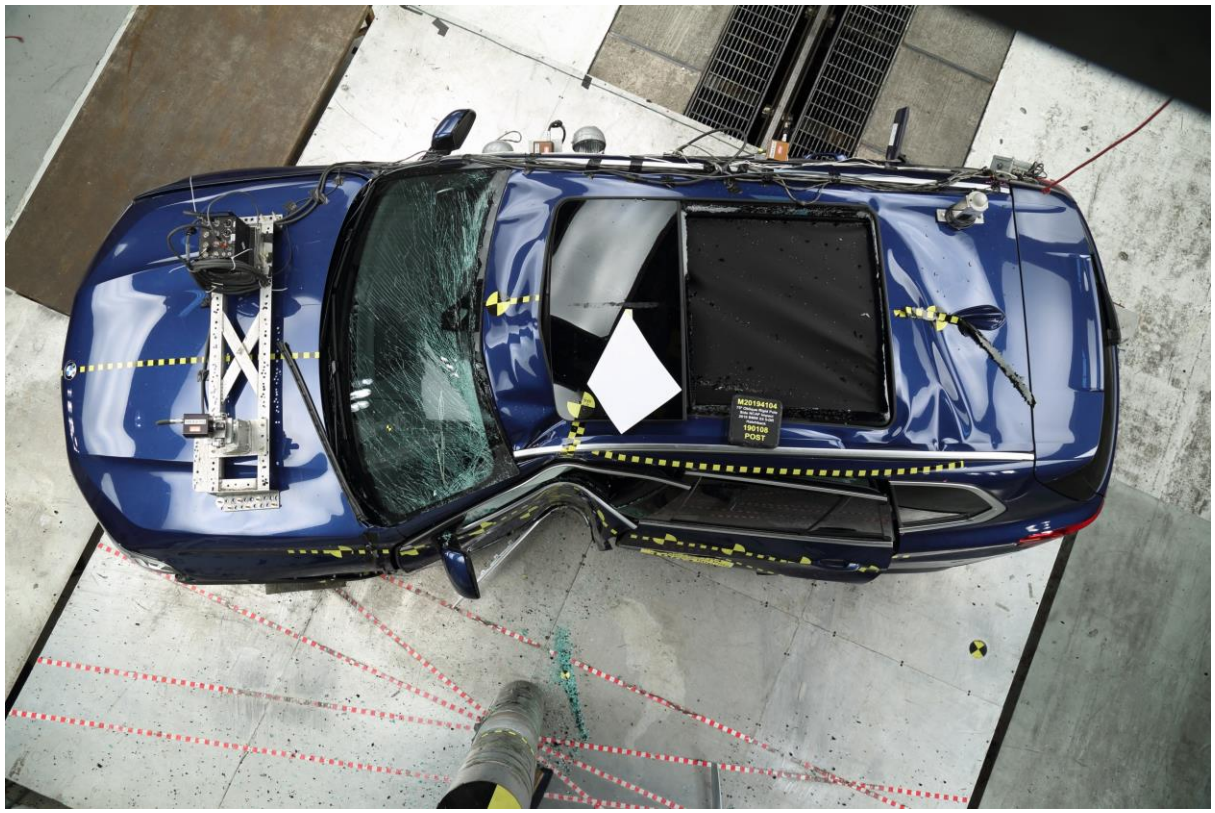
No. 012 Post-Test Rear View of Test Vehicle

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

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

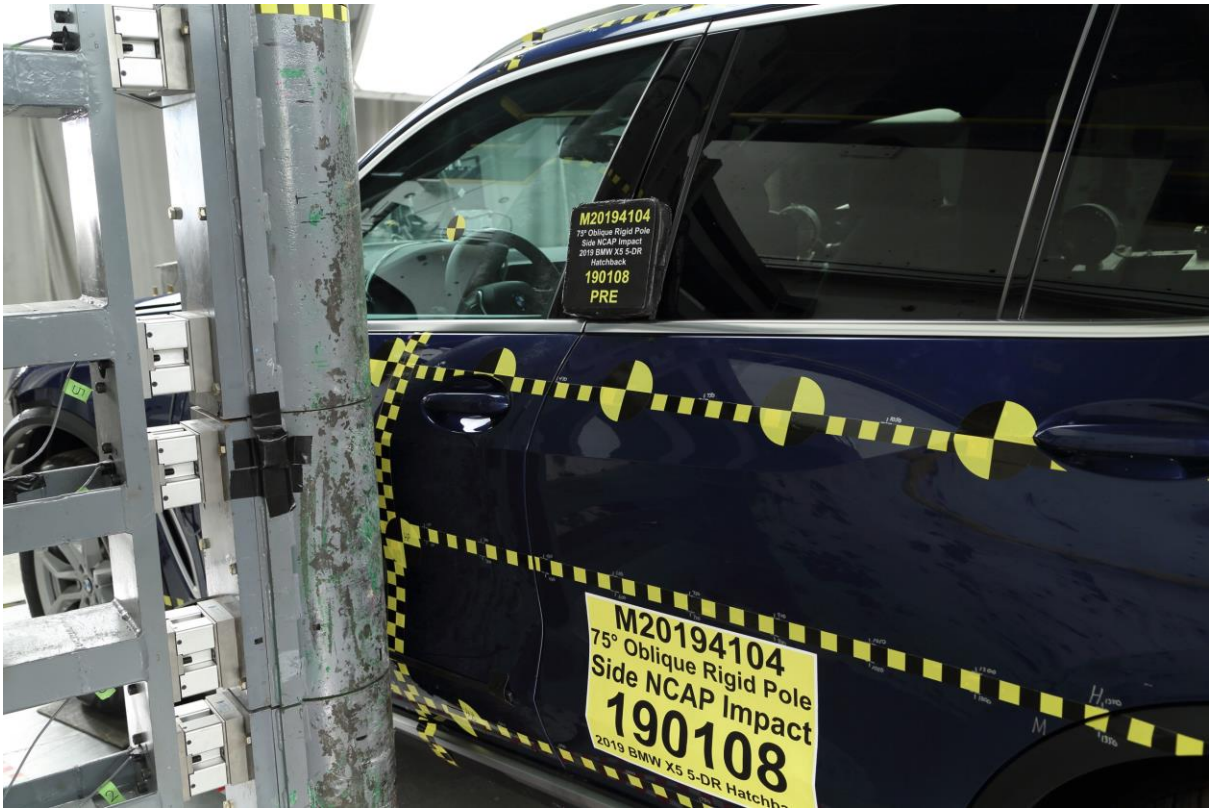


No. 015 Pre-Test Overhead View of Test Area



No. 016 Post-Test Overhead View of Test Area

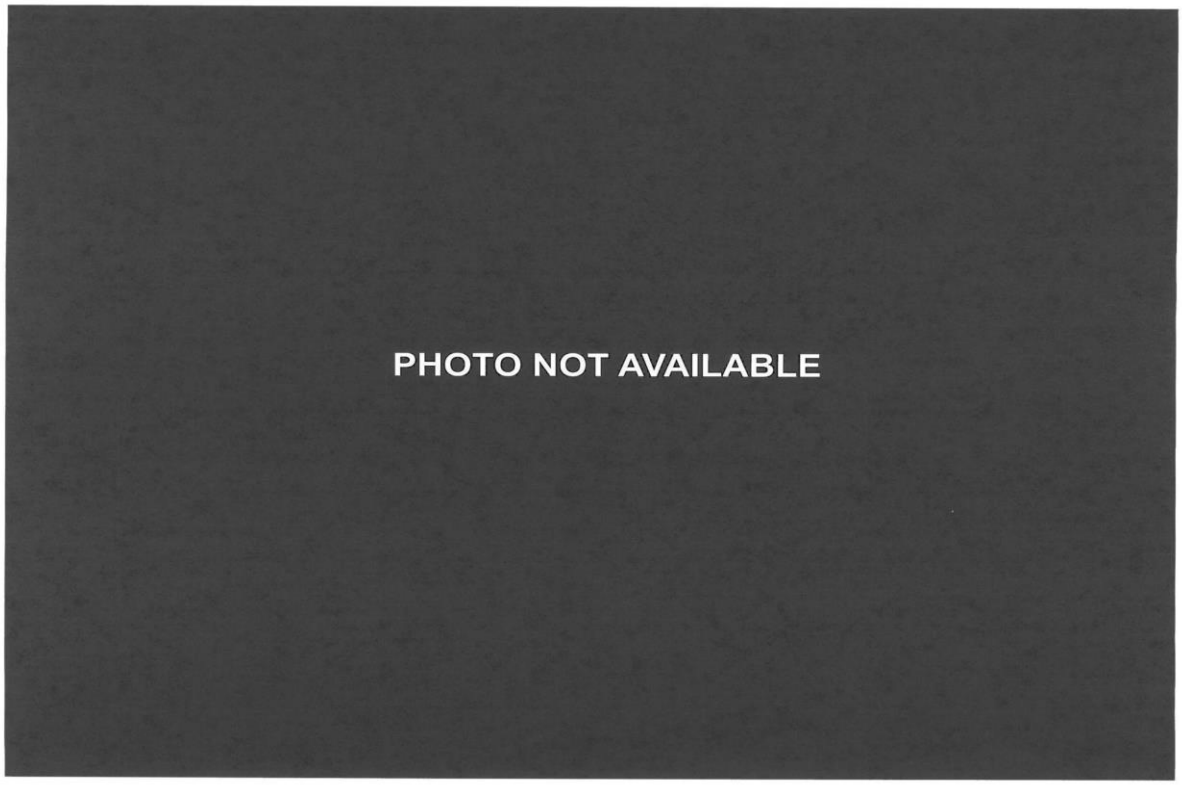
No. 017 Pre-Test Left Side View of Pole Positioned Against Side of Vehicle



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

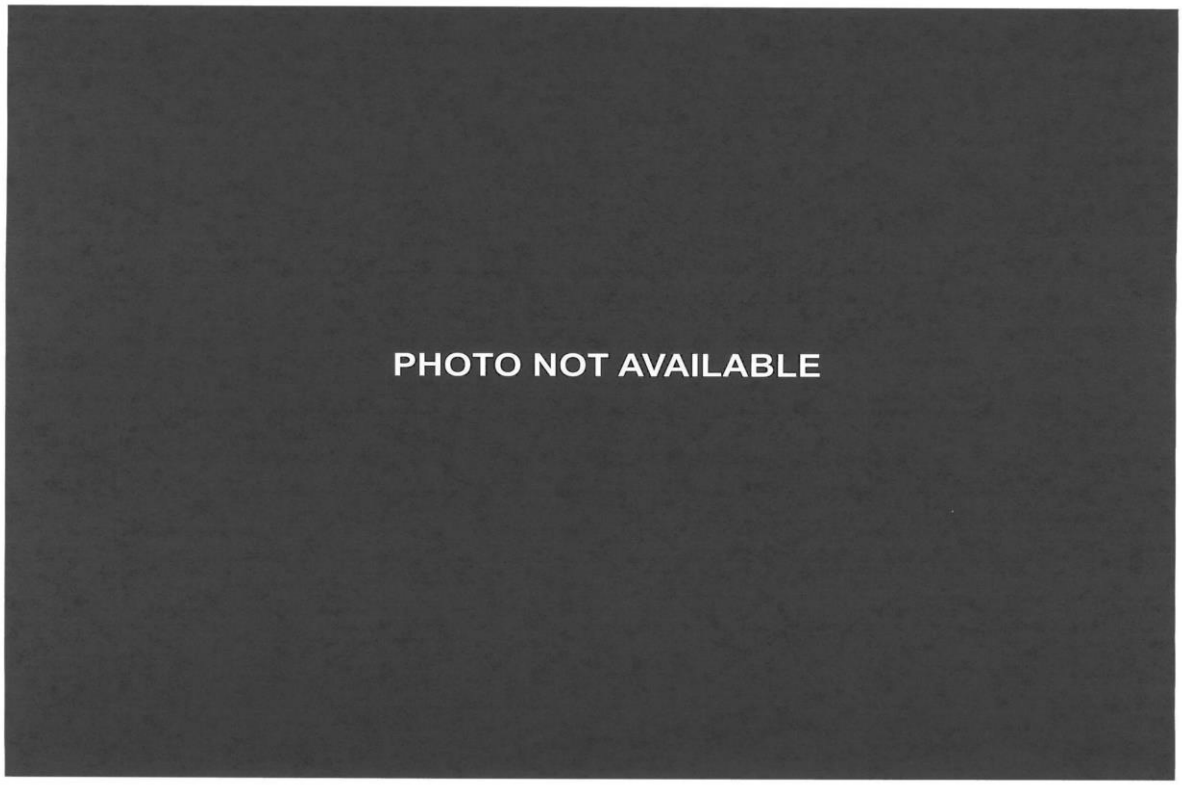
No. 019 Pre-Test Close-Up View of Impact Point Target

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



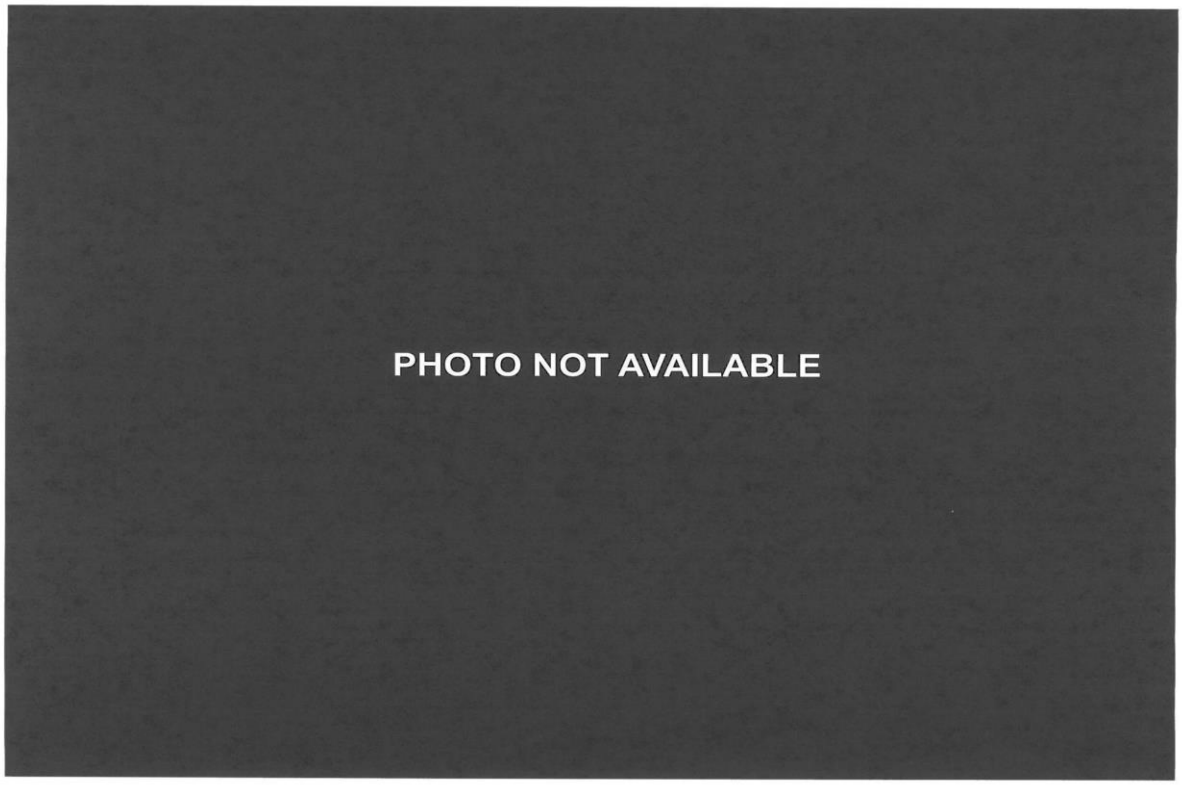
No. 021 Pre-Test Front Close-Up View of Dummy Head and Chest

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



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

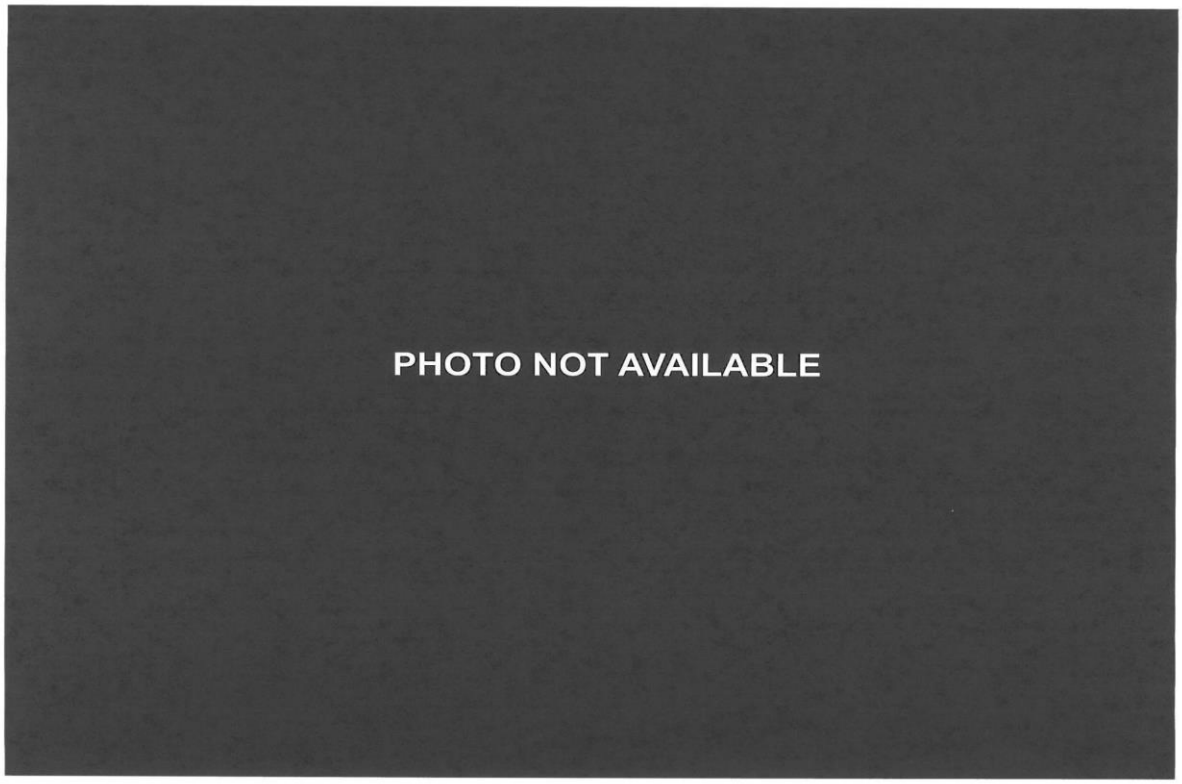
Intentionally Left Blank



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

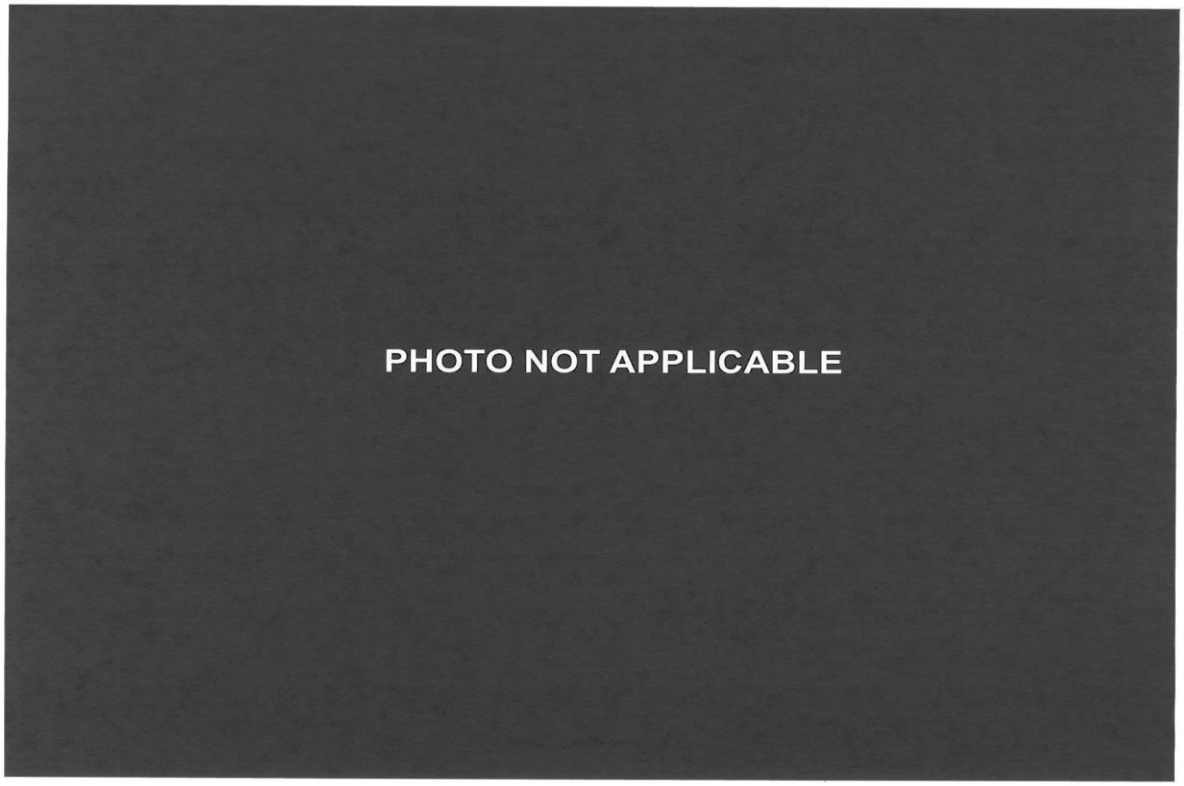
No. 033 Pre-Test View of Belt Anchorage for Dummy

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

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

Intentionally Left Blank

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

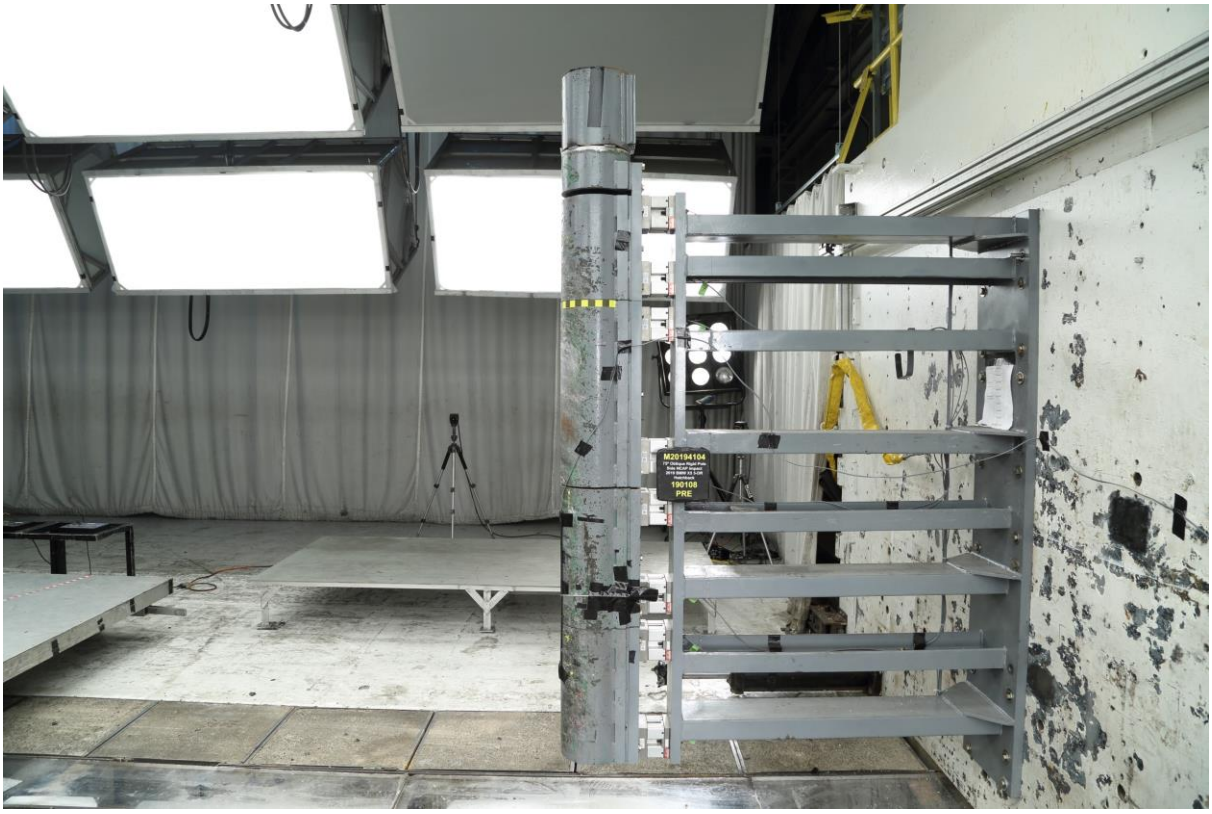
No. 054 Post-Test View of Fuel Filler Cap or Fuel Filler Neck

No. 055 Close-Up View of Vehicle Certification Label

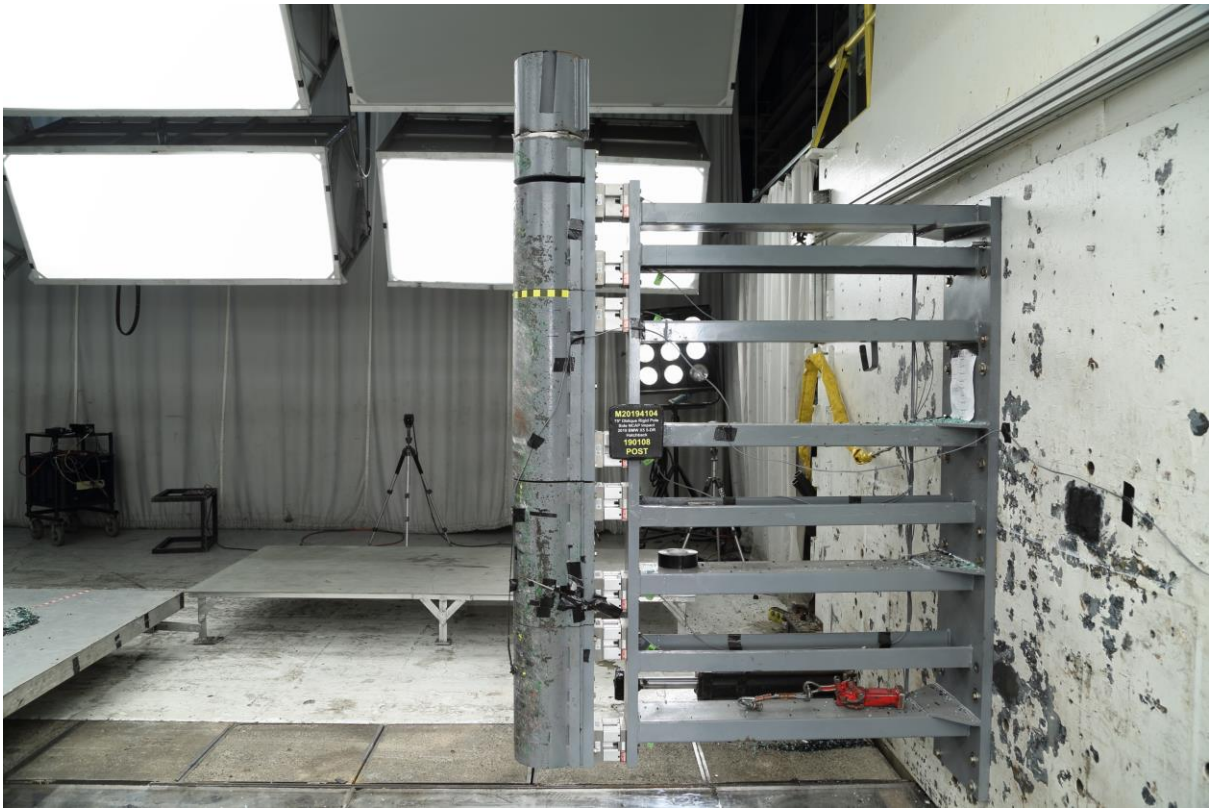
No. 056 Close-Up View of Vehicle Tire Information Placard or Label

No. 057 Pre-Test Pole Barrier Front View

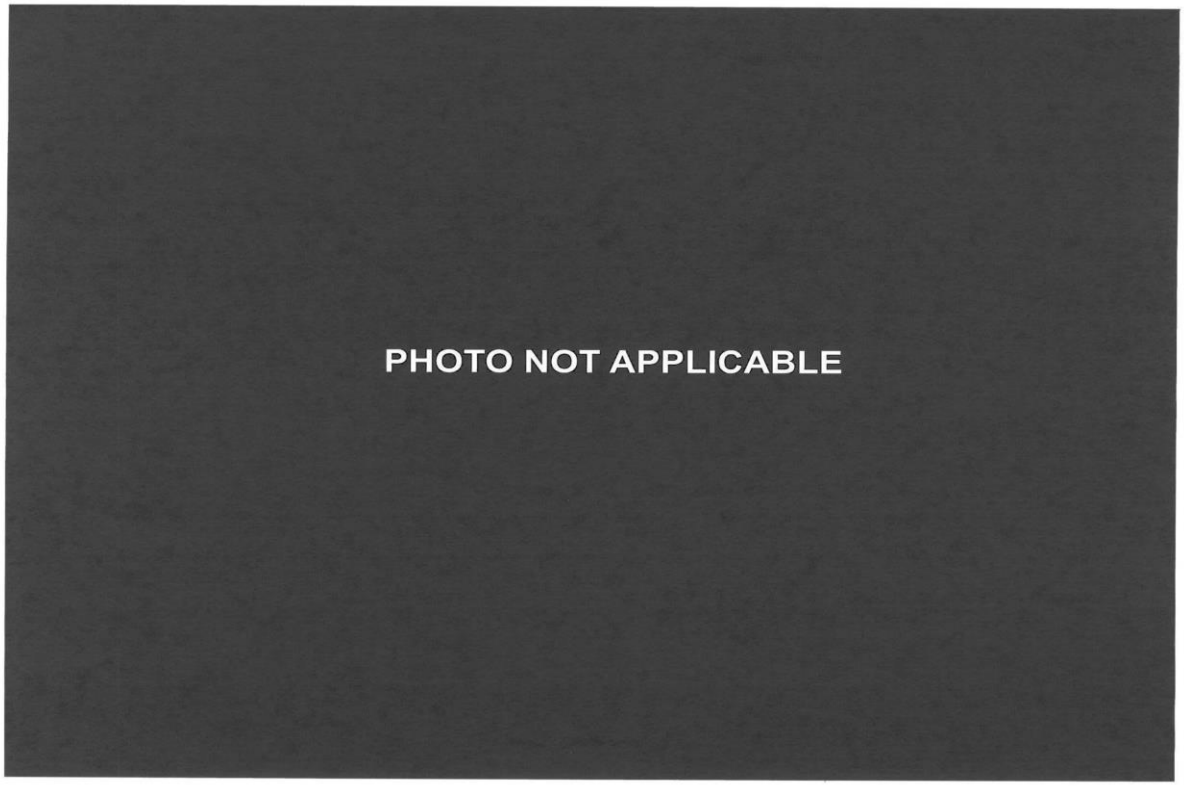
No. 058 Post-Test Pole Barrier Front View



No. 059 Pre-Test Pole Barrier Side View



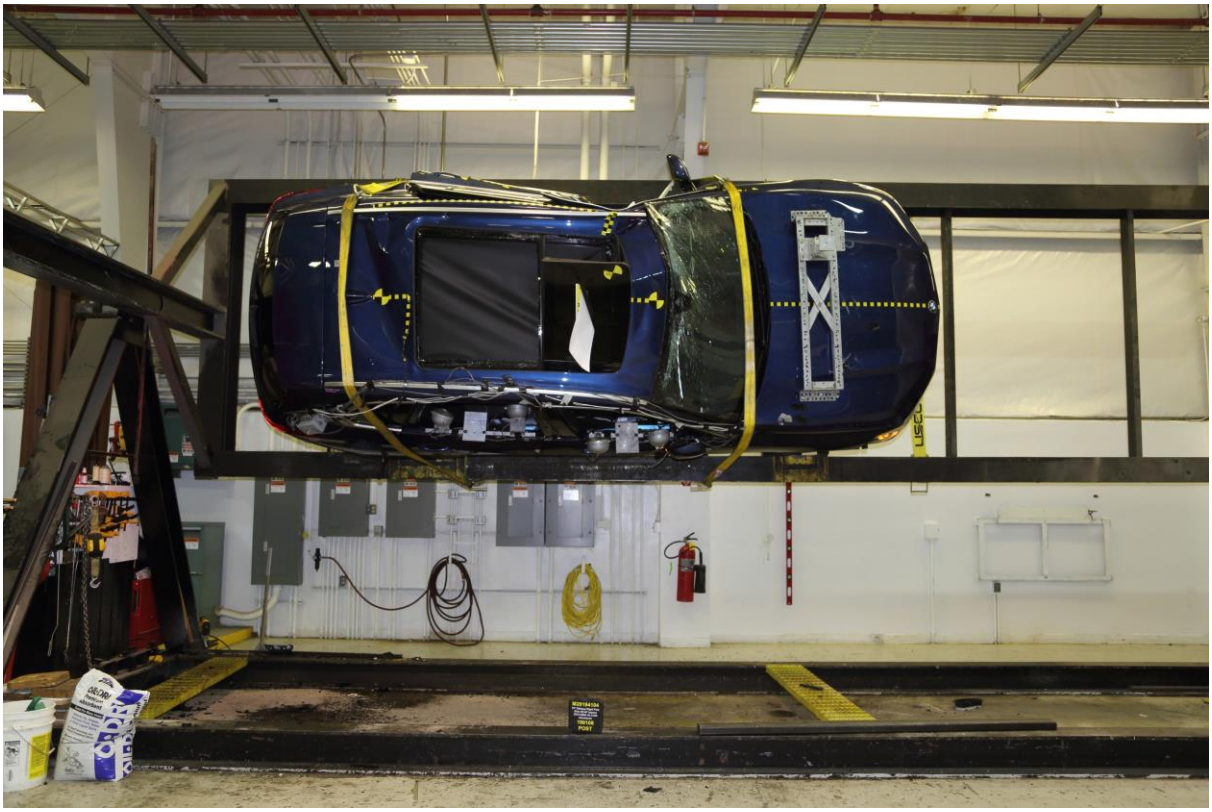
No. 060 Post-Test Pole Barrier Side View



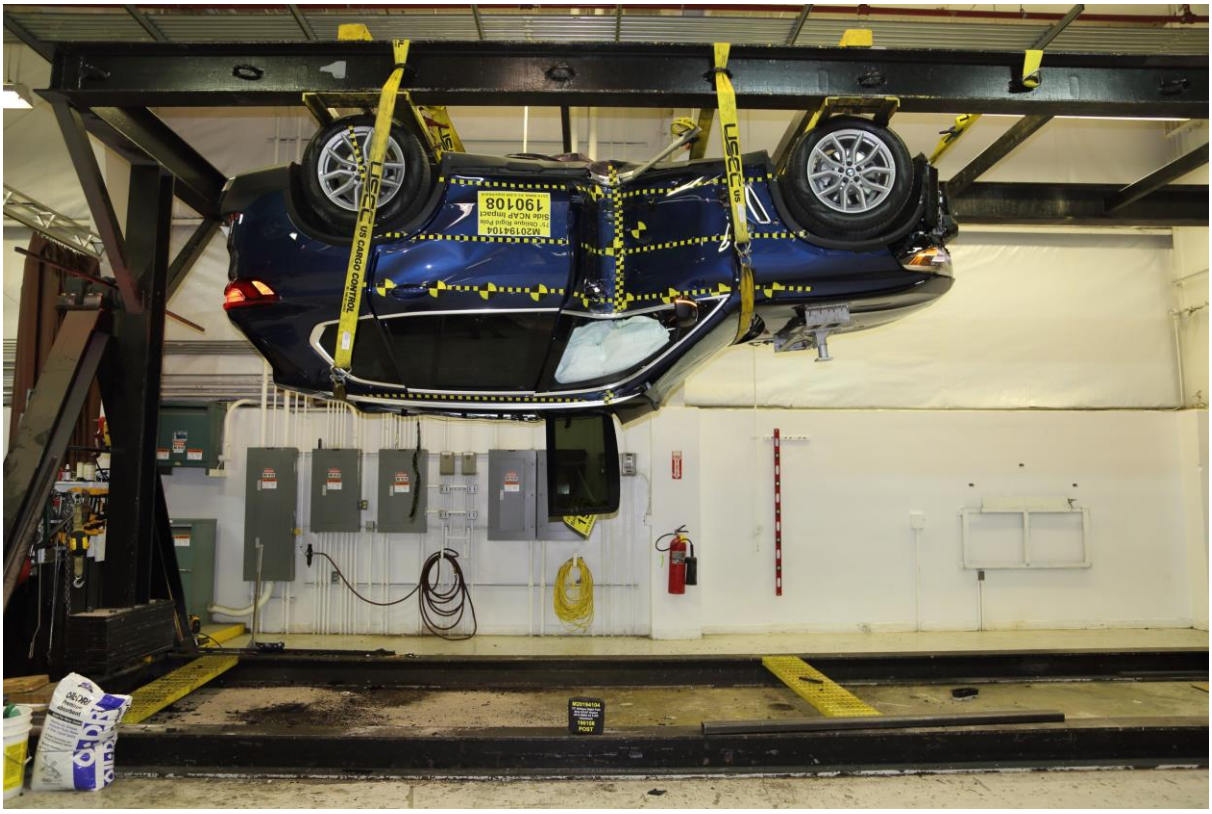
No. 061 Pre-Test Ballast View

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

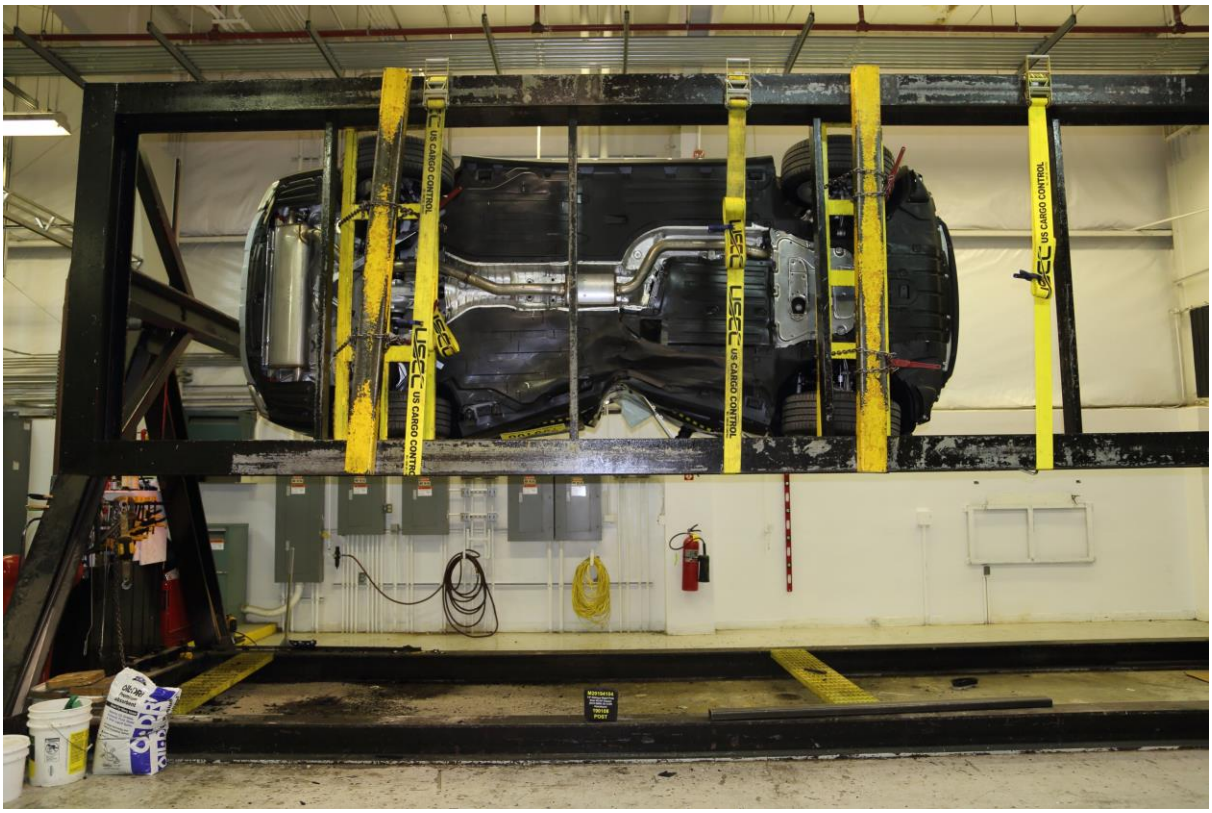
No. 063 FMVSS No. 301 Static Rollover 0 Degrees



No. 064 FMVSS No. 301 Static Rollover 90 Degrees



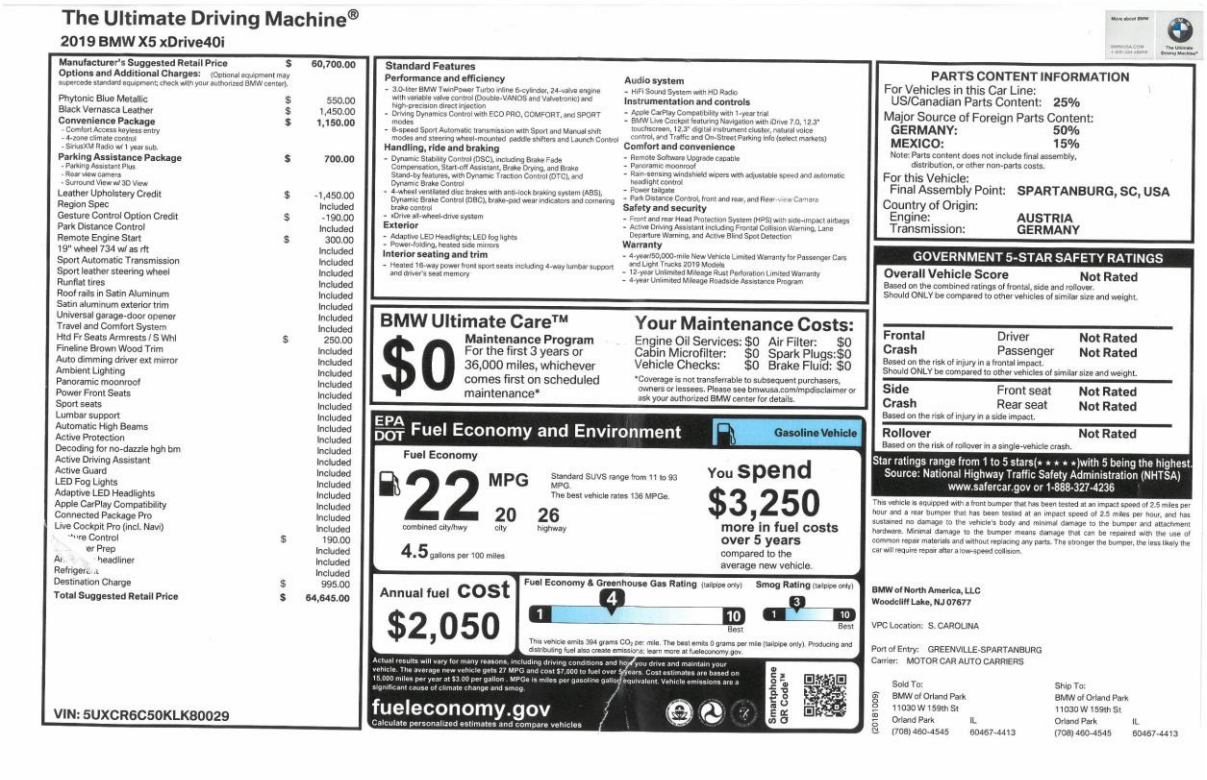
No. 065 FMVSS No. 301 Static Rollover 180 Degrees



No. 066 FMVSS No. 301 Static Rollover 270 Degrees

No. 067 FMVSS No. 301 Static Rollover 360 Degrees

No. 068 Impact Event



The Ultimate Driving Machine®

2019 BMW X5 xDrive40i

Manufacturer's Suggested Retail Price	$	60,700.00
Options and Additional Charges: (Optional equipment may supercede standard equipment; check with your authorized BMW center).		
Phytonic Blue Metallic	$	550.00
Black Vernasca Leather	$	1,450.00
Convenience Package	$	1,150.00
- Comfort Access keyless entry		
- 4-zone climate control		
- SiriusXM Radio w/ 1 year sub.		
Parking Assistance Package	$	700.00
- Parking Assistant Plus		
- Rear view camera		
- Surround View w/ 3D View		
Leather Upholstery Credit	$	-1,450.00
Region Spec		Included
Gesture Control Option Credit	$	-190.00
Park Distance Control		Included
Remote Engine Start	$	300.00
19" wheel 734 w/ as rft		Included
Sport Automatic Transmission		Included
Sport leather steering wheel		Included
Runflat tires		Included
Roof rails in Satin Aluminum		Included
Satin aluminum exterior trim		Included
Universal garage-door opener		Included
Travel and Comfort System		Included
Htd Fr Seats Armrests / S Whl	$	250.00
Fineline Brown Wood Trim		Included
Auto dimming driver ext mirror		Included
Ambient Lighting		Included
Panoramic moonroof		Included
Power Front Seats		Included
Sport seats		Included
Lumbar support		Included
Automatic High Beams		Included
Active Protection		Included
Decoding for no-dazzle hgh bm		Included
Active Driving Assistant		Included
Active Guard		Included
LED Fog Lights		Included
Adaptive LED Headlights		Included
Apple CarPlay Compatibility		Included
Connected Package Pro		Included
Live Cockpit Pro (incl. Navi)		Included
[illegible] Control	$	190.00
[illegible] er Prep		Included
Ai[illegible] headliner		Included
Refrigera[illegible]		Included
Destination Charge	$	995.00
Total Suggested Retail Price	$	64,645.00

VIN: 5UXCR6C50KLK80029

Standard Features

Performance and efficiency
- 3.0-liter BMW TwinPower Turbo inline 6-cylinder, 24-valve engine with variable valve control (Double-VANOS and Valvetronic) and high-precision direct injection
- Driving Dynamics Control with ECO PRO, COMFORT, and SPORT modes
- 8-speed Sport Automatic transmission with Sport and Manual shift modes and steering wheel-mounted paddle shifters and Launch Control

Handling, ride and braking
- Dynamic Stability Control (DSC), including Brake Fade Compensation, Start-off Assistant, Brake Drying, and Brake Stand-by features, with Dynamic Traction Control (DTC), and Dynamic Brake Control
- 4-wheel ventilated disc brakes with anti-lock braking system (ABS), Dynamic Brake Control (DBC), brake-pad wear indicators and cornering brake control
- xDrive all-wheel-drive system

Exterior
- Adaptive LED Headlights; LED fog lights
- Power-folding, heated side mirrors

Interior seating and trim
- Heated 16-way power front sport seats including 4-way lumbar support and driver's seat memory

Audio system
- HiFi Sound System with HD Radio

Instrumentation and controls
- Apple CarPlay Compatibility with 1-year trial
- BMW Live Cockpit featuring Navigation with iDrive 7.0, 12.3" touchscreen, 12.3" digital instrument cluster, natural voice control, and Traffic and On-Street Parking Info (select markets)

Comfort and convenience
- Remote Software Upgrade capable
- Panoramic moonroof
- Rain-sensing windshield wipers with adjustable speed and automatic headlight control
- Power tailgate
- Park Distance Control, Front and rear, and Rear-view Camera

Safety and security
- Front and rear Head Protection System (HPS) with side-impact airbags
- Active Driving Assistant including Frontal Collision Warning, Lane Departure Warning, and Active Blind Spot Detection

Warranty
- 4-year/50,000-mile New Vehicle Limited Warranty for Passenger Cars and Light Trucks 2019 Models
- 12-year Unlimited Mileage Rust Perforation Limited Warranty
- 4-year Unlimited Mileage Roadside Assistance Program

BMW Ultimate Care™

$0 Maintenance Program For the first 3 years or 36,000 miles, whichever comes first on scheduled maintenance*

Your Maintenance Costs:

Engine Oil Services: $0 Air Filter: $0
Cabin Microfilter: $0 Spark Plugs: $0
Vehicle Checks: $0 Brake Fluid: $0

*Coverage is not transferrable to subsequent purchasers, owners or lessees. Please see bmwusa.com/mpdisclaimer or ask your authorized BMW center for details.

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: **22** MPG combined city/hwy (20 city, 26 highway)
4.5 gallons per 100 miles
Standard SUVS range from 11 to 93 MPG.
The best vehicle rates 136 MPGe.

You spend **$3,250** more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$2,050**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 4 (1 Worst, 10 Best)
Smog Rating (tailpipe only): 3 (1 Worst, 10 Best)
This vehicle emits 394 grams CO_2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.
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 cost $7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.00 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code™

PARTS CONTENT INFORMATION

For Vehicles in this Car Line:
US/Canadian Parts Content: 25%
Major Source of Foreign Parts Content:
GERMANY: 50%
MEXICO: 15%
Note: Parts content does not include final assembly, distribution, or other non-parts costs.

For this Vehicle:
Final Assembly Point: SPARTANBURG, SC, USA
Country of Origin:
Engine: AUSTRIA
Transmission: GERMANY

GOVERNMENT 5-STAR SAFETY RATINGS

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

Frontal Crash — Driver: Not Rated; Passenger: Not Rated
Based on the risk of injury in a frontal impact.
Should ONLY be compared to other vehicles of similar size and weight.

Side Crash — Front seat: Not Rated; Rear seat: Not Rated
Based on the risk of injury in a side impact.

Rollover Not Rated
Based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars(★ ★ ★ ★ ★)with 5 being the highest.
Source: National Highway Traffic Safety Administration (NHTSA)
www.safercar.gov or 1-888-327-4236

This vehicle is equipped with a front bumper that has been tested at an impact speed of 2.5 miles per hour and a rear bumper that has been tested at an impact speed of 2.5 miles per hour, and has sustained no damage to the vehicle's body and minimal damage to the bumper and attachment hardware. Minimal damage to the bumper means damage that can be repaired with the use of common repair materials and without replacing any parts. The stronger the bumper, the less likely the car will require repair after a low-speed collision.

BMW of North America, LLC
Woodcliff Lake, NJ 07677

VPC Location: S. CAROLINA

Port of Entry: GREENVILLE-SPARTANBURG
Carrier: MOTOR CAR AUTO CARRIERS

Sold To:	Ship To:
BMW of Orland Park	BMW of Orland Park
11030 W 159th St	11030 W 159th St
Orland Park IL	Orland Park IL
(708) 460-4545 60467-4413	(708) 460-4545 60467-4413

(2018/1099)

No. 069 Monroney Label

CONTROLS

Seats, mirrors, and steering wheel

Symbol	Description
	Green: the safety belt is buckled on the corresponding rear seat.
	Red: the safety belt is not buckled on the corresponding rear seat.

Safety mode

In critical situations, for instance during an emergency stop, the front safety belts tighten automatically.

If the situation passes without an accident occurring, the belt tension relaxes.

If the belt tension does not loosen automatically, stop the vehicle and unbuckle the safety belt using the red button in the safety belt buckle. Fasten the safety belt before continuing on your trip.

Front head restraints

General information

The current head restraint position can be stored using the memory function, refer to page 122.

Safety information

⚠ WARNING

A missing protective effect due to removed or not correctly adjusted head restraints can cause injuries in the head and neck area. There is a risk of injury.

- ▷ Before driving, install the removed head restraints on the occupied seats.
- ▷ Adjust the head restraint so its center supports the back of the head at as close to eye level as possible.
- ▷ Adjust the distance so that the head restraint is as close as possible to the back of the head. Adjust the distance via the backrest tilt as needed.

⚠ WARNING

Body parts can be jammed when moving the head restraint. There is a risk of injury. Make sure that the area of movement is clear when moving the head restraint.

⚠ WARNING

Objects on the head restraint reduce the protective effect in the head and neck area. There is a risk of injury.

- ▷ Do not use seat or head restraint covers.
- ▷ Do not hang objects, for instance clothes hangers, directly on the head restraint.
- ▷ Only use accessories that have been determined to be safe for attachment to a head restraint.
- ▷ Do not use any accessories, for instance pillows, while driving.

Active head restraint

In the event of a rear-end collision with a certain severity, the active head restraint automatically reduces the distance from the head.

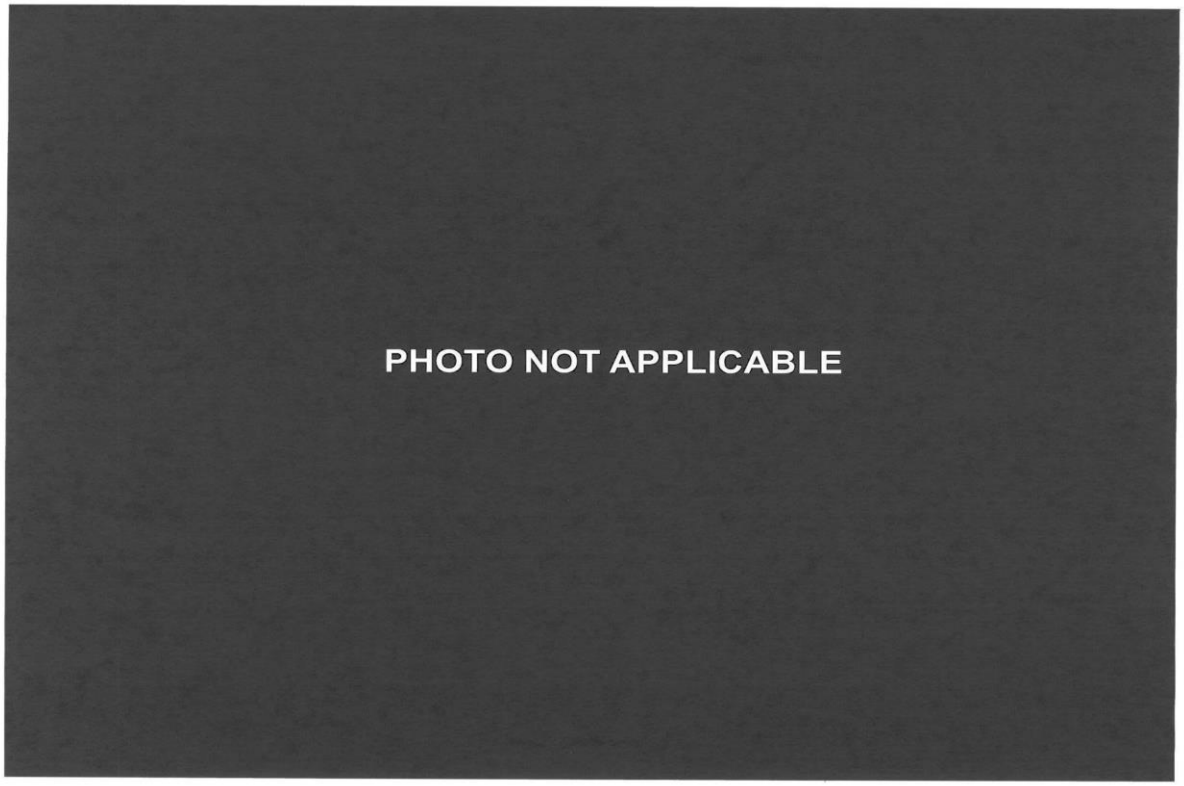
Have the active head restraint checked and if necessary replaced in the case of damage or if it was exposed to an accident.

Adjusting the height

Push switch up or down.

117

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



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

APPENDIX B
VEHICLE AND DUMMY RESPONSE DATA PLOTS

TABLE OF DATA PLOTS

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)
Driver Head Angular Velocity (X)
Driver Head Angular Velocity (Y)
Driver Head Angular Velocity (Z)

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

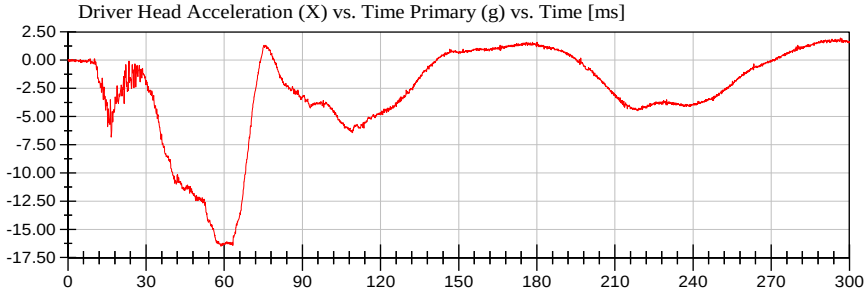
Test Date: 01/08/2019

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 190108 (M20194104)

Driver Head Acceleration (X) vs. Time Primary (g) vs. Time [ms]



<Max>

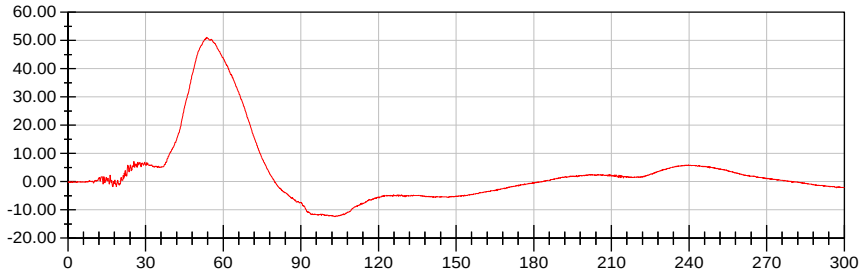
1.98 g at 296.64 ms

<Min>

-16.50 g at 58.72 ms

CFC_1000

Driver Head Acceleration (Y) vs. Time Primary (g) vs. Time [ms]



<Max>

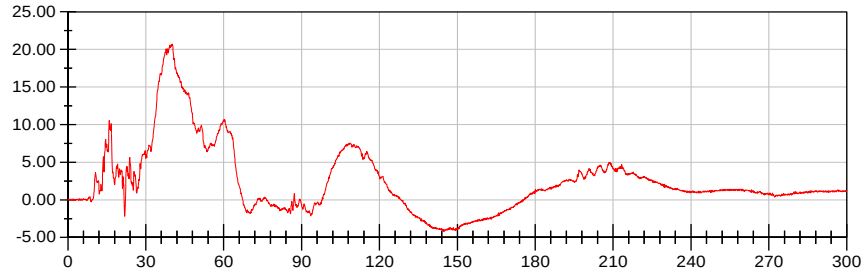
51.09 g at 53.68 ms

<Min>

-12.36 g at 102.88 ms

CFC_1000

Driver Head Acceleration (Z) vs. Time Primary (g) vs. Time [ms]



<Max>

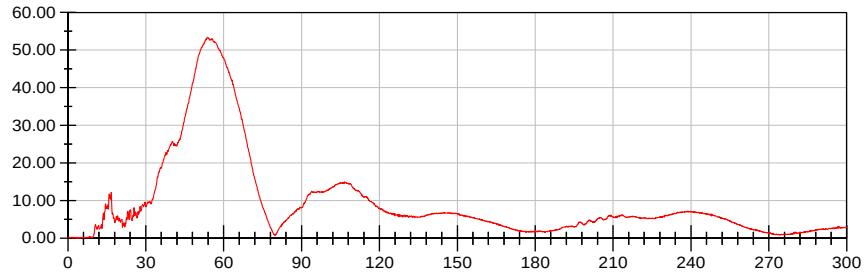
20.72 g at 40.16 ms

<Min>

-4.23 g at 144.72 ms

CFC_1000

Driver Head Acceleration Resultant Primary vs. Time (g) vs. Time [ms]



<Max>

53.40 g at 53.68 ms

<Min>

0.06 g at 4.00 ms

CFC_1000

NHTSA

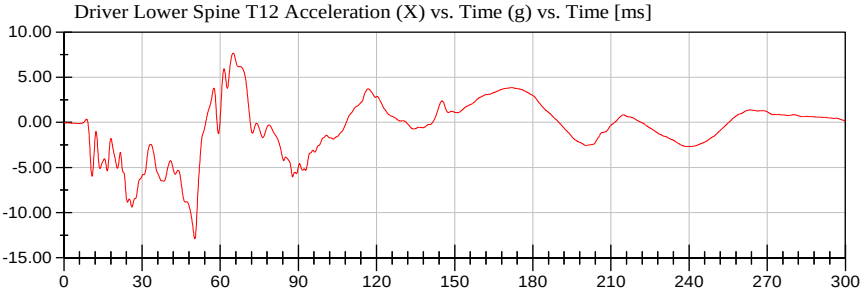
Test Date: 01/08/2019

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 190108 (M20194104)

Driver Lower Spine T12 Acceleration (X) vs. Time (g) vs. Time [ms]



<Max>

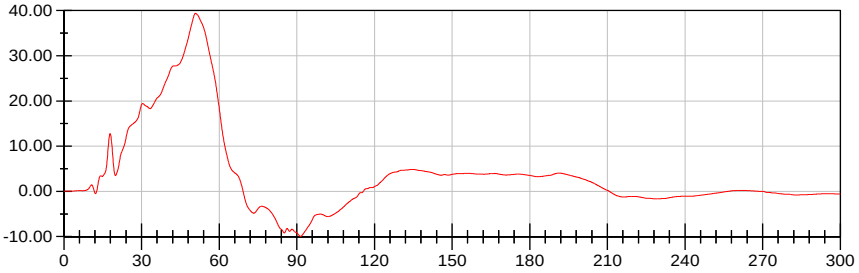
7.66 g at 64.96 ms

<Min>

-12.91 g at 50.24 ms

CFC_180

Driver Lower Spine T12 Acceleration (Y) vs. Time (g) vs. Time [ms]



<Max>

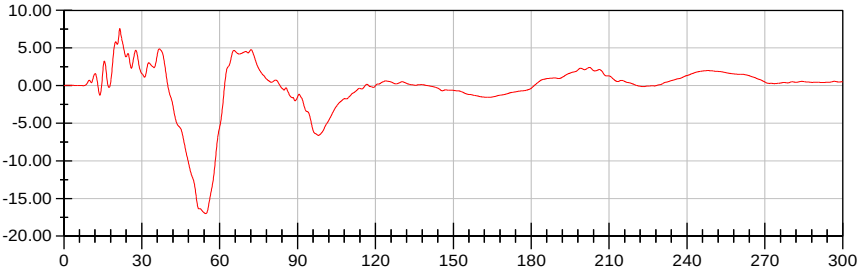
39.39 g at 50.88 ms

<Min>

-9.97 g at 91.52 ms

CFC_180

Driver Lower Spine T12 Acceleration (Z) vs. Time (g) vs. Time [ms]



<Max>

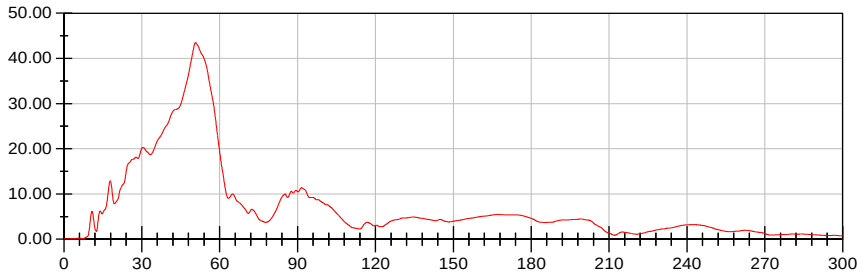
7.59 g at 21.52 ms

<Min>

-17.02 g at 54.64 ms

CFC_180

Driver Lower Spine T12 Acceleration Resultant vs. Time (g) vs. Time [ms]



<Max>

43.48 g at 50.72 ms

<Min>

0.09 g at 0.08 ms

CFC_180

NHTSA

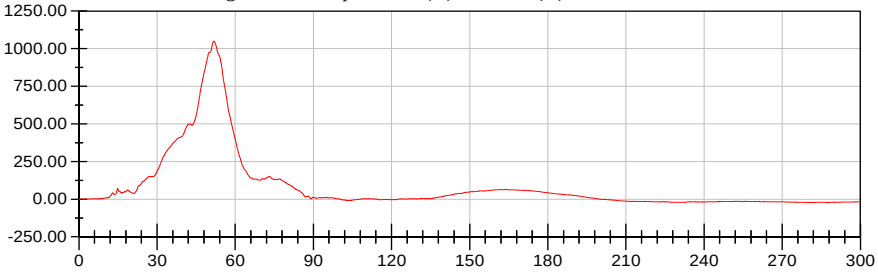
Test Date: 01/08/2019

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 190108 (M20194104)

Driver Iliac Wing Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

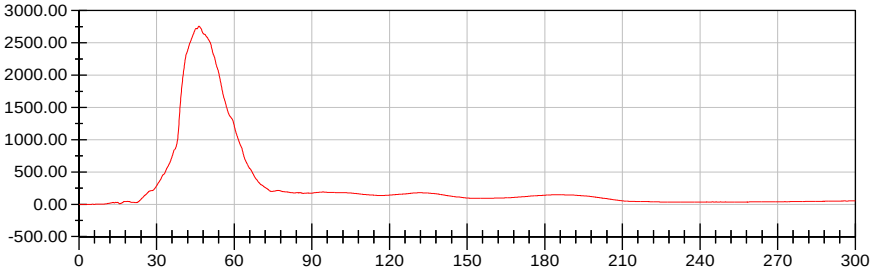
1,050.39 N at 51.76 ms

<Min>

-22.42 N at 282.32 ms

CFC_600

Driver Acetabulum Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

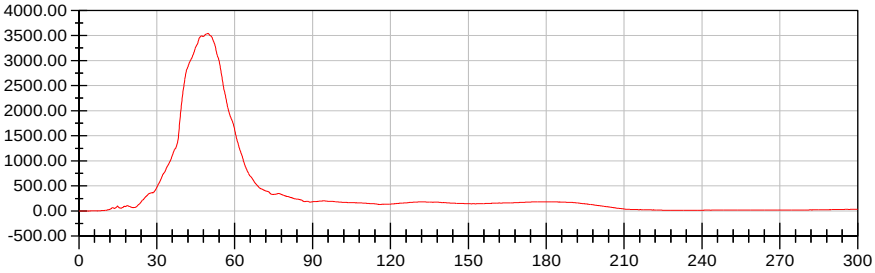
2,758.78 N at 46.40 ms

<Min>

-0.51 N at 0.00 ms

CFC_600

Driver Total Pelvis Force on Impact Side (Y) vs. Time (N) vs. Time [ms]



<Max>

3,541.90 N at 49.68 ms

<Min>

-0.56 N at 0.00 ms

CFC_600

APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

Pre-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 30

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	787	Yes
B	Shoulder Pivot Height	437.0 - 453.0	449	Yes
C	H-Point Height	79.0 - 89.0	86	Yes
D	H-Point from Seat Back	141.0 - 151.0	148	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	103	Yes
F	Thigh Clearance	119.0 - 135.0	131	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	530	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	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	878	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. 30-1
Test Date: 12/3/2018

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.8 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	120.9 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-3.7 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

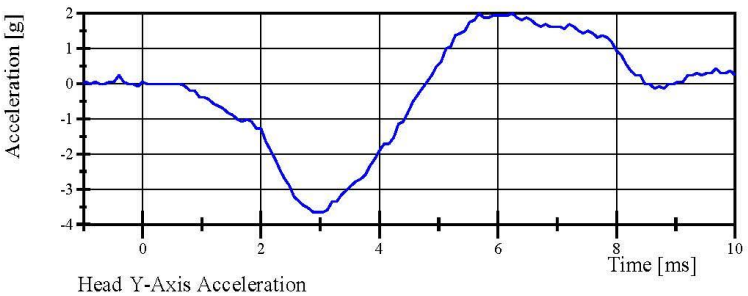
Condition: Used

Comments:
Head S/N: 1330

Transportation Research Center Inc.

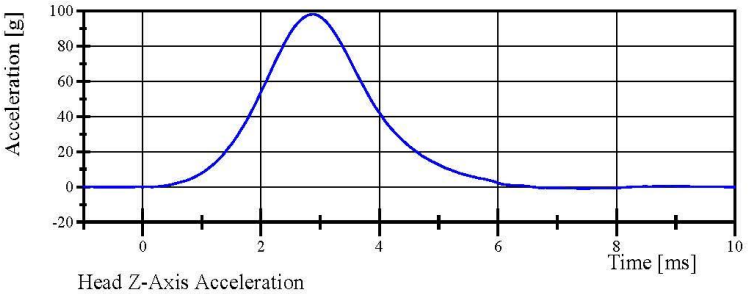
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/3/2018

Head X-Axis Acceleration



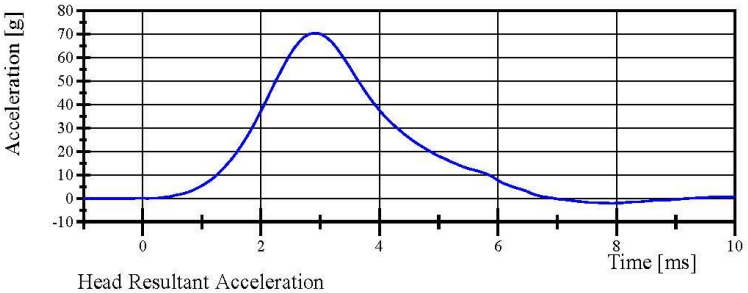
Filter Class: CFC_1000
Max: 2.0 g at 5.7 ms
Min: -3.7 g at 2.9 ms

Head Y-Axis Acceleration



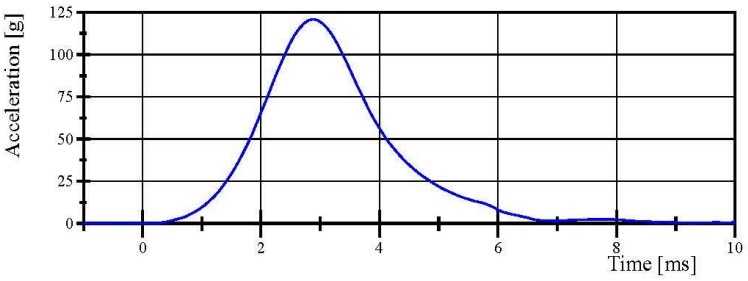
Filter Class: CFC_1000
Max: 98.2 g at 2.9 ms
Min: -0.9 g at 7.4 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 70.4 g at 2.9 ms
Min: -2.1 g at 7.9 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 120.9 g at 2.9 ms
Min: 0.0 g at -0.7 ms

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

12.03.2018 15:12:11 230

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 297 Certification No. 30-2
Test Date: 12/3/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.613 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.344 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.480 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.739 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.764 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.916 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-71.4 deg	Yes
Time of Peak	50 - 70 ms	67.7 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	40.1 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	122.1 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 779

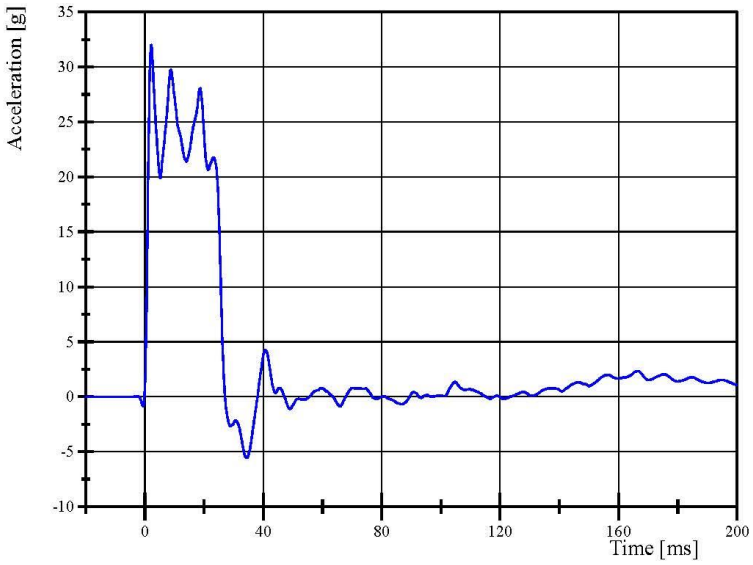
Specification Source: CFR49 Part 572 Subpart V with Polarity in accordance with J211

12.03.2018 16:22:08 745

Transportation Research Center Inc.

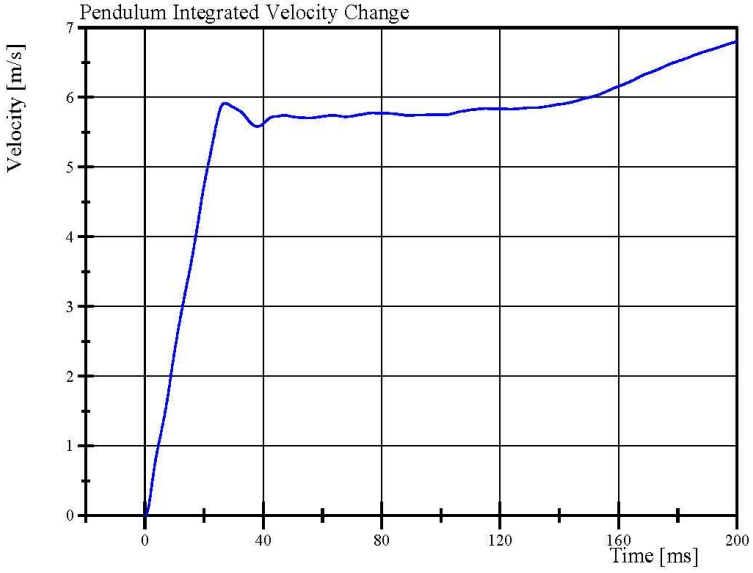
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 30-2
Test Date: 12/3/2018

Pendulum Acceleration



Filter Class: CFC_180
Max: 32.0 g at 2.2 ms
Min: -5.6 g at 34.5 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.8 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

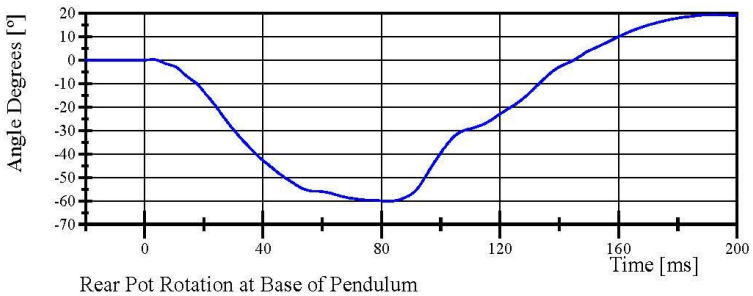
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

12.03.2018 16:22:38 745

Transportation Research Center Inc.

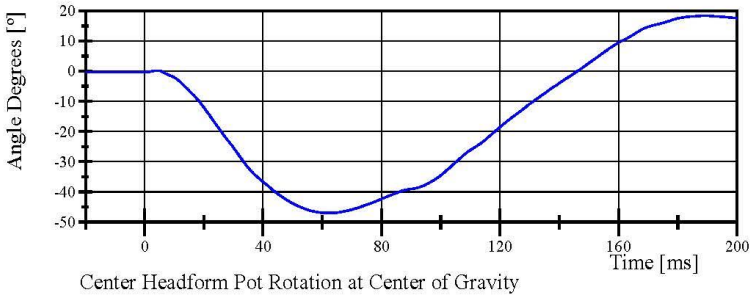
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 30-2
Test Date: 12/3/2018

Forward Pot Rotation at Base of Pendulum



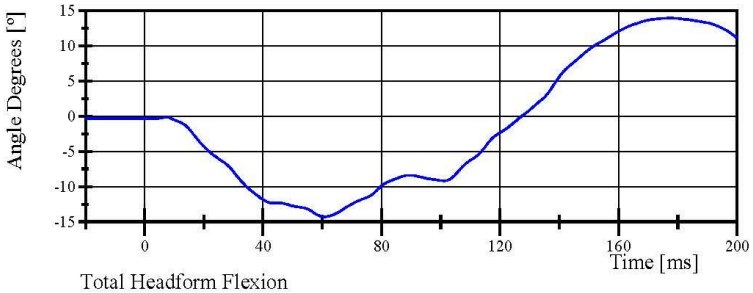
Filter Class: CFC_60
Max: 19.4 ° at 192.3 ms
Min: -60.1 ° at 82.4 ms

Rear Pot Rotation at Base of Pendulum



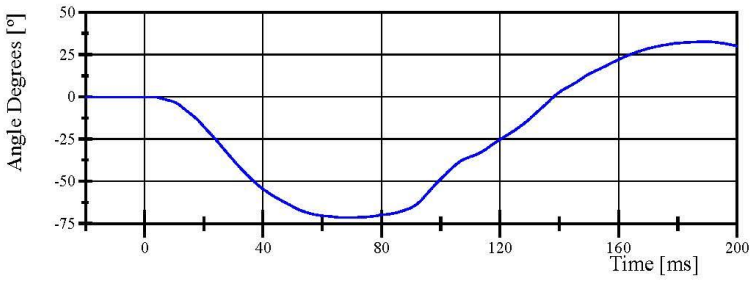
Filter Class: CFC_60
Max: 18.4 ° at 189.2 ms
Min: -47.0 ° at 62.1 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 13.9 ° at 177.3 ms
Min: -14.3 ° at 60.7 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 32.6 ° at 189.4 ms
Min: -71.4 ° at 67.7 ms

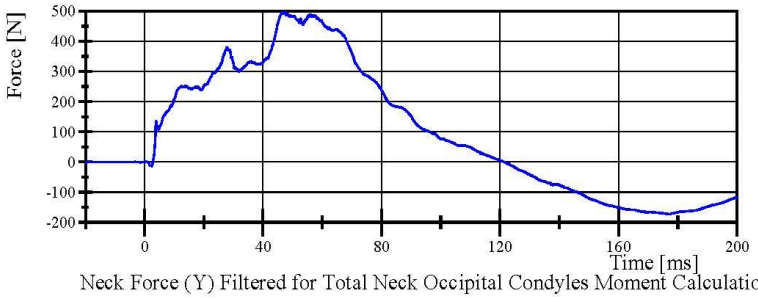
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

12.03.2018 16:22:39 745

Transportation Research Center Inc.

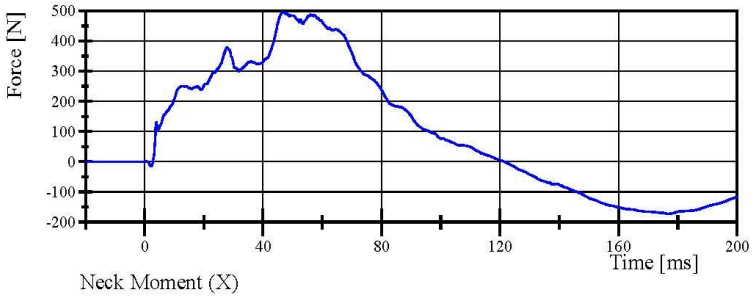
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 30-2
Test Date: 12/3/2018

Neck Force (Y)



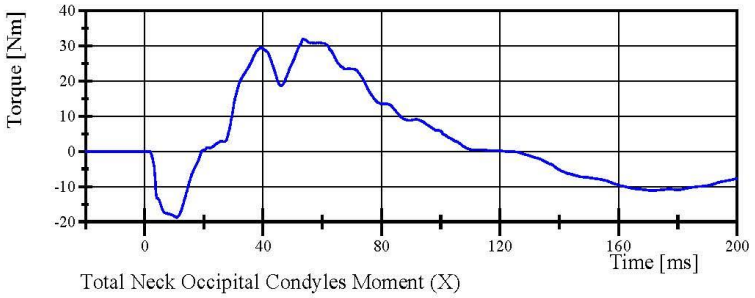
Filter Class: CFC_1000
Max: 497.8 N at 46.8 ms
Min: -172.5 N at 176.5 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



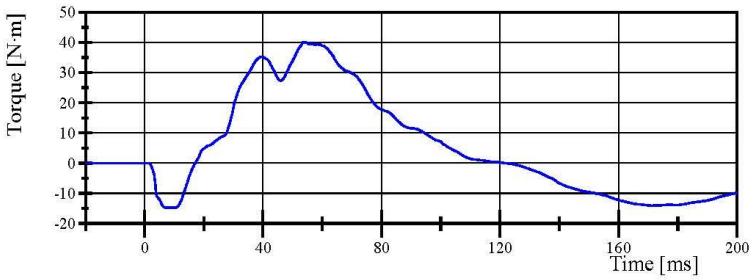
Filter Class: CFC_600
Max: 496.1 N at 46.7 ms
Min: -172.3 N at 177.0 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 32.0 Nm at 53.4 ms
Min: -18.7 Nm at 10.9 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 40.1 N·m at 53.4 ms
Min: -14.7 N·m at 8.0 ms

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

12.03.2018 16:22:40 745

Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.28 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	19.6 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259

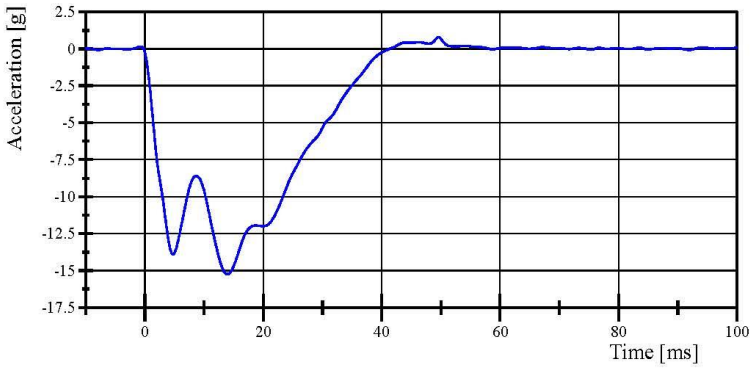
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

12.04.2018 08:58:37 884

Transportation Research Center Inc.

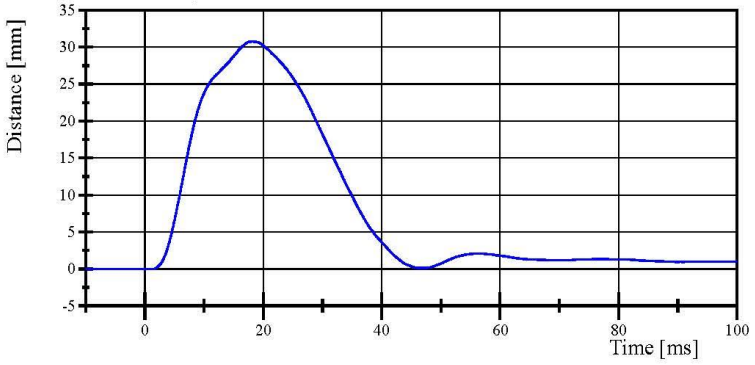
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Probe Acceleration



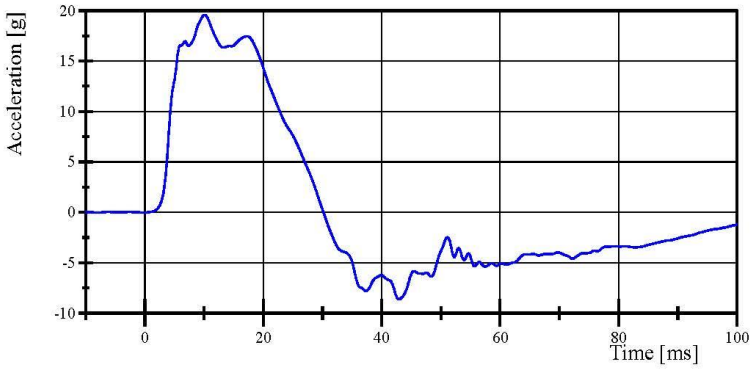
Filter Class: CFC_180
Max: 0.8 g at 49.6 ms
Min: -15.3 g at 13.9 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 30.8 mm at 18.2 ms
Min: -0.0 mm at 1.4 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 19.6 g at 10.1 ms
Min: -8.6 g at 42.9 ms

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

12.04.2018 09:00:45 884

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.755 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-33.6 g	Yes
Shoulder Displacement	31 - 40 mm	35.0 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.1 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.8 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	35.2 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	37.9 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	35.2 g	Yes

Test meets specifications.

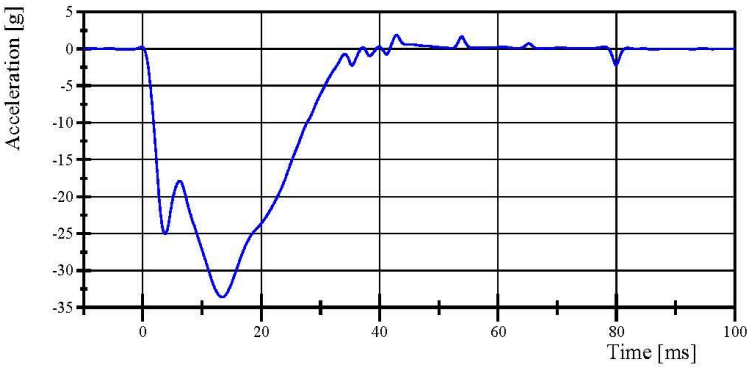
Condition: Used

Comments:
Left Arm S/N: 940L
Upper Thorax Rib #1 S/N: 2009
MiddleThorax Rib #2 S/N: 2010
LowerThorax Rib #3 S/N: 2029

Transportation Research Center Inc.

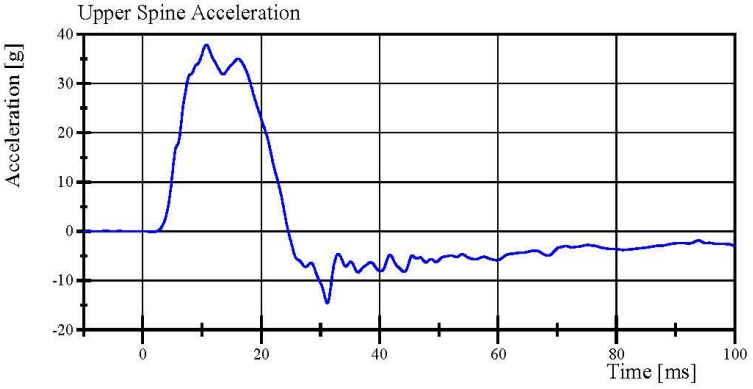
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Probe Acceleration



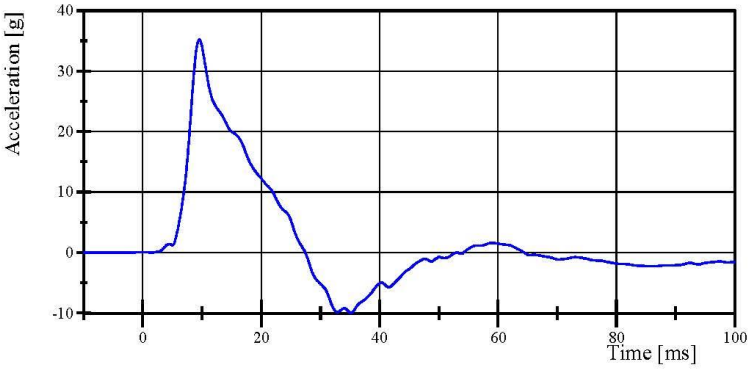
Filter Class: CFC_180
Max: 1.9 g at 42.9 ms
Min: -33.6 g at 13.4 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 37.9 g at 10.7 ms
Min: -14.6 g at 31.1 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 35.2 g at 9.5 ms
Min: -9.9 g at 35.2 ms

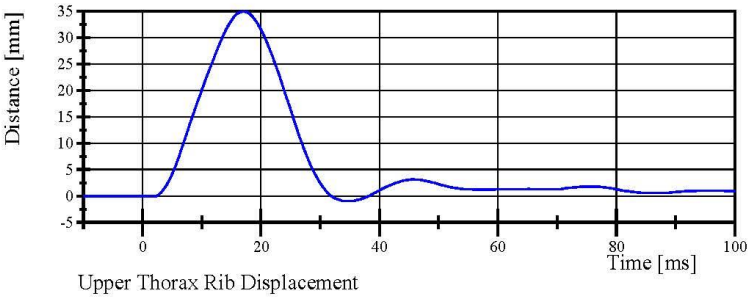
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

12.04.2018 09:47:44 604

Transportation Research Center Inc.

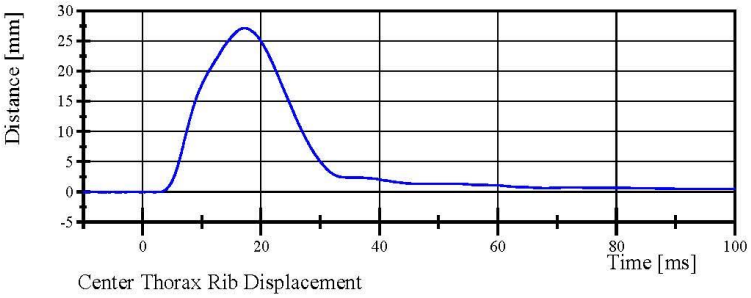
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Shoulder Rib Displacement



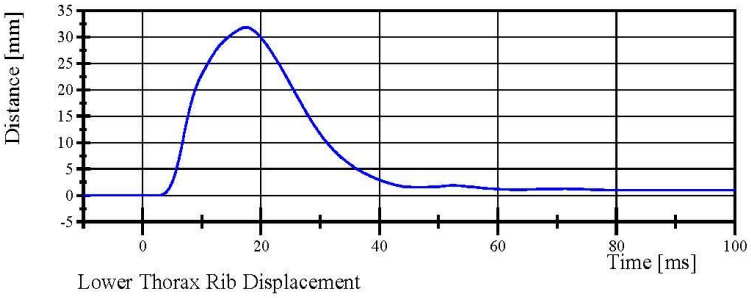
Filter Class: CFC_600
Max: 35.0 mm at 17.0 ms
Min: -1.0 mm at 34.6 ms

Upper Thorax Rib Displacement



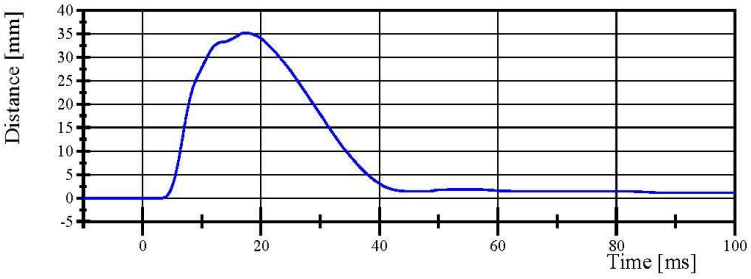
Filter Class: CFC_600
Max: 27.1 mm at 17.2 ms
Min: -0.0 mm at -7.0 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.8 mm at 17.4 ms
Min: -0.0 mm at -6.9 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 35.2 mm at 17.3 ms
Min: -0.0 mm at -0.4 ms

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

12.04.2018 09:47:45 604

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.343 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-16.1 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	35.2 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	40.9 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	39.2 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	15.2 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.6 g	Yes

Test meets specifications.

Condition: Used

Comments:
Upper Thorax Rib #1 S/N: 2009
Middle Thorax Rib #2 S/N: 2010
Lower Thorax Rib #3 S/N: 2029

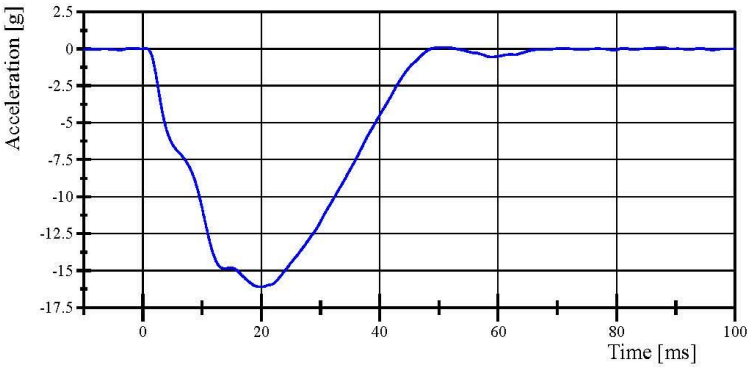
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

12.04.2018 09:12:38 835

Transportation Research Center Inc.

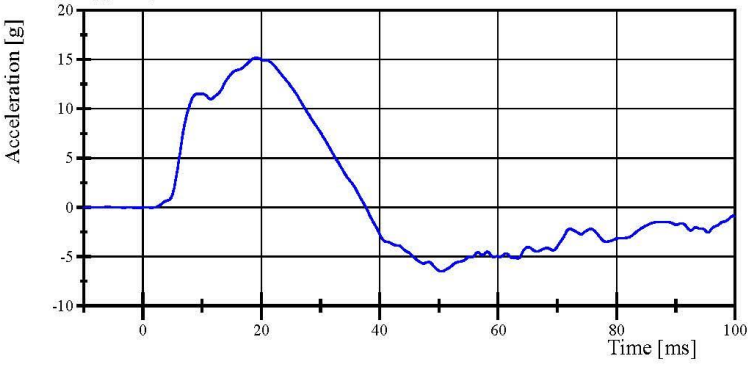
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Probe Acceleration



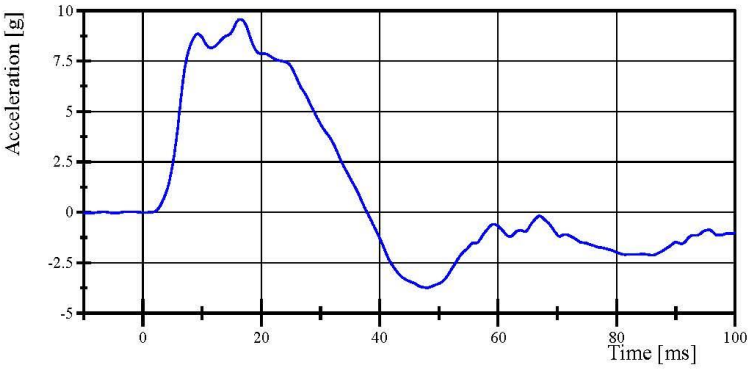
Filter Class: CFC_180
Max: 0.1 g at 51.0 ms
Min: -16.1 g at 19.8 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 15.2 g at 19.1 ms
Min: -6.5 g at 50.4 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.6 g at 16.5 ms
Min: -3.7 g at 48.0 ms

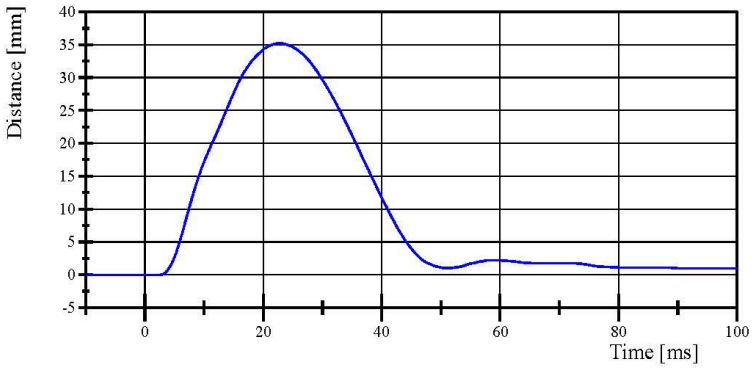
Specification Source: CFR49 Part 572 Subpart V
with Polarity in accordance with J211

12.04.2018 09:14:15 835

Transportation Research Center Inc.

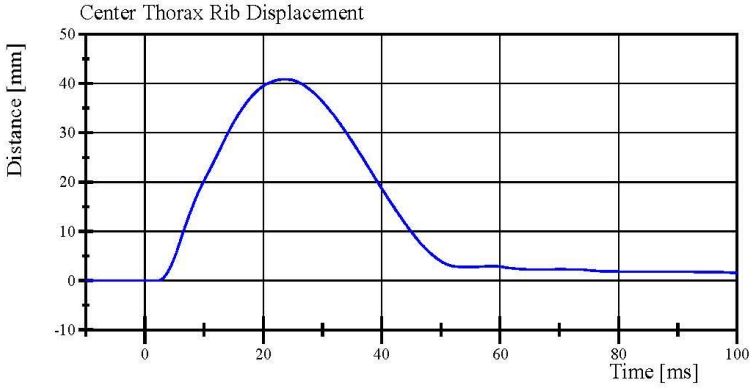
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Upper Thorax Rib Displacement



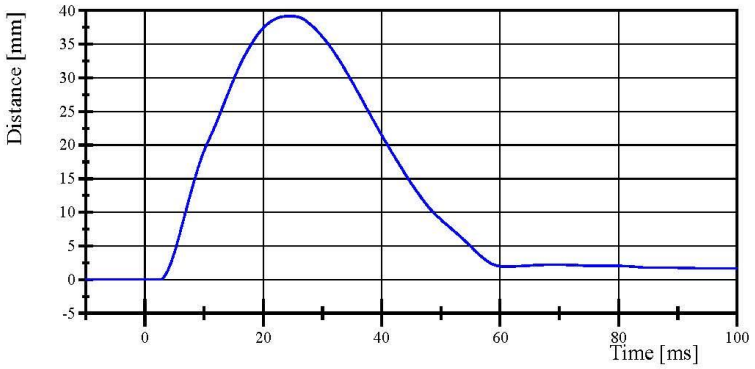
Filter Class: CFC_600
Max: 35.2 mm at 22.8 ms
Min: -0.0 mm at -5.4 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 40.9 mm at 23.7 ms
Min: -0.0 mm at 1.4 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 39.2 mm at 24.0 ms
Min: -0.0 mm at 2.6 ms

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

12.04.2018 09:14:15 835

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.26 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.0 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	39.7 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	38.6 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.68 g	Yes

Test meets specifications.

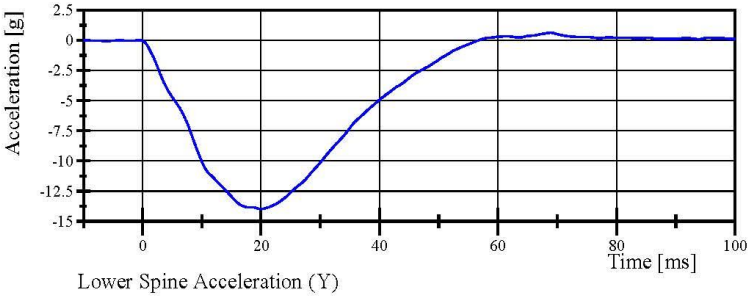
Condition: Used

Comments:
Upper Abdominal Rib S/N: 1747
Lower Abdominal Rib S/N: 1748

Transportation Research Center Inc.

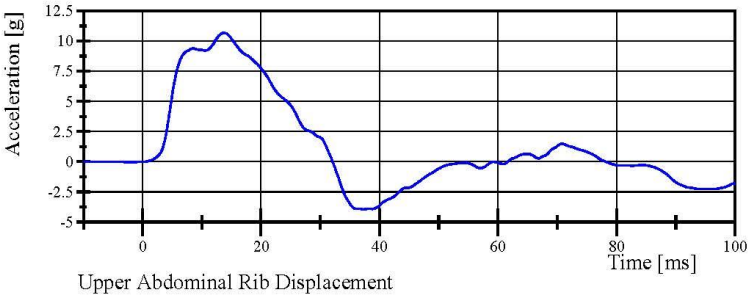
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 30-1
Test Date: 12/4/2018

Probe Acceleration



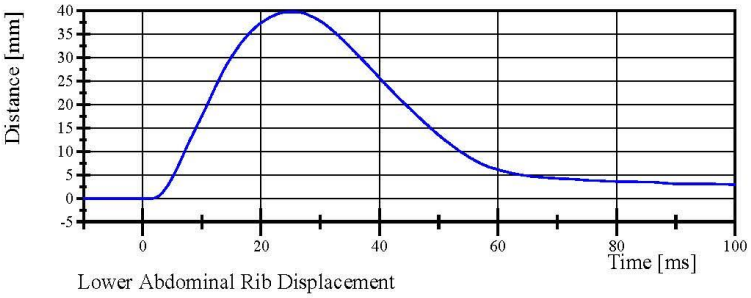
Filter Class: CFC_180
Max: 0.6 g at 68.9 ms
Min: -14.0 g at 20.0 ms

Lower Spine Acceleration (Y)



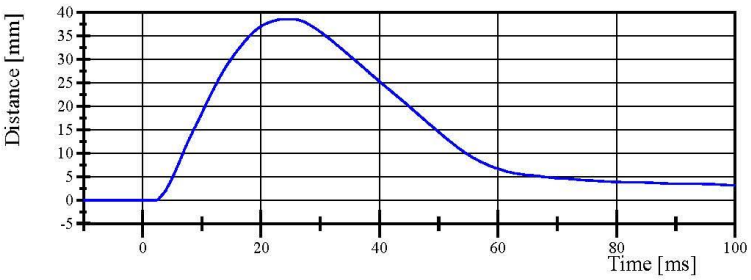
Filter Class: CFC_180
Max: 10.7 g at 13.8 ms
Min: -3.9 g at 37.2 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 39.7 mm at 25.0 ms
Min: -0.0 mm at 1.5 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 38.6 mm at 24.2 ms
Min: -0.0 mm at 2.2 ms

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

12.04.2018 08:57:15 682

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 30-19
Test Date: 1/4/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.62 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-43.04 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	41.4 g	Yes
Acetabulum Force	3,600 - 4,300 N	4,180.1 N	Yes

Test meets specifications.

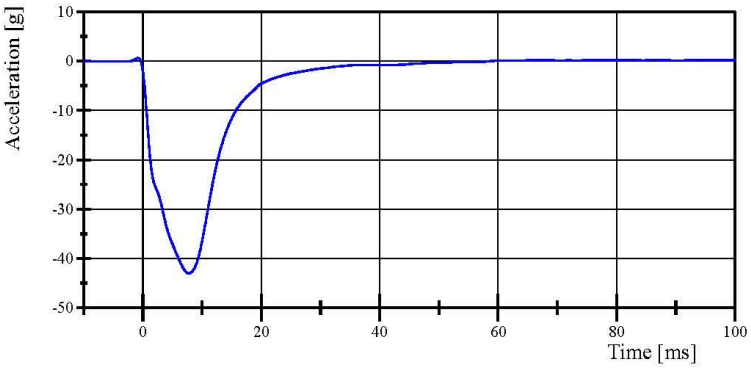
Condition: Used

Comments:
Pelvis Skin S/N: 751
Pelvis Plug Info:
Manufacturer: SACO
S/N: 12141
Cal Date: 20180228

Transportation Research Center Inc.

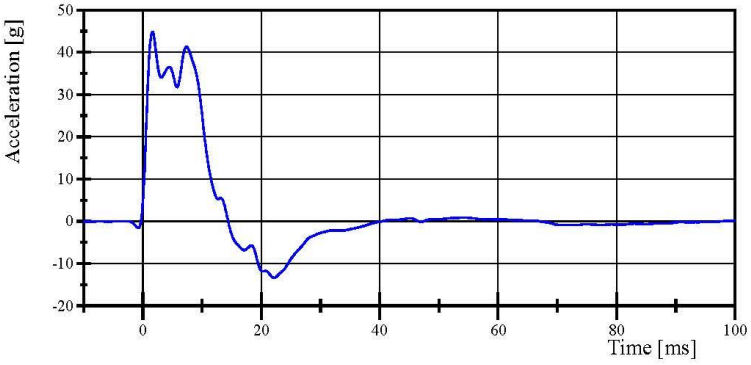
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 30-19
Test Date: 1/4/2019

Probe Acceleration



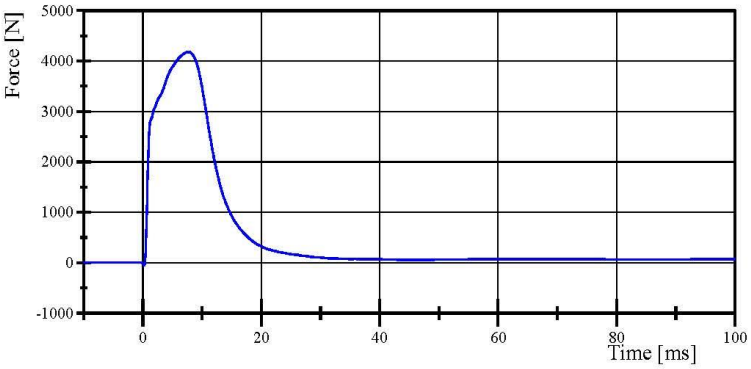
Filter Class: CFC_180
Max: 0.6 g at -0.8 ms
Min: -43.0 g at 7.8 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 44.9 g at 1.6 ms
Min: -13.4 g at 22.2 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 4,180.1 N at 7.7 ms
Min: -51.2 N at 0.2 ms

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

01.04.2019 06:38 451

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 30-2
Test Date: 1/4/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.37 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-37.3 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	33.2 g	Yes
Iliac Force	4,100 - 5,100 N	4,199.4 N	Yes

Test meets specifications.

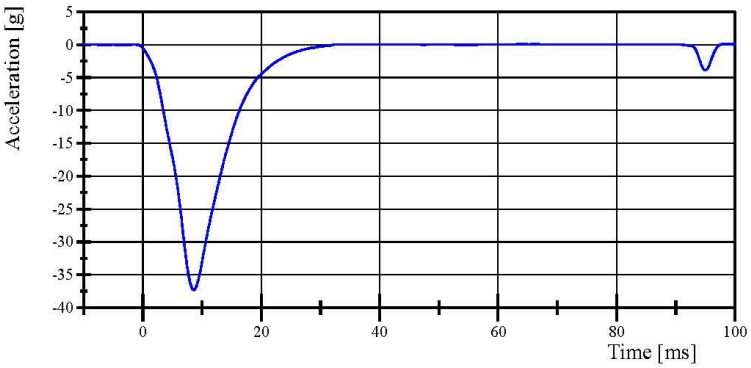
Condition: Used

Comments:
Pelvis Skin S/N: 751

Transportation Research Center Inc.

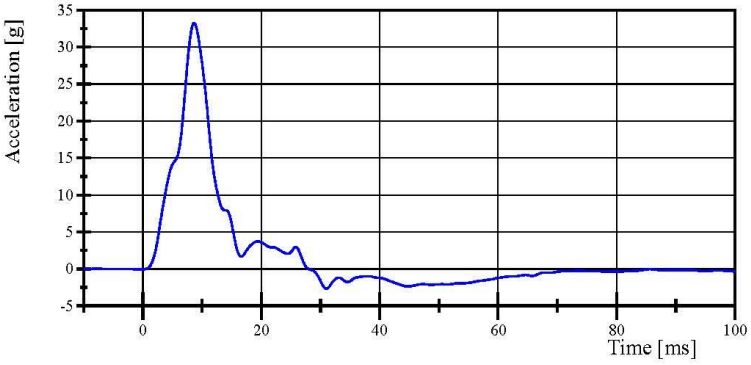
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 30-2
Test Date: 1/4/2019

Probe Acceleration



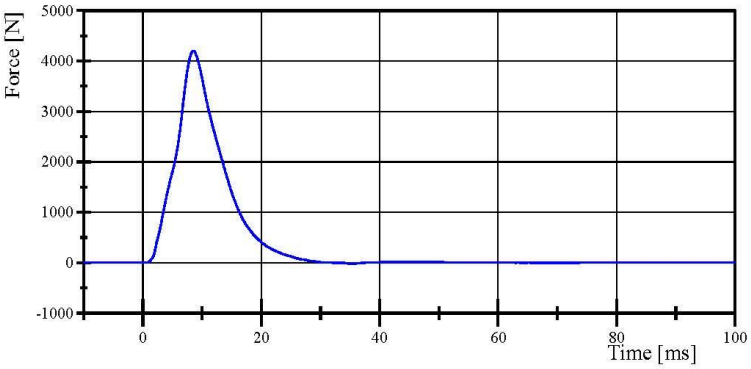
Filter Class: CFC_180
Max: 0.1 g at 98.2 ms
Min: -37.3 g at 8.6 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 33.2 g at 8.6 ms
Min: -2.7 g at 31.0 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 4,199.4 N at 8.6 ms
Min: -15.8 N at 35.1 ms

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

01.04.2019 08:49 669

Post-Test Calibration Sheets
Driver S/N 297

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. 297 Calibration No. 31

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	788	Yes
B	Shoulder Pivot Height	437.0 - 453.0	450	Yes
C	H-Point Height	79.0 - 89.0	86	Yes
D	H-Point from Seat Back	141.0 - 151.0	148	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	103	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	530	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	201	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	85	Yes
W	Foot Width (left)	78.0 - 94.0	85	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	879	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. 31-1
Test Date: 1/9/2019

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	118.6 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	-5.4 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

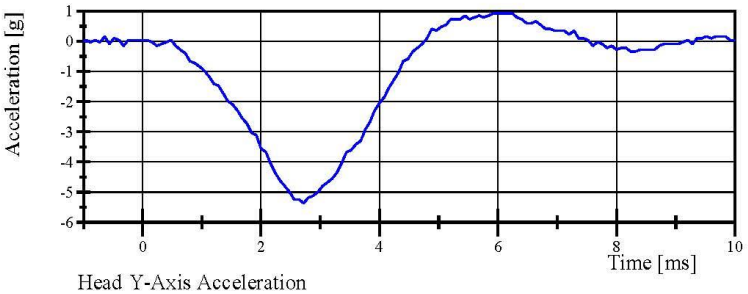
Test meets specifications.

Condition: Used
Comments:
Head S/N: 1330

Transportation Research Center Inc.

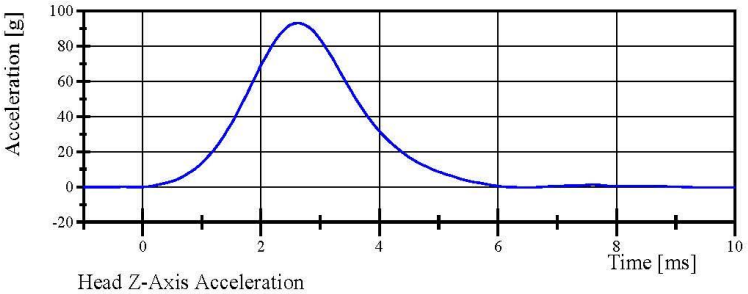
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/9/2019

Head X-Axis Acceleration



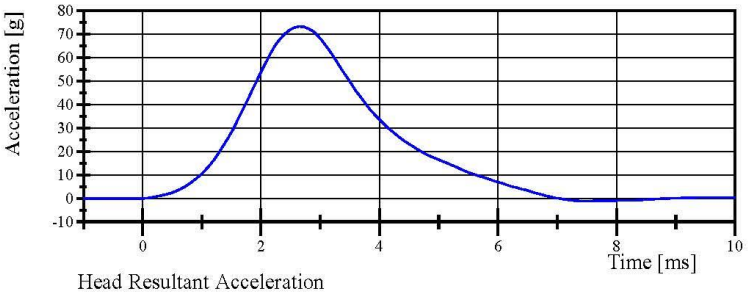
Filter Class: CFC_1000
Max: 0.9 g at 5.9 ms
Min: -5.4 g at 2.7 ms

Head Y-Axis Acceleration



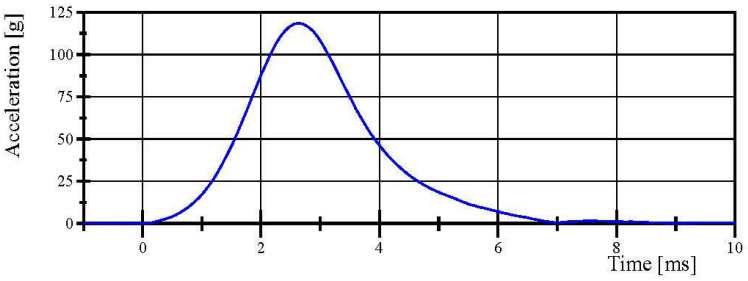
Filter Class: CFC_1000
Max: 93.2 g at 2.6 ms
Min: -0.3 g at 6.4 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 73.2 g at 2.6 ms
Min: -1.2 g at 7.4 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 118.6 g at 2.6 ms
Min: 0.0 g at -1.0 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. 31-2
Test Date: 1/9/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.626 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.448 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.591 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.795 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.785 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.987 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-71.1 deg	Yes
Time of Peak	50 - 70 ms	67.4 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	41.4 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	118.8 ms	Yes

Test meets specifications.

Condition: Used

Comments:
Neck S/N: 779

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

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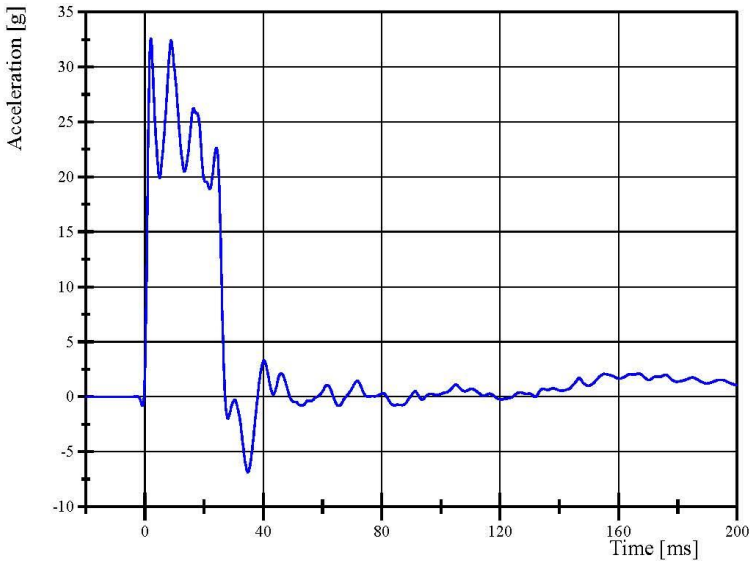
Transportation Research Center Inc.

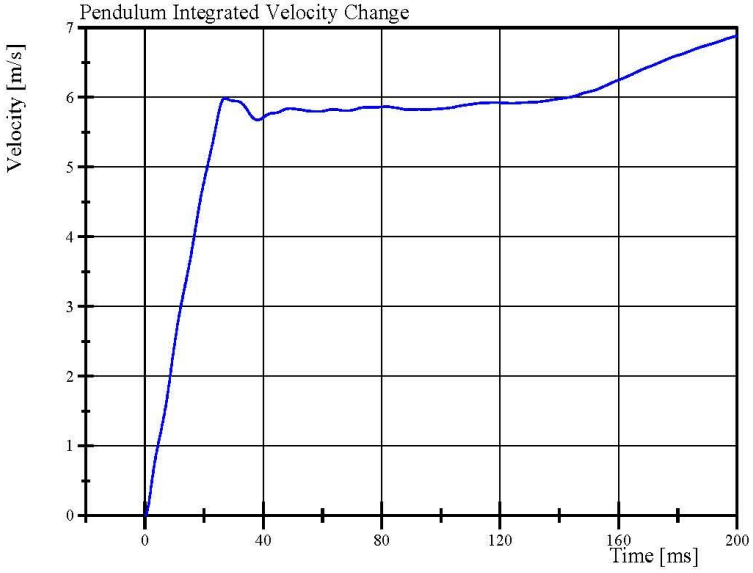
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 31-2
Test Date: 1/9/2019

Pendulum Acceleration



Filter Class: CFC_180
Max: 32.6 g at 2.0 ms
Min: -6.9 g at 34.9 ms

Pendulum Integrated Velocity Change



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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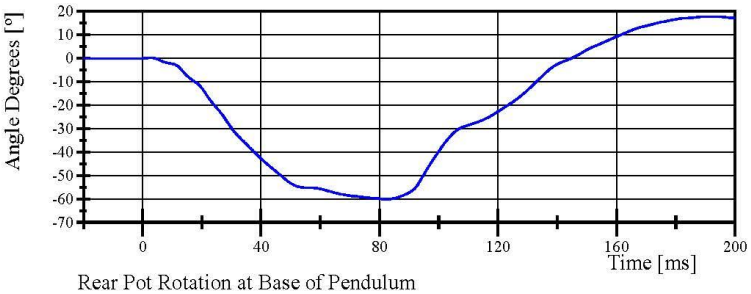
Transportation Research Center Inc.

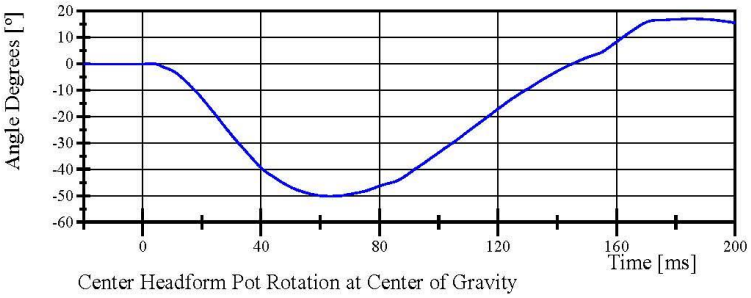
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 31-2
Test Date: 1/9/2019

Forward Pot Rotation at Base of Pendulum



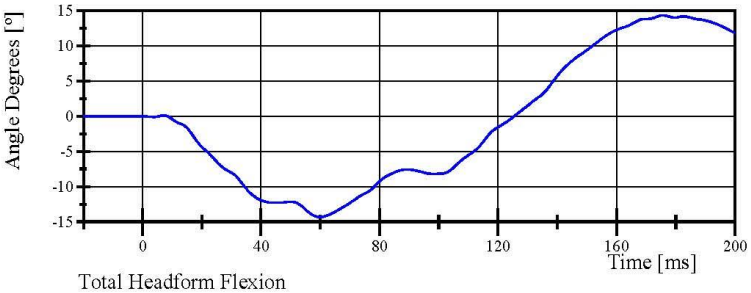
Filter Class: CFC_60
Max: 17.8 ° at 191.4 ms
Min: -60.1 ° at 82.4 ms

Rear Pot Rotation at Base of Pendulum



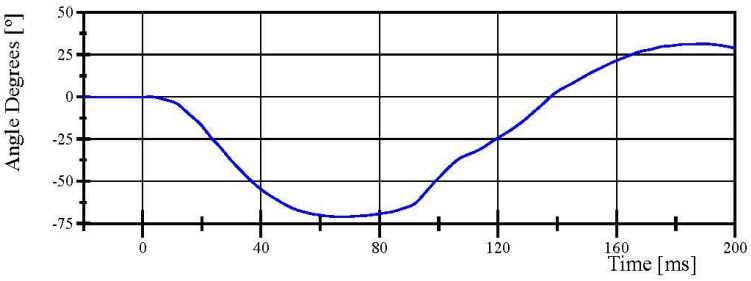
Filter Class: CFC_60
Max: 17.1 ° at 185.4 ms
Min: -50.2 ° at 63.3 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 14.3 ° at 175.6 ms
Min: -14.3 ° at 59.9 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 31.4 ° at 189.4 ms
Min: -71.1 ° at 67.4 ms

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

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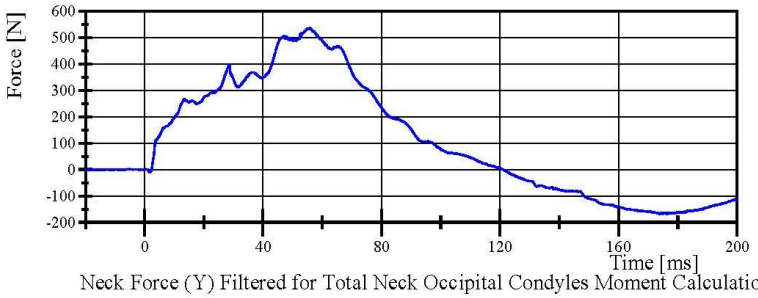
Transportation Research Center Inc.

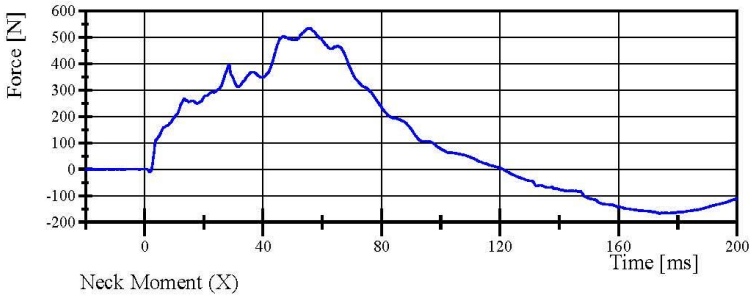
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 31-2
Test Date: 1/9/2019

Neck Force (Y)



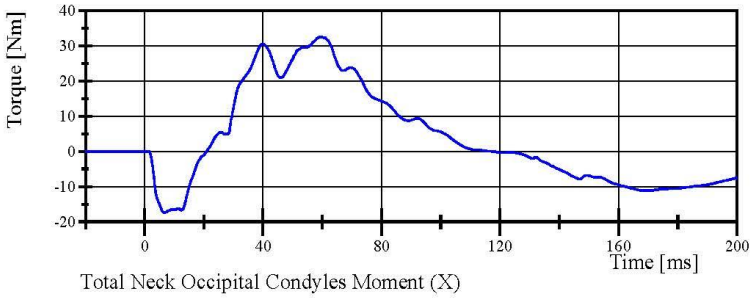
Filter Class: CFC_1000
Max: 536.1 N at 55.8 ms
Min: -168.2 N at 173.9 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



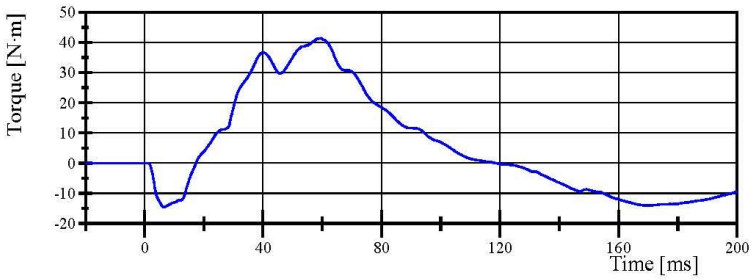
Filter Class: CFC_600
Max: 534.5 N at 55.8 ms
Min: -167.1 N at 173.9 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 32.6 Nm at 59.5 ms
Min: -17.3 Nm at 6.6 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constar
Max: 41.4 N·m at 59.6 ms
Min: -14.4 N·m at 6.6 ms

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

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Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.29 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-15.7 g	Yes
Shoulder Displacement	28 - 37 mm	30.7 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	19.8 g	Yes

Test meets specifications.

Condition: Used

Comments:
Left Arm S/N: 940L
Shoulder Rib S/N: 180-3355 259

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

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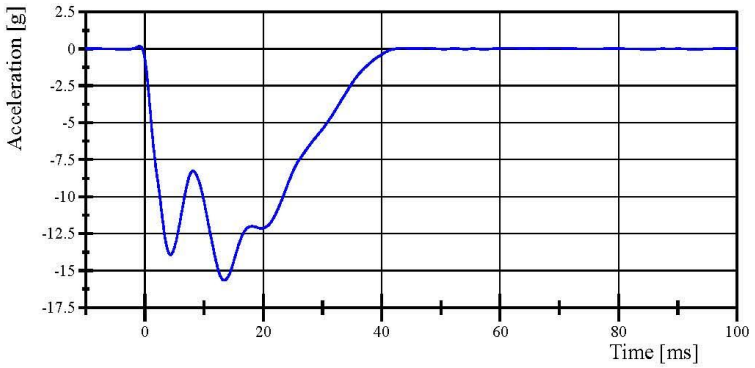
Transportation Research Center Inc.

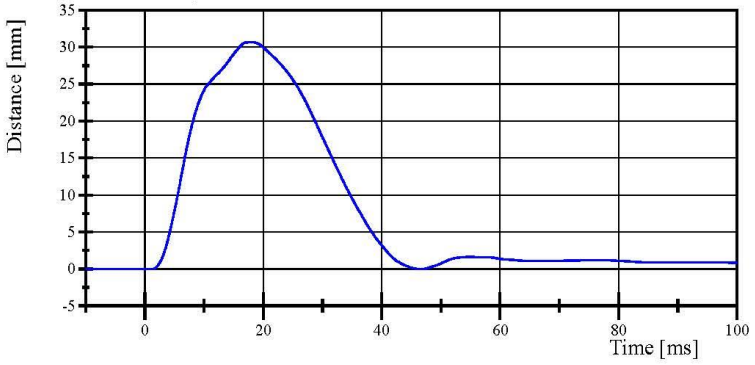
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



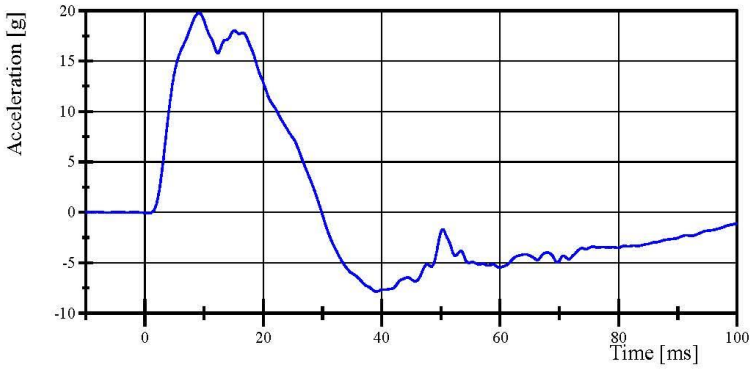
Filter Class: CFC_180
Max: 0.2 g at -0.9 ms
Min: -15.7 g at 13.4 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 30.7 mm at 17.8 ms
Min: -0.0 mm at 1.3 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 19.8 g at 9.1 ms
Min: -7.9 g at 39.0 ms

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

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Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.750 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-34.8 g	Yes
Shoulder Displacement	31 - 40 mm	35.9 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	27.4 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.0 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	33.8 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	38.9 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	36.2 g	Yes

Test meets specifications.

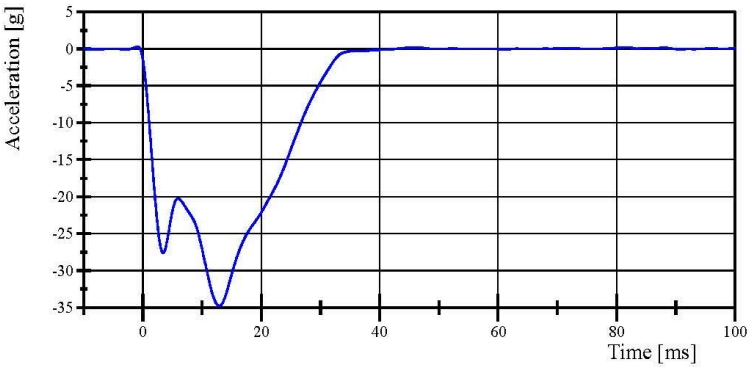
Condition: Used

Comments:
Left Arm S/N: 940L
Upper Thorax Rib #1 S/N: 2009
MiddleThorax Rib #2 S/N: 2010
LowerThorax Rib #3 S/N: 2029

Transportation Research Center Inc.

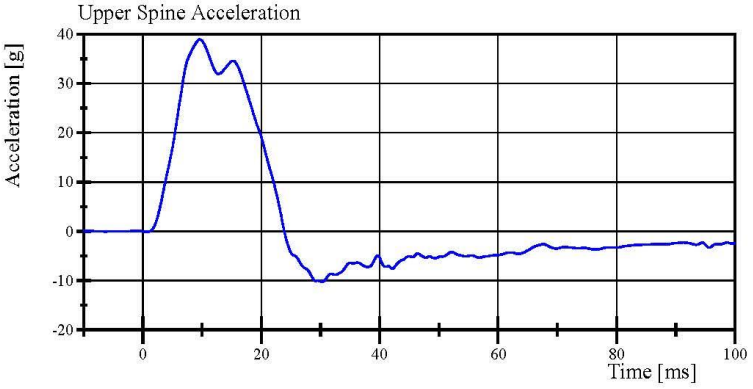
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



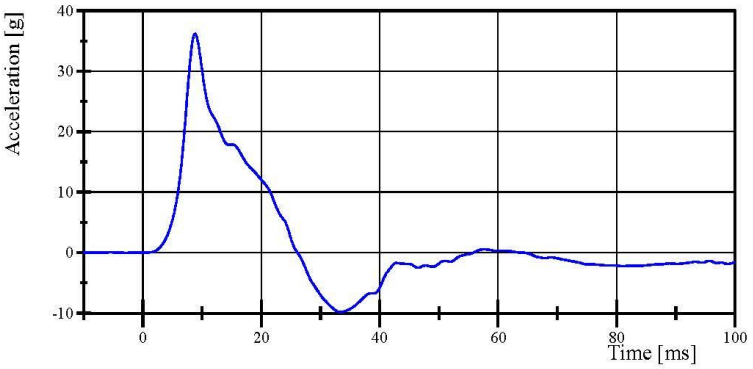
Filter Class: CFC_180
Max: 0.3 g at -1.0 ms
Min: -34.8 g at 12.9 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 38.9 g at 9.6 ms
Min: -10.2 g at 30.3 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 36.2 g at 8.8 ms
Min: -9.8 g at 33.4 ms

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

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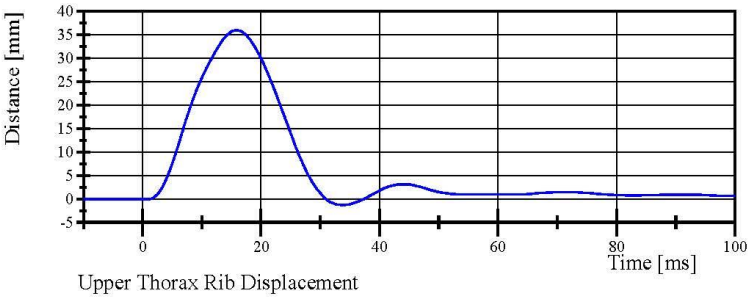
Transportation Research Center Inc.

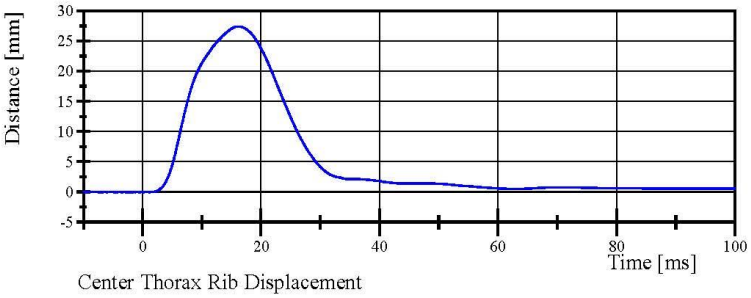
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Shoulder Rib Displacement



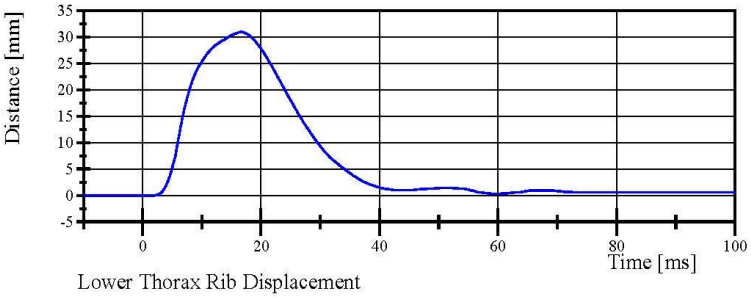
Filter Class: CFC_600
Max: 35.9 mm at 15.9 ms
Min: -1.3 mm at 33.8 ms

Upper Thorax Rib Displacement



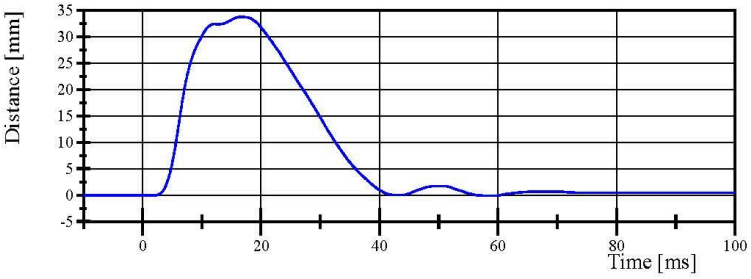
Filter Class: CFC_600
Max: 27.4 mm at 16.2 ms
Min: -0.0 mm at -7.0 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.0 mm at 16.6 ms
Min: -0.0 mm at -4.9 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 33.8 mm at 16.9 ms
Min: -0.1 mm at 59.5 ms

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

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Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.335 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-16.0 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	36.9 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	41.3 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	38.7 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	15.0 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.6 g	Yes

Test meets specifications.

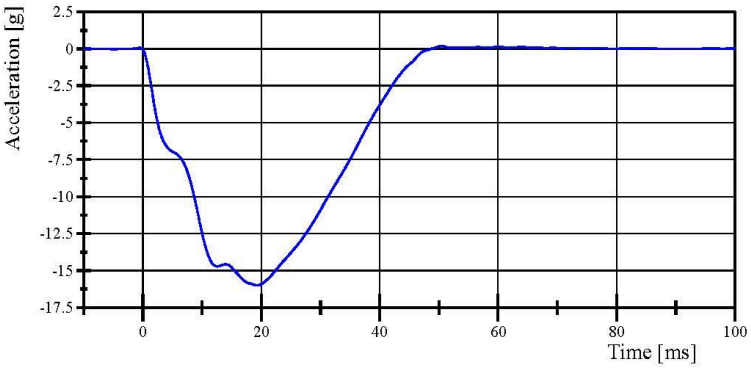
Condition: Used

Comments:
Upper Thorax Rib #1 S/N: 2009
Middle Thorax Rib #2 S/N: 2010
Lower Thorax Rib #3 S/N: 2029

Transportation Research Center Inc.

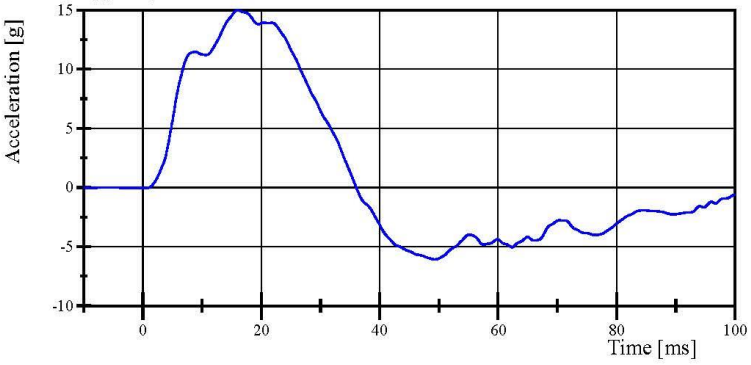
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



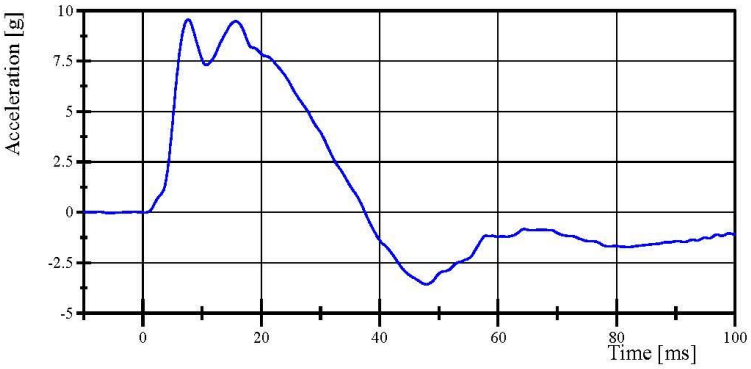
Filter Class: CFC_180
Max: 0.2 g at 50.4 ms
Min: -16.0 g at 19.3 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 15.0 g at 16.0 ms
Min: -6.1 g at 49.3 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.6 g at 7.7 ms
Min: -3.6 g at 47.8 ms

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

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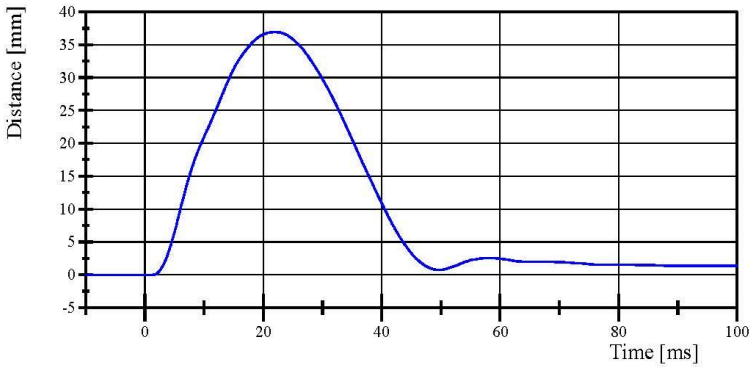
Transportation Research Center Inc.

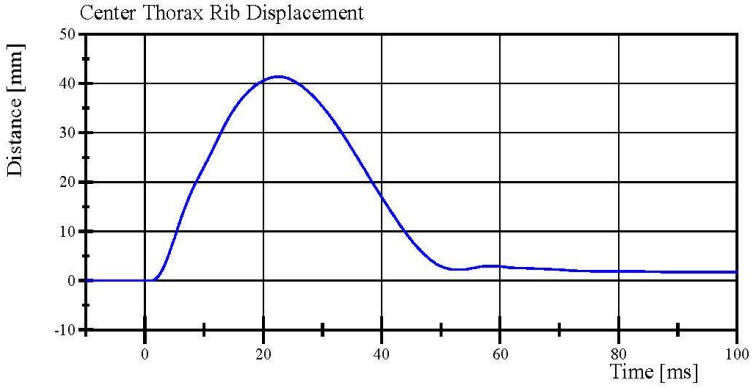
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Upper Thorax Rib Displacement



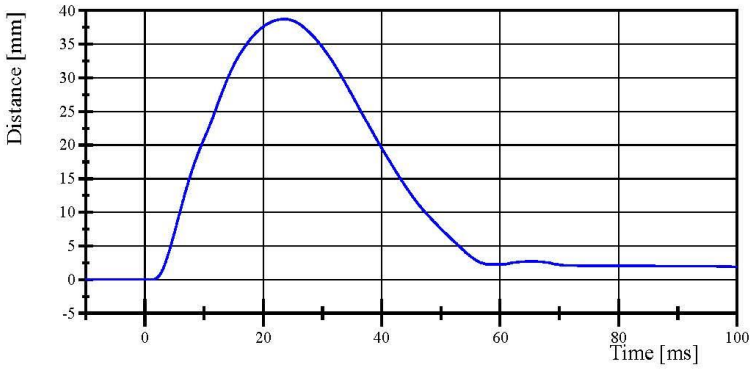
Filter Class: CFC_600
Max: 36.9 mm at 22.0 ms
Min: -0.0 mm at -7.5 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 41.3 mm at 22.7 ms
Min: -0.0 mm at 1.0 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 38.7 mm at 23.3 ms
Min: -0.0 mm at 0.2 ms

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

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Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.26 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.1 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	37.9 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	39.3 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.84 g	Yes

Test meets specifications.

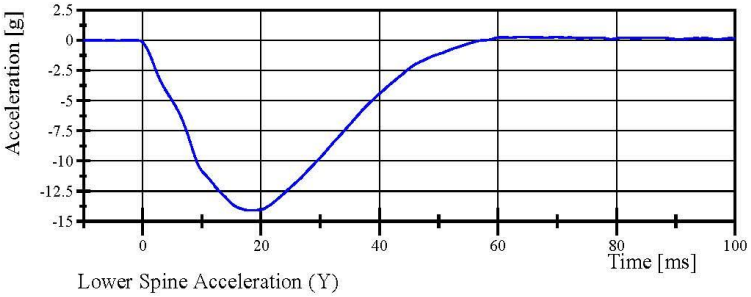
Condition: Used

Comments:
Upper Abdominal Rib S/N: 1747
Lower Abdominal Rib S/N: 1748

Transportation Research Center Inc.

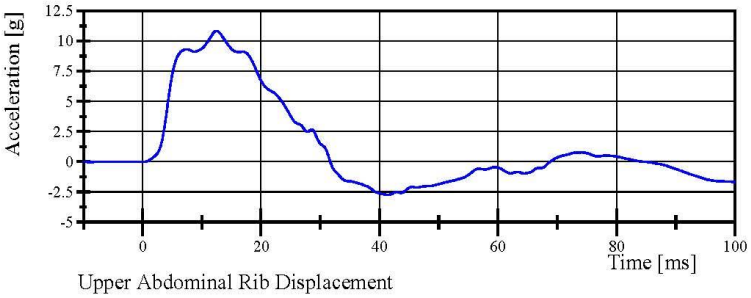
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



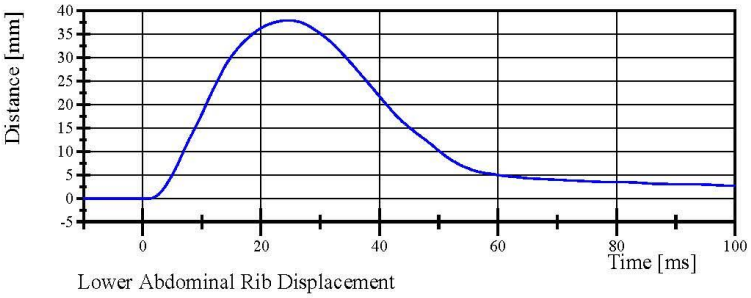
Filter Class: CFC_180
Max: 0.3 g at 64.3 ms
Min: -14.1 g at 18.4 ms

Lower Spine Acceleration (Y)



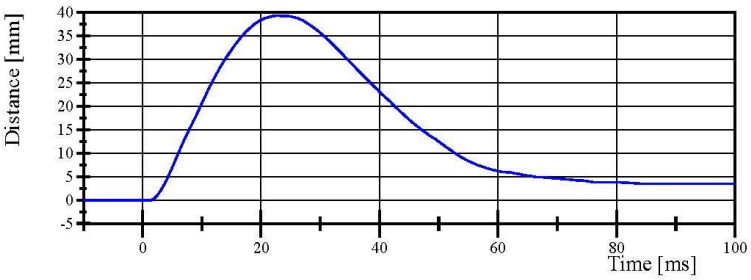
Filter Class: CFC_180
Max: 10.8 g at 12.5 ms
Min: -2.7 g at 41.4 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 37.9 mm at 24.4 ms
Min: -0.0 mm at 1.1 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 39.3 mm at 22.6 ms
Min: -0.0 mm at 1.2 ms

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

01.10.2019 06:48 703

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/9/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.61 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-44.25 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	40.7 g	Yes
Acetabulum Force	3,600 - 4,300 N	4,390.4 N	No

Test does not meet specifications.

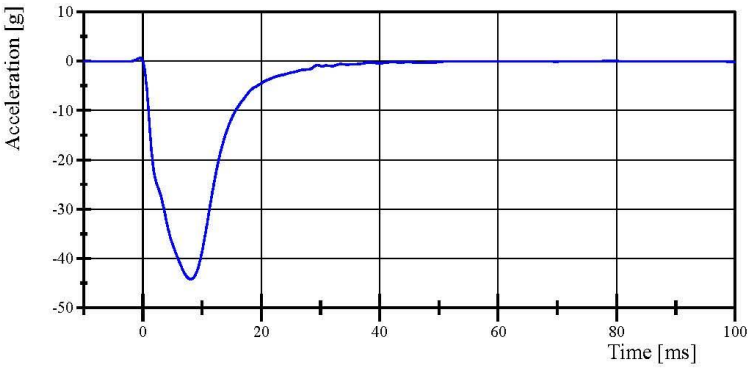
Condition: Used

Comments:
Pelvis Skin S/N: 751
Pelvis Plug Info:
Manufacturer: SACO
S/N: 12239
Cal Date: 20180314

Transportation Research Center Inc.

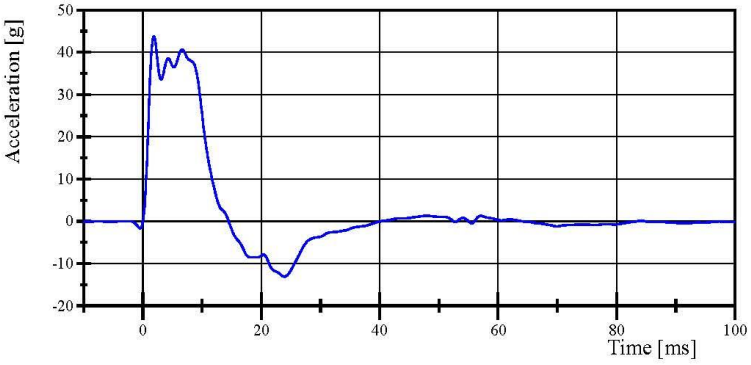
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/9/2019

Probe Acceleration



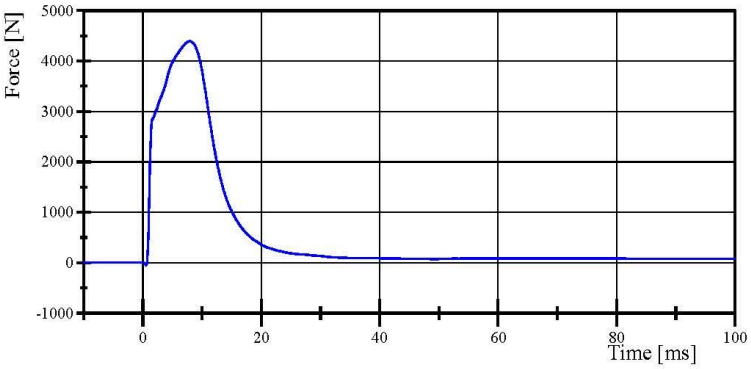
Filter Class: CFC_180
Max: 0.6 g at -0.5 ms
Min: -44.2 g at 8.1 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 43.8 g at 1.8 ms
Min: -13.1 g at 23.9 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 4,390.4 N at 7.9 ms
Min: -49.3 N at 0.6 ms

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

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Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.40 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-33.7 g	No
Peak Pelvis Lateral Acceleration	28 - 39 g	22.6 g	No
Iliac Force	4,100 - 5,100 N	3,530.3 N	No

Test does not meet specifications.

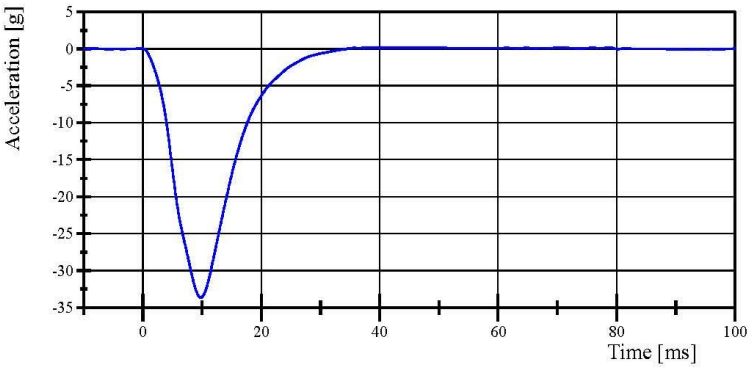
Condition: Used

Comments:
Pelvis Skin S/N: 751

Transportation Research Center Inc.

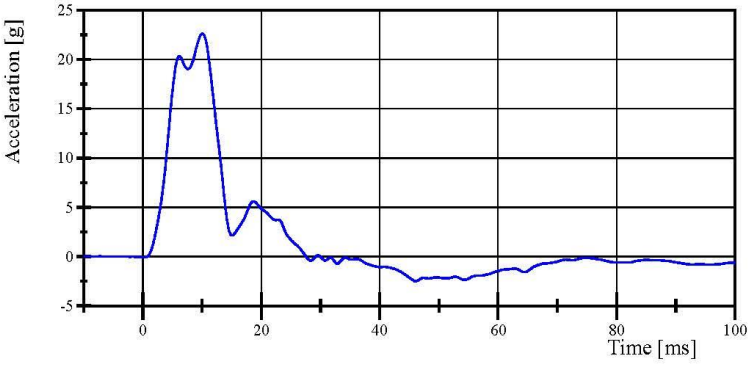
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 31-1
Test Date: 1/10/2019

Probe Acceleration



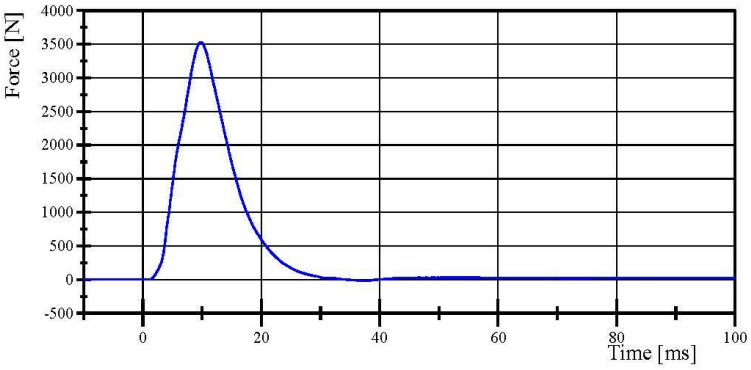
Filter Class: CFC_180
Max: 0.2 g at 78.8 ms
Min: -33.7 g at 9.8 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 22.6 g at 10.1 ms
Min: -2.5 g at 46.1 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 3,530.3 N at 9.8 ms
Min: -18.7 N at 37.3 ms

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

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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	3-Dec-2018
			Y	P93549	Endevco	3-Dec-2018
			Z	P93776	Endevco	3-Dec-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	3-Dec-2018
			Y	P91522	Endevco	3-Dec-2018
			Z	P91511	Endevco	3-Dec-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)				12274	SACO	15-Mar-2018
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	21-Dec-2018
Vehicle Center of Gravity	Y	P94524	Endevco	21-Dec-2018
Vehicle Center of Gravity	Z	P88460	Endevco	21-Dec-2018
Left Floor Sill	Y	P94485	Endevco	21-Dec-2018
A-Pillar Sill	Y	P97716	Endevco	21-Dec-2018
A-Pillar Low	Y	T11447	Endevco	3-Jan-2019
A-Pillar Mid	Y	T10349	Endevco	3-Jan-2019
B-Pillar Sill	Y	P56615	Endevco	21-Dec-2018
B-Pillar Low	Y	P97719	Endevco	24-Oct-2018
B-Pillar Mid	Y	P88043	Endevco	24-Oct-2018
Driver Seat	Y	T10668	Endevco	21-Dec-2018
Engine Top	X	T11388	Endevco	3-Jan-2019
Engine Top	Y	T11448	Endevco	3-Jan-2019
Firewall	Y	T10650	Endevco	21-Dec-2018
Right Roof	Y	P88453	Endevco	21-Dec-2018
Right Floor Sill	Y	P73570	Endevco	24-Oct-2018
Rear Floor Pan	X	T11457	Endevco	3-Jan-2019
Rear Floor Pan	Y	T11451	Endevco	3-Jan-2019

TABLE 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	DK7091S	Humanetics	14-Nov-2018
Load Cell 2	DK7120S	Humanetics	14-Nov-2018
Load Cell 3	DK7118S	Humanetics	14-Nov-2018
Load Cell 4	DK7124S	Humanetics	14-Nov-2018
Load Cell 5	DK7111S	Humanetics	14-Nov-2018
Load Cell 6	DK7126S	Humanetics	14-Nov-2018
Load Cell 7	DK7112S	Humanetics	14-Nov-2018
Load Cell 8	DK7074S	Humanetics	14-Nov-2018