FINAL REPORT NUMBER: SPNCAP-TRC-14-002

NEW CAR ASSESSMENT PROGRAM (NCAP)
SIDE IMPACT POLE TEST

General Motors LLC
2014 Mercedes-Benz E-350 4-Door Sedan
NHTSA NUMBER: M20144301

PREPARED BY:
Transportation Research Center Inc.
10820 State Route 347
P. O. Box B-67
East Liberty, OH 43319

Report Date: December 19, 2013

FINAL REPORT

PREPARED FOR:
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Office of Crashworthiness Standards
Mail Code: NVS-111
1200 New Jersey Ave, SE
Room W43-410
Washington, D.C. 20590

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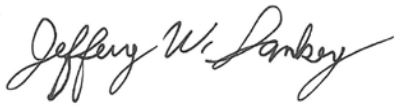
Report Prepared By: ILO Project Operations Group

Report Approved By: 

Jeffery W. Sankey, Manager, Project Operations

Approval Date: December 19, 2013

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

Technical Report Documentation Page

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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 2014 Mercedes-Benz E-350 4-door sedan, 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 November 13, 2013.

The impact velocity was 32.20 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 21° C. The test vehicle's post-test maximum crush was 343 mm at Level 3.

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

	Unit	Threshold	Front SID-IIs
Head Injury Criteria (HIC_{36}):	NA	1000	492
Resultant Lower Spine Acceleration:	g's	82	53.2
Total Pelvic Force: (sum of acetabular and iliac forces)	N	5525	4770.6
Maximum Thoracic Rib Deflection	mm	38	26.9
Maximum Abdomen Rib Deflection	mm	45	38.1

The door struck by the pole 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 MY14 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-09-D-00125. The purpose of this test is to generate comparative side impact performance in a 2014 Mercedes-Benz E-350 4-door sedan manufactured by Daimler AG Stuttgart. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated September 2013.

SECTION 2
SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a model year 2014 Mercedes-Benz E-350 4-door sedan. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.20 km/h. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, OH, on November 13, 2013. 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 September 2013. Camera locations and other pertinent camera information are included in this report.

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

Head CG Triaxial Accelerometers
Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
Abdomen Upper and Lower Rib Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Iliac Load Cell
Acetabulum Load Cell

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

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	492
Lower Spine Acceleration	G	82	53.2
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	4770.6
Maximum Thoracic Rib Deflection	mm	38*	26.9
Maximum Abdominal Rib Deflection	mm	45*	38.1

* 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		
Curtain	Yes	Yes	Yes	Yes
Side Torso Airbag	Yes	Yes	No	N/A
Side Pelvis Airbag	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	Yes	No
Seat Belt Load Limiter	Yes	Yes	Yes	No
Other	None	NA	None	NA

GENERAL COMMENTS

None

SECTION 3
OCCUPANT AND VEHICLE INFORMATION

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	M20144301
Model Year	2014
Make	Mercedes-Benz
Model	E-350
Body Style	4-door Sedan
VIN	WDDHF5KB6EA877922
Body Color	Silver
Odometer Reading (km/mi)	14 mi.
Engine Displacement (L)	3.5
Type/No. Cylinders	6
Engine Placement	Inline
Transmission Type	Automatic
Transmission Speeds	7
Overdrive	Yes
Final Drive	RWD
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	None
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	Yes
Driver Torso/Pelvis Airbag	No
Driver Pelvis Airbag	Yes
Driver Knee Airbag	Yes
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Rear Pass. Load Limiter	Yes
Other Safety Restraint	None

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Daimler AG Stuttgart
Date of Manufacturer	08/13
Vehicle Type	Passenger Car

GVWR (kg)	2300
GAWR Front (kg)	1095
GAWR Rear (kg)	1235

VEHICLE SEATING AND WEIGHT CAPACITY DATA

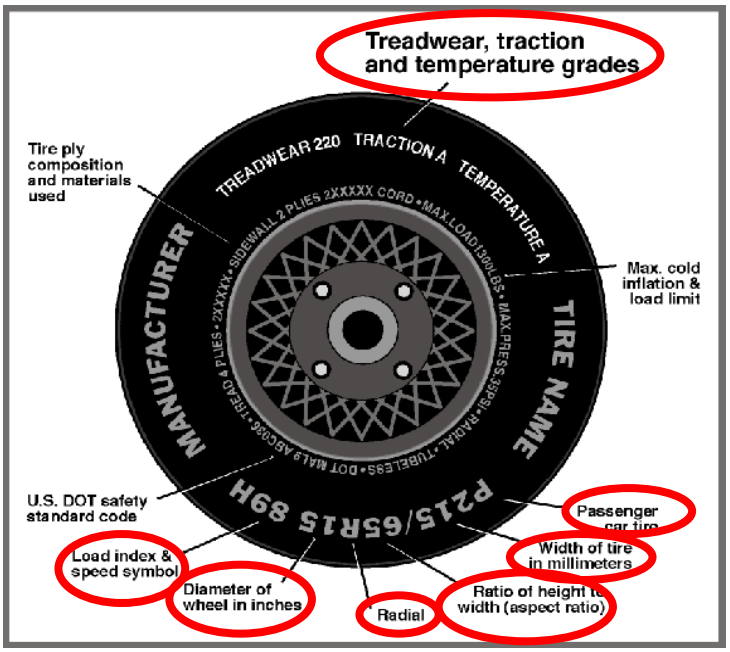
	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	5	5	5
Vehicle Capacity Weight (VCW) (kg)				375
DSC X 68.04 kg				340.2
Rated Cargo and Luggage Weight (RCLW) (kg)				34.8

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	No	No		No	Yes	No
Rear or Second Row Seat	No	Yes	No	No	Yes	No	No
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: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



DATA FROM TIRE PLACARD

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	240	290
Recommended Tire Size	245/40R18 Extra Load	245/40R18 Extra Load
Tire Size on Vehicle	245/40R18 Extra Load	245/40R18 Extra Load
Tire Manufacturer	Continental	Continental
Tire Model	ContiProContact	ContiProContact
Treadwear	400	400
Traction	AA	AA
Temperature Grades	A	A
Tire Plies Sidewall	1	1
Tire Plies Body	5	5
Load Index/Speed Symbol	97 V	97 V
Tire Material	Rayon, Steel & Polyamide	Rayon, Steel & Polyamide
DOT Safety Code Left	HW2P N1H6 2813	HW2P N1H6 2713
DOT Safety Code Right	HW2P N1H6 2813	HW2P N1H6 2713

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

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	234	227	248	255
Tire Placard	kPa	240	240	290	290
Owner's Manual	kPa	240	240	290	290
As Tested	kPa	240	240	290	290

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	449.0	433.0		466.2	453.0		469.6	471.4	
Right	kg	472.0	425.8		493.2	445.8		478.6	450.0	
Ratio	%	51.7	48.3		51.6	48.4		50.7	49.3	
Totals	kg	921.0	858.8	1779.8	959.4	898.8	1858.2	948.2	921.4	1869.6

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1779.8	(A)
Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used	kg	49.0	(B)
Rated Cargo/Luggage Weight (RCLW)	kg	34.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1863.6	(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)? X YES □ NO

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
None	0.0

TEST VEHICLE ATTITUDES AND CG

	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	Deg.	+0.2	+0.2	+0.3	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg.	+0.3	+0.1	+0.4	Yes
Front Bumper-Line Angle (left-to-right)**	Deg.	0.0	+0.1	-0.1	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg.	+0.1	+0.3	0.0	Yes
Vehicle CG (Aft of Front Axle)	mm	1387	1391	1417	
Vehicle CG (Left (+) / Right (-) from longitudinal Centerline)	mm	-7.0	-8.5	+5.0	

*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".

DATA SHEET NO. 2

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

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

SEAT POSITIONING

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

SCRL ANGLE RANGE

Seat	SCRL(°)		
	Max.	Min.	Mid
Driver Seat	18.8	7.3	13.0
Front Passenger Seat	N/A	N/A	N/A
Front Center Seat*	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	16.7
Non-Struck Side Rear Seat	Fixed	Fixed	16.9
Rear Center Seat*	Fixed	Fixed	17.6

* 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	13.0	172	Max	158	177	195
			Mid	135	154	172
			Min	109	129	147
Front Passenger Seat	13.0	153	Max	139	158	176
			Mid	116	135	153
			Min	90	110	128
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	16.7	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Non-Struck Side Rear Seat	16.9	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	N/A
			Min	N/A	N/A	N/A
Rear Center Seat*	17.6	Fixed	Max	N/A	N/A	N/A
			Mid	N/A	N/A	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: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

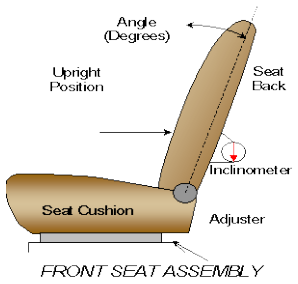
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position from Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	274	N/A	0	N/A
Front Passenger Seat	274	N/A	0	N/A
Front Center Seat*	N/A	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	N/A	Fixed	N/A
Non-Struck Side Rear Seat	Fixed	N/A	Fixed	N/A
Rear Center Seat*	Fixed	N/A	Fixed	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	90.0	N/A	0	N/A
Front Passenger Seat	90.0	N/A	0	N/A
Front Center Seat*	N/A	N/A	0	N/A
Struck Side Rear Seat	25.0	Fixed	N/A	N/A
Non-Struck Side Rear Seat	24.9	Fixed	N/A	N/A
Rear Center Seat*	22.1	Fixed	N/A	N/A

* If applicable.

SEAT BELT ANCHORAGE ADJUSTMENT

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

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

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	N/A, Power	N/A, Lowermost

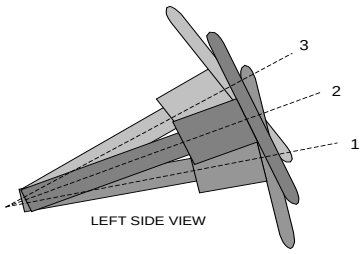
DATA SHEET NO. 2 (CONTINUED)
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

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	69.5	200
Geometric Center, Position No. 2	67.4	200
Uppermost, Position No. 3	65.3	200
Telescoping Steering Wheel Travel		45
Test Position	67.4	222

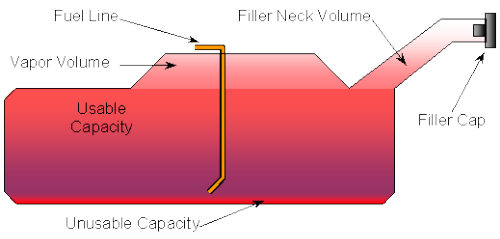


STEERING COLUMN ASSEMBLY

FUEL PUMP

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

Fuel tank is located in front of the rear axle. Filler neck enters at top left rear corner of tank. Cap is on left rear quarter panel. Fuel lines run along the inside inner frame rail.



VEHICLE FUEL TANK ASSEMBLY

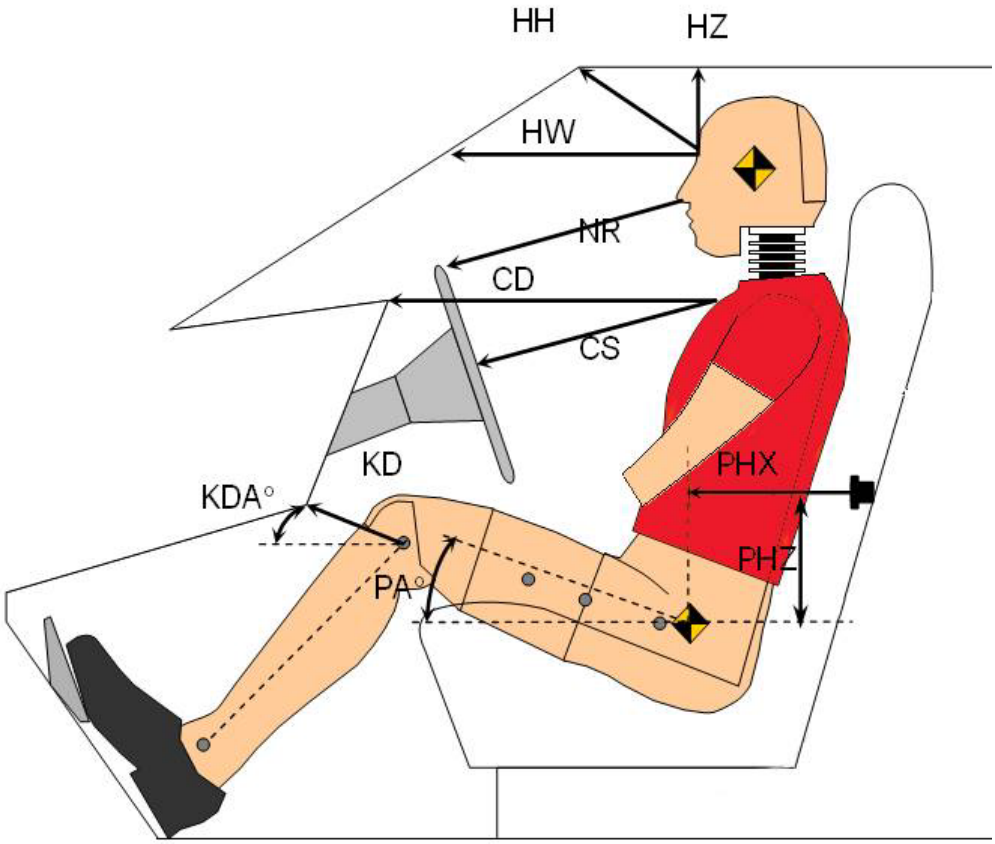
FUEL TANK CAPACITY

	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	80.0
Usable Capacity of "Optional" Tank (see Form No. 1)	N/A
Usable Capacity of Standard Tank (see Owner's Manual)	80.0
Usable Capacity of Optional Tank (see Owner's Manual)	N/A
93% of Usable Capacity	74.4
Actual Amount of Solvent Used in Test	74.4
1/3 of Usable Capacity	26.7

Is the Actual Amount of Solvent Used in the test equal to 93% +/- 1% of the Usable Capacity stated on Form No. 1? X YES □ NO

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

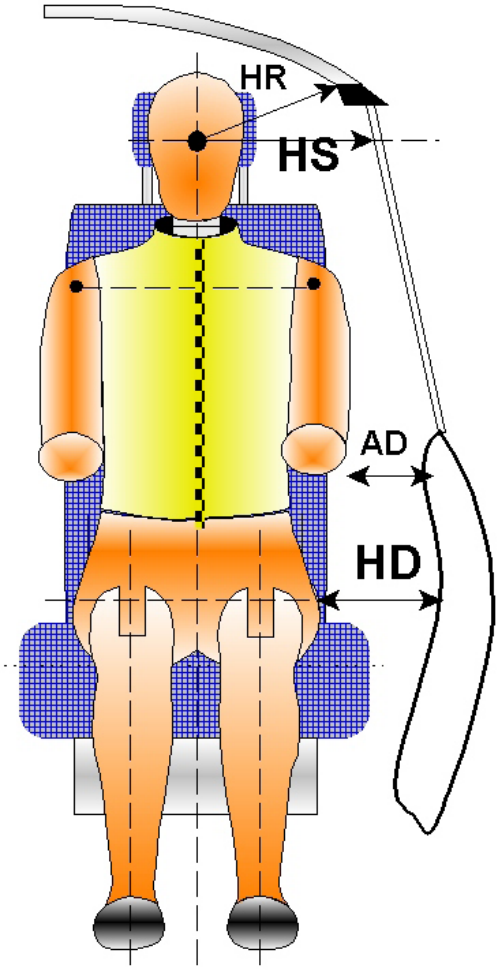
Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



Code	Measurement Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	217	
HW	Head to Windshield	465	
HZ	Head to Roof Liner	145	
NR	Nose to Rim	216	
CD	Chest to Dashboard	379	
CS	Chest to Steering Wheel	156	
KDL/KDLA°	Left Knee to Dash	101	57.9
KDR/KDRA°	Right Knee to Dash	86	58.0
PAX°	Pelvic Tilt Angle (X-axis)		0.3
PAY°	Pelvic Tilt Angle (Y-axis)		21.3
PHX	Hip Point to Striker (X-Axis)	342	
PHZ	Hip Point to Striker (Z-Axis)	165	

DATA SHEET NO. 4
DUMMY LATERAL CLEARANCE DIMENSIONS

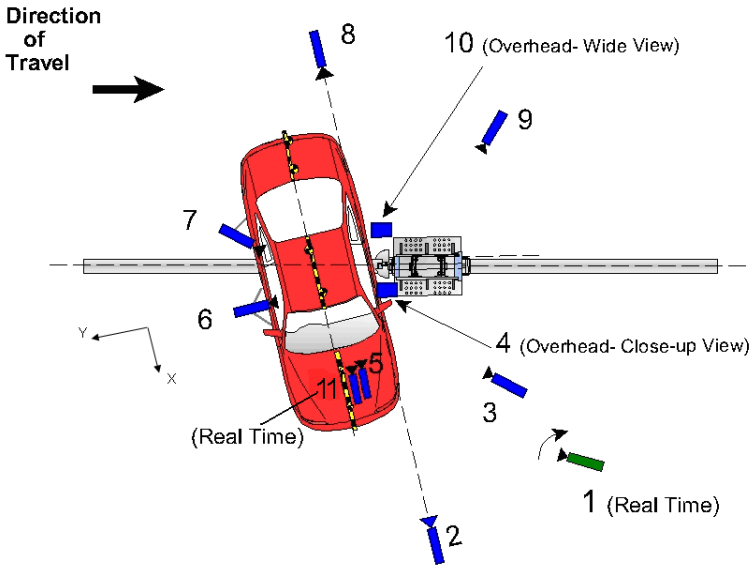
Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



Code	Measurement Description	Length (mm)
HR	Head to Side Header	230
HS	Head to Side Window	373
AD	Arm to Door	133
HD	Hip Point to Door	230

DATA SHEET NO. 5
CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



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	5359	102	-1134	25	1000
3	Impact side 45° – forward pole view	3941	-1194	-1332	Zoom	1000
4	Overhead Close-up view of impact	0	0	-5623	25	1000
5	Onboard – dummy front view				12.5	1000
6	Onboard – dummy side view				8.5	1000
7	Onboard – dummy rear oblique view				8.5	1000
8	Rear ground level – impact view	-5222	0	-1227	12.5	1000
9	Impact side 45° – rearward pole view	-3216	-2356	-1238	Zoom	1000
10	Overhead wide view of impact	0	421	-5612	8.5	1000
11	Real time dummy front view				Zoom	30

All measurements accurate to +/- 6 mm.

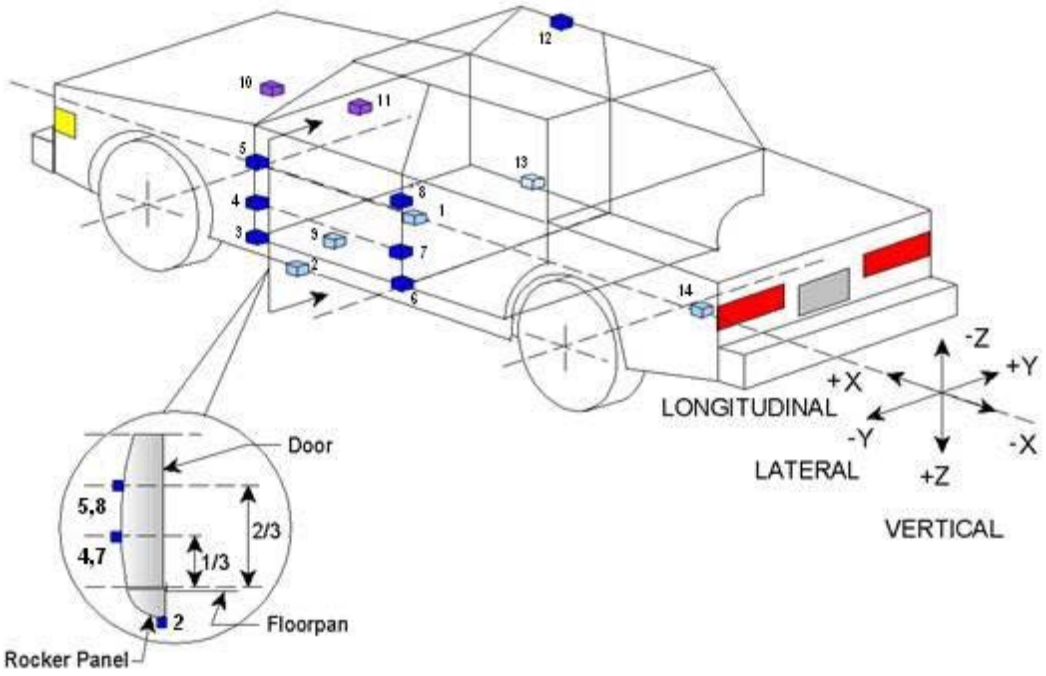
NOTE: Vehicle was at a 75° angle to the rigid pole.
If applicable, explain why camera(s) did not run: Not Applicable

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: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



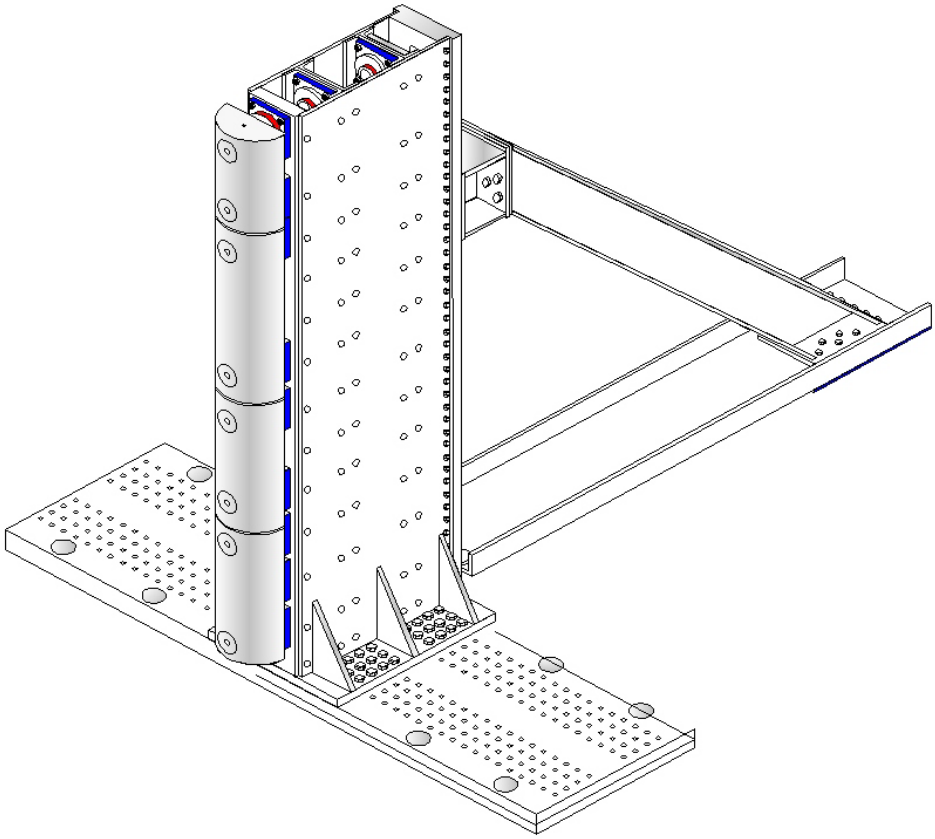
	Accelerometer/Sensor Location			
	ID	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3205	125	-362
2	Left Floor Sill	3224	-710	-318
3	A-Pillar Sill	3559	-710	-335
4	A-Pillar Low	3627	-830	-515
5	A-Pillar Mid	3630	-830	-840
6	B-Pillar Sill	2494	-700	-275
7	B-Pillar Low	2570	-830	-572
8	B-Pillar Mid	2540	-830	-882
9	Driver Seat Track	2854	-550	-320
10	Engine Top	4140	10	-856
11	Firewall	3850	-40	-847
12	Right Roof	2400	605	-1434
13	Right Floor Sill	3275	710	-300
14	Rear Floorpan	1277	10	-513

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: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

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: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	Side Curtain Airbag
Top of Head	Side Curtain Airbag, Head Restraint
Left Side of Head	Side Curtain Airbag
Back of Head	Head Restraint
Left Shoulder	Torso Airbag
Upper Torso	Torso Airbag
Lower Torso	Torso Airbag
Left Hip	Pelvis Airbag
Left Knee	None

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	N/A
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	N/A
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	N/A
Disengaged from Latched Position	No	No	No	No	N/A
Latch Separated from Striker	No	No	No	No	N/A
Jammed Shut	Yes	Yes	No	No	N/A
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	Fixed	No	Fixed
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	Severe deformation of B-pillar
Sill Separation	None
Windshield Damage	Broken
Side Window Damage	Broken
Other Notable Effects	None

DATA SHEET NO. 8 (CONTINUED)
POST TEST OBSERVATIONS

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

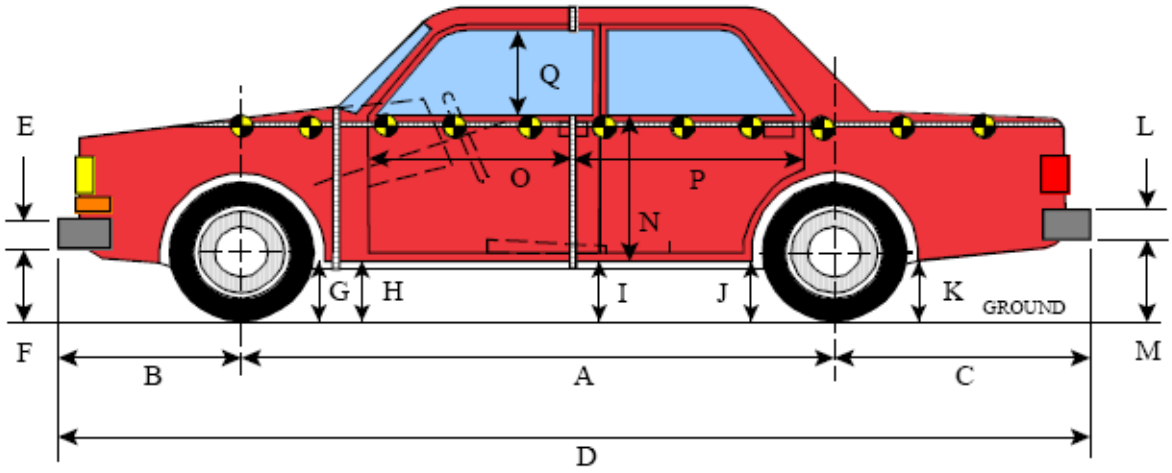
Restraint Type	Struck Side (Driver)		Struck Side (Rear Passenger)	
	Mounted	Deployed	Mounted	Deployed
Front Airbag	Yes	No		
Knee Airbag	Yes	No		
Curtain	Yes	Yes	Yes	Yes
Side Torso Airbag	Yes	Yes	No	NA
Side Pelvis Airbag	Yes	Yes	No	NA
Seat Belt Pretensioner	Yes	Yes	Yes	NA
Seat Belt Load Limiter	Yes	Yes	Yes	NA
Other	None	NA	None	NA

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		1264
Actual Impact Point (Aft of Front Axle)	mm		1266
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 of Intended Impact point	-2
Angle Between Vehicle's Longitudinal Centerline and Line of Motion	degrees	75 +/- 3	
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.20
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.17

DATA SHEET NO. 9
VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



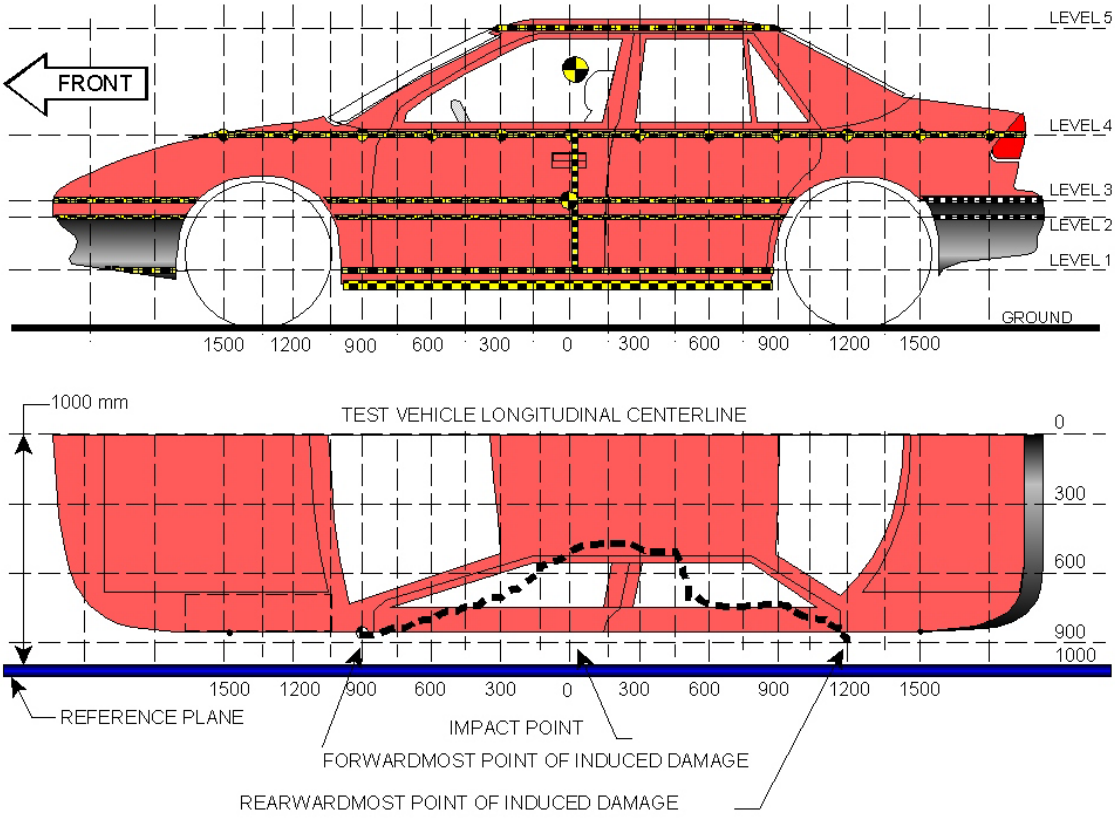
LEFT SIDE VIEW
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Measurement Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2875	2815	60
B	Front Axle to Front Surface of Vehicle	855	855	0
C	Rear Axle to Rear Surface of Vehicle	1155	1155	0
D	Total Length at Centerline	4885	4895	-10
E	Front Bumper Thickness	88	88	0
F	Front Bumper Bottom to Ground	382	410	-28
G	Sill Height at Front Wheel Well	190	215	-25
H	Sill Height at Front Door Leading Edge	200	214	-14
I	Sill Height at B-Pillar	220	215	5
J1	Sill Height at Rear Wheel Well	236	279	-43
J2	Pinch Weld Height at Rear Wheel Well	155	190	-35
K	Sill Height Aft of Rear Wheel Well	300	325	-25
L	Rear Bumper Thickness	120	120	0
M	Rear Bumper Bottom to Ground	485	520	-35
N	Sill Height to Bottom of Front Window Sill	745	720	25
O	Front Door Leading Edge to Impact CL	648	650	-2
P	Rear Door Trailing Edge to Impact CL	1482	1155	327
Q	Front Window Opening	395	355	40
R	Right Side Length	4715	4740	-25
S	Left Side Length	4715	4680	35
T	Vehicle Width at "B" Pillars	1835	1730	105

DATA SHEET NO. 10
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



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	338	280	0
2	Occupant H-Point	542	328	0
3	Mid-Door	629	343	0
4	Window Sill	890	317	0
5	Window Top	1415	81	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

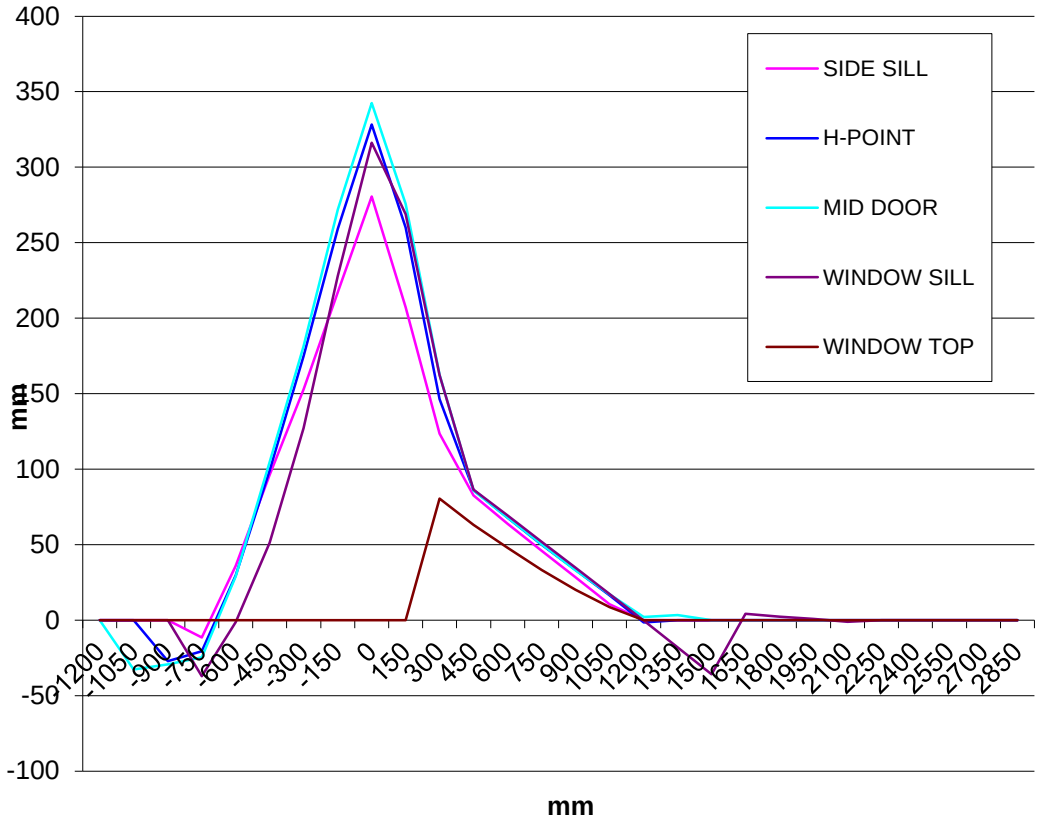
Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900	893	910	909	0	0	923	937	938	0	0	-30	-27	-29	0	0
-750	889	909	911	832	0	901	930	935	869	0	-12	-21	-24	-37	0
-600	887	909	912	842	0	851	879	883	843	0	36	30	29	-1	0
-450	885	910	914	851	0	789	811	809	800	0	96	99	105	51	0
-300	883	911	916	860	0	730	736	734	733	0	153	175	182	127	0
-150	881	911	917	868	0	664	652	645	640	0	217	259	272	228	0
0	879	911	918	875	0	599	583	575	558	0	280	328	343	317	0
150	878	910	917	881	0	670	650	642	612	0	208	260	275	269	0
300	877	908	916	878	579	753	762	753	715	498	124	146	163	163	81
450	876	905	912	886	585	793	819	826	800	521	83	86	86	86	64
600	876	903	910	888	583	813	835	843	818	536	63	68	67	70	47
750	878	902	909	889	582	832	852	859	837	549	46	50	50	52	33
900	882	902	908	890	579	853	868	874	855	559	29	34	34	35	20
1050	888	902	907	886	570	877	886	890	868	561	11	16	17	18	9
1200	0	915	910	868	0	0	917	908	868	0	0	-2	2	0	0
1350	0	0	922	874	0	0	0	919	892	0	0	0	3	-18	0
1500	0	0	0	871	0	0	0	0	907	0	0	0	0	-36	0
1650	0	0	0	867	0	0	0	0	863	0	0	0	0	4	0
1800	0	0	0	859	0	0	0	0	857	0	0	0	0	2	0
1950	0	0	0	848	0	0	0	0	847	0	0	0	0	1	0
2100	0	0	0	832	0	0	0	0	833	0	0	0	0	-1	0
2250	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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

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

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



DATA SHEET NO. 11
FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13

Test Time: 13:32 **Temperature:** 70.4

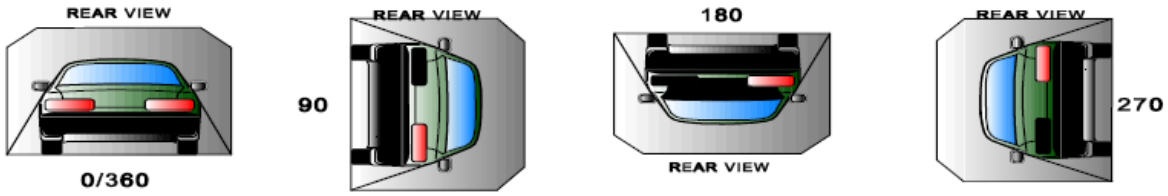
A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 ounce)

B. For the 5 minute period after motion ceases: 0
(Maximum allowable is 5 ounces)

C. For the following 25 minutes: 0
(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	120	300	420
90 to 180	120	300	840
180 to 270	120	300	1260
270 to 360	120	300	1680

FMVSS NO. 301 ROLLOVER SPILLAGE TABLE

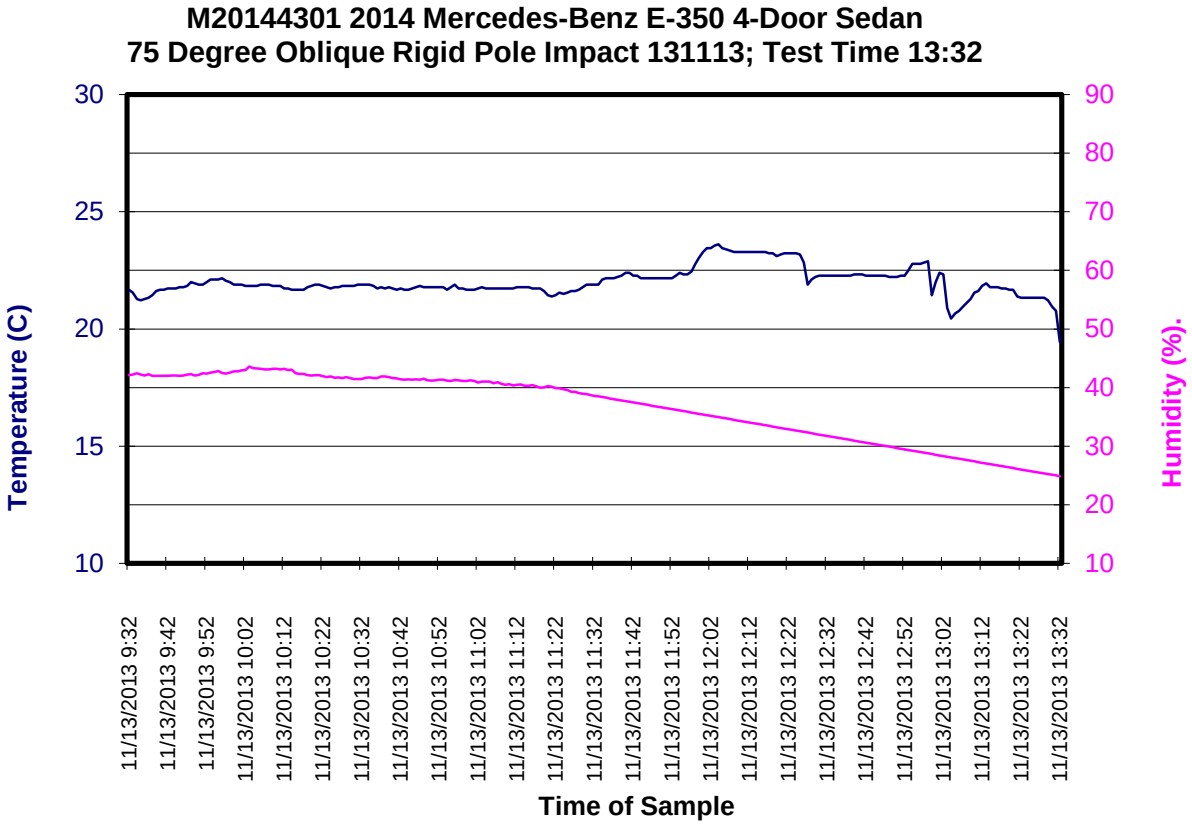
Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0 to 90	0	0	0	NA
90 to 180	0	0	0	NA
180 to 270	0	0	0	NA
270 to 360	0	0	0	NA

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. 12
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2014 Mercedes-Benz E-350 4-door sedan NHTSA No.: M20144301
Test Program: SPNCAP Side Impact Test Date: 11/13/13



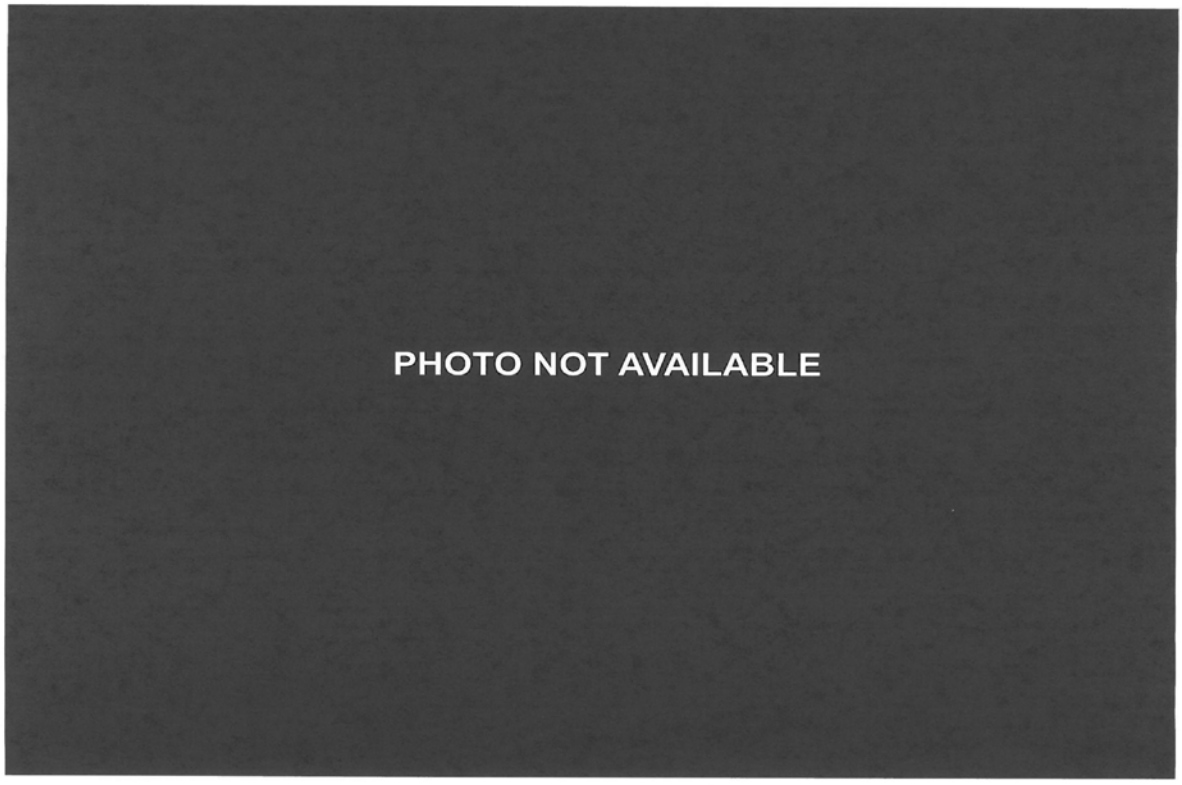
APPENDIX A

PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

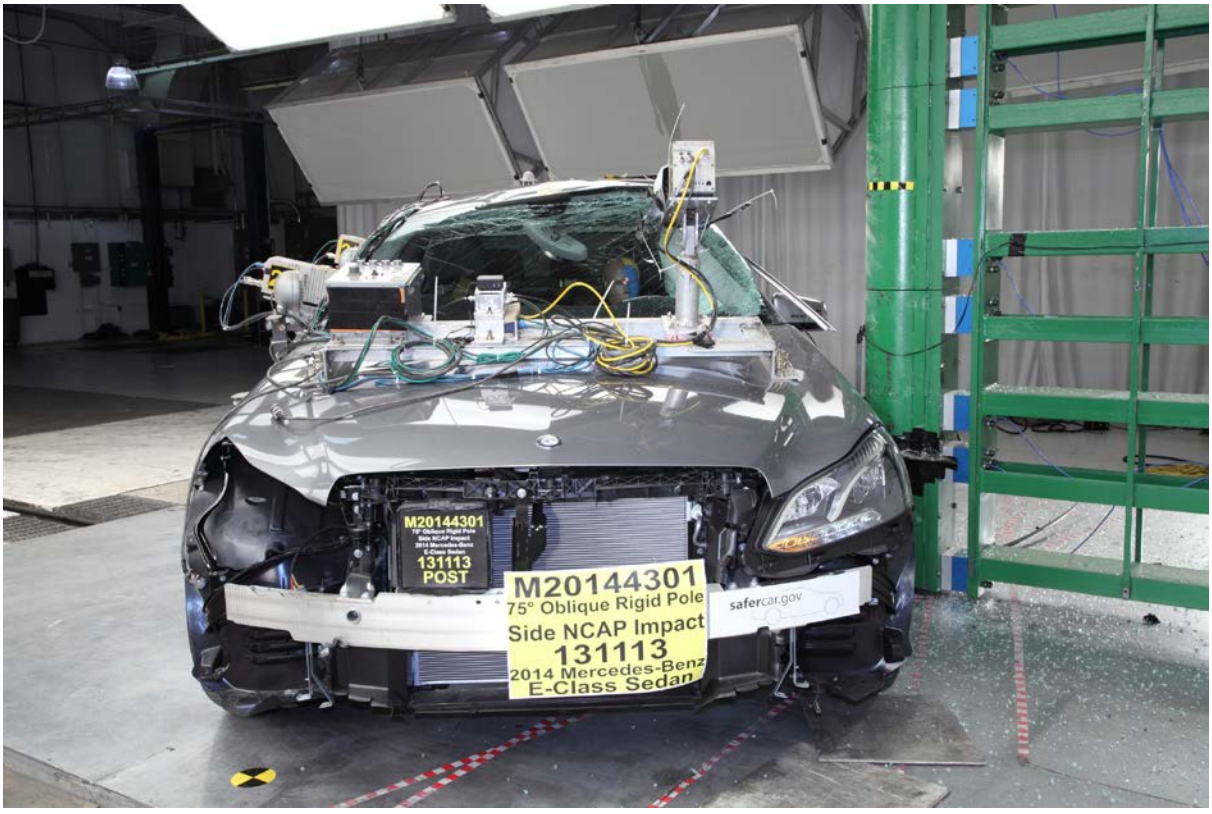
TABLE OF PHOTOGRAPHS (CONTINUED)

001 As Delivered Right Front 3-4 View of Test Vehicle



002 As Delivered Left Rear 3-4 View of Test Vehicle

003 Pre-Test Frontal View of Test Vehicle



004 Post-Test Frontal View of Test Vehicle

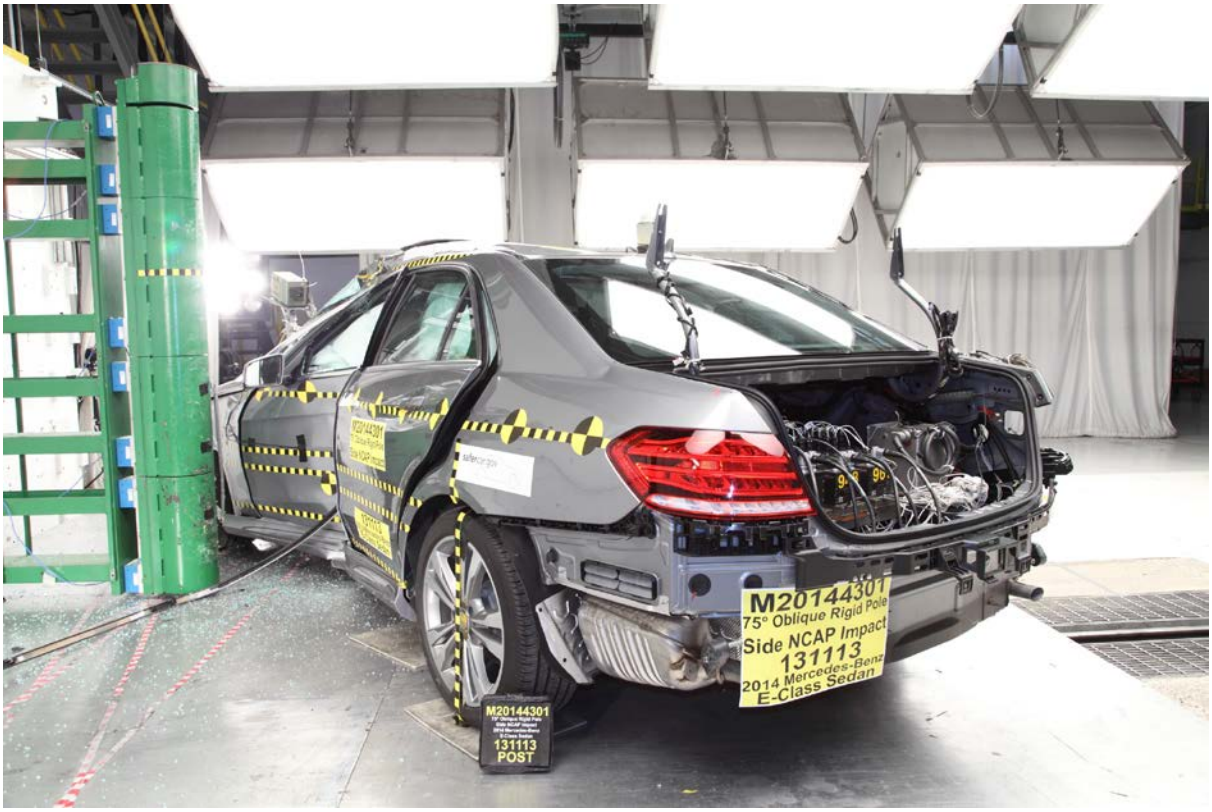
005 Pre-Test Left Front 3-4 View of Test Vehicle

006 Post-Test Left Front 3-4 View of Test Vehicle

007 Pre-Test Left Side View of Test Vehicle

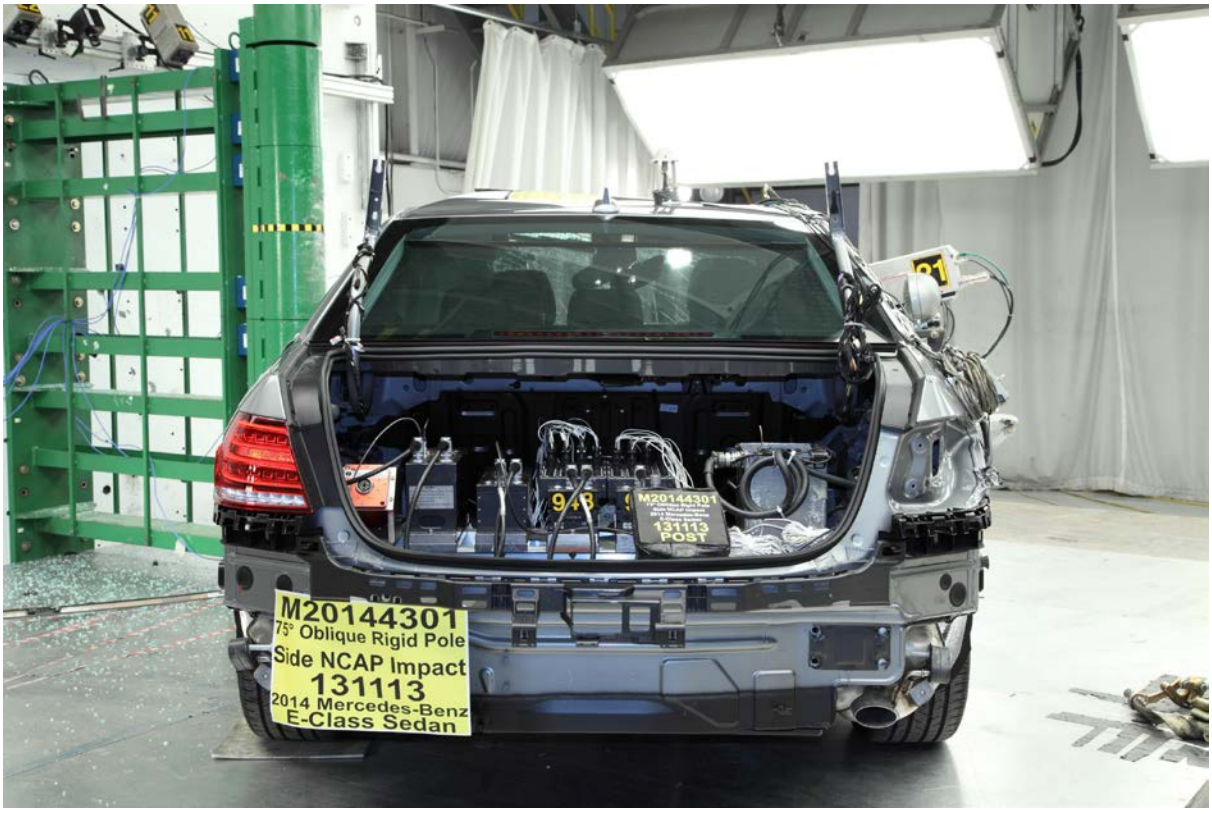
008 Post-Test Left Side View of Test Vehicle

009 Pre-Test Left Rear 3-4 View of Test Vehicle



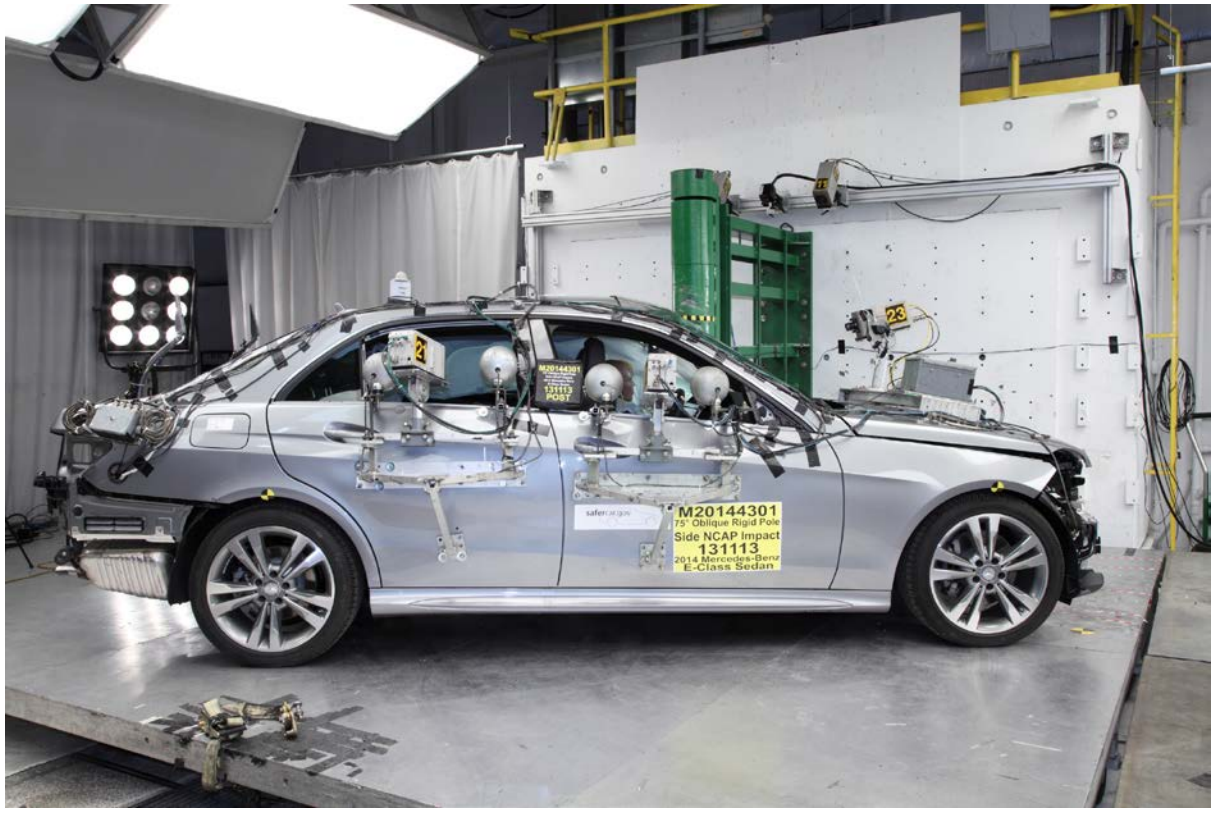
010 Post-Test Left Rear 3-4 View of Test Vehicle

011 Pre-Test Rear View of Test Vehicle

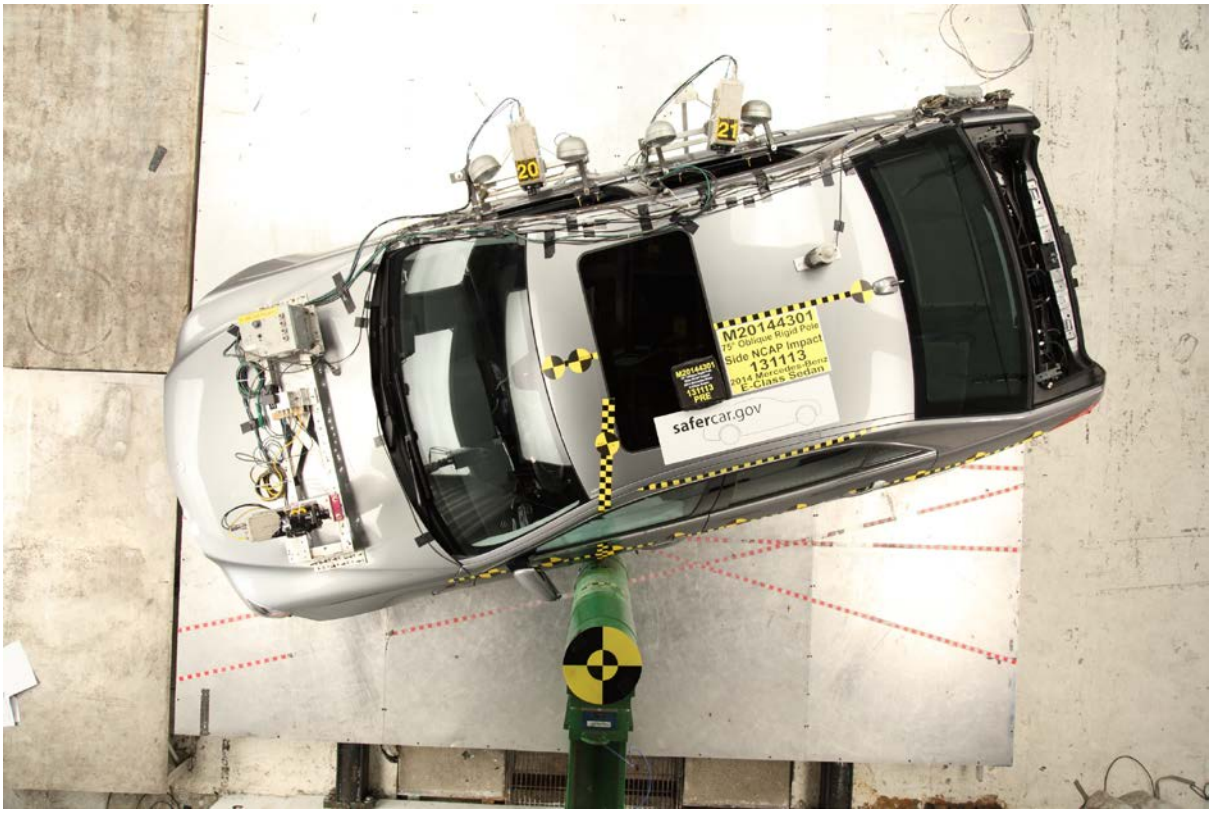


012 Post-Test Rear View of Test Vehicle

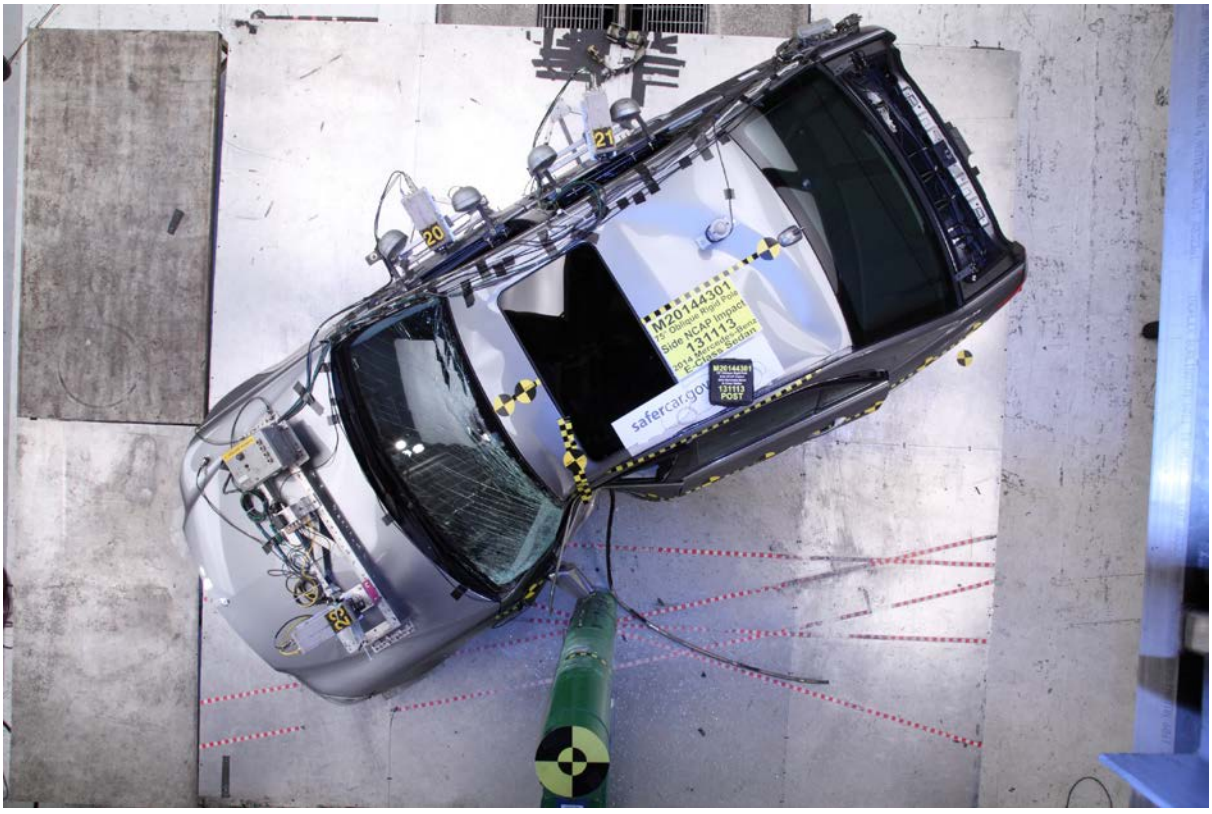
013 Pre-Test Right Side View of Test Vehicle



014 Post-Test Right Side View of Test Vehicle



015 Pre-Test Overhead View of Test Area



016 Post-Test Overhead View of Test Area

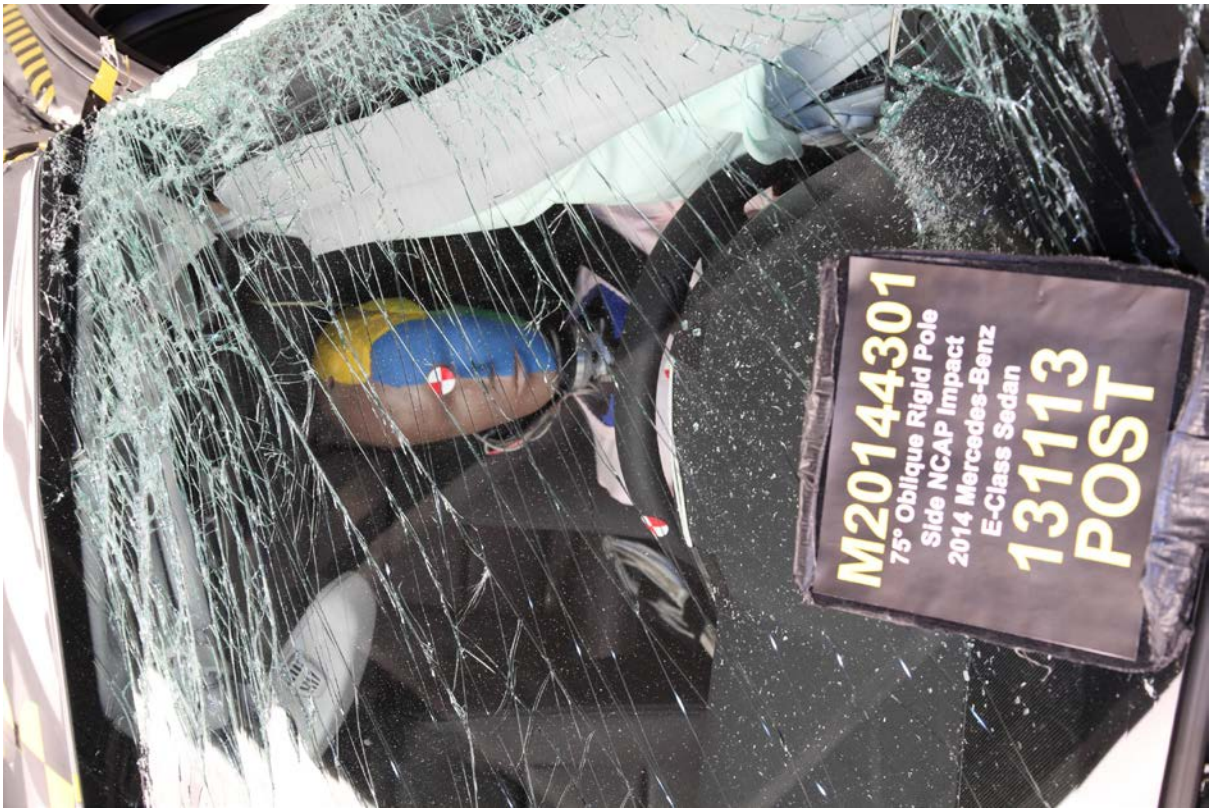
017 Pre-Test Left Side View of Pole Positioned Against Side of Vehicle

018 Pre-Test Right Side View of Pole Positioned Against Side of Vehicle

019 Pre-Test Close-Up View of Impact Point Target

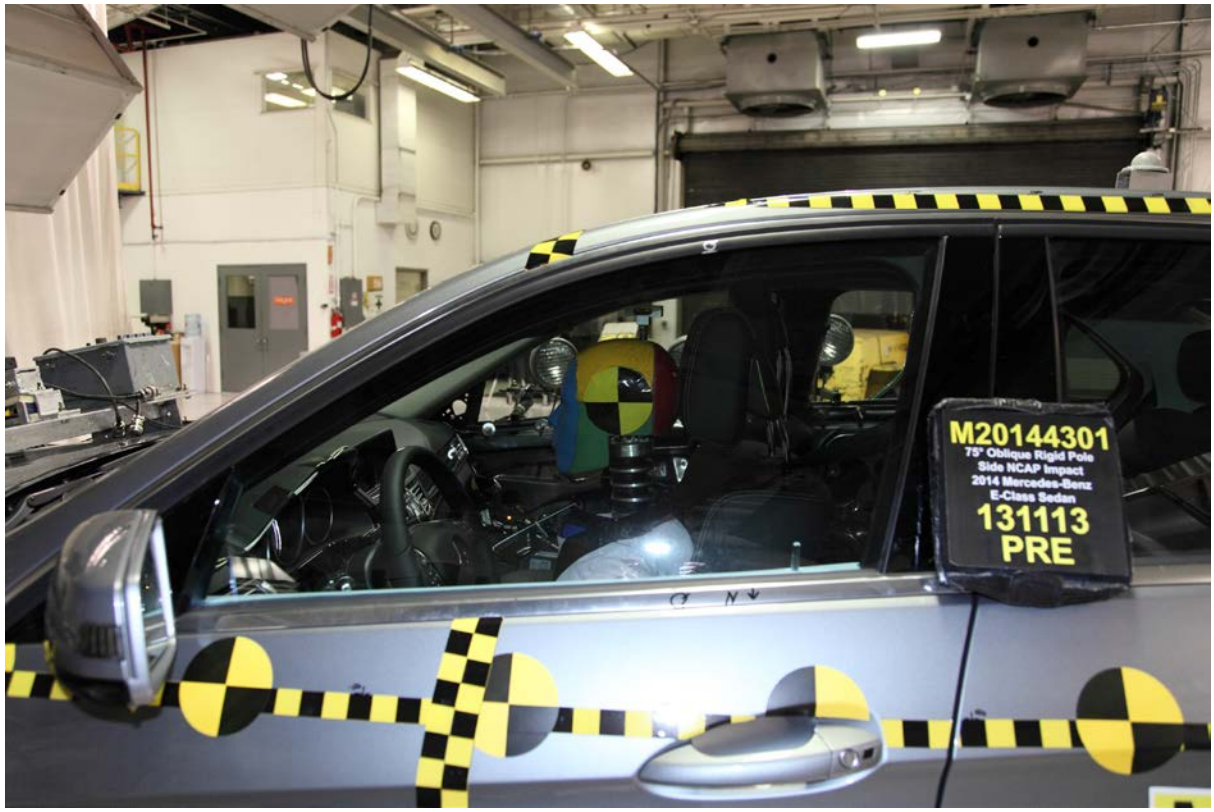
020 Post-Test Close-Up View of Impact Point Target Showing Impact Location

021 Pre-Test Front Close-Up View of Dummy Head and Chest



022 Post-Test Front Close-Up View of Dummy

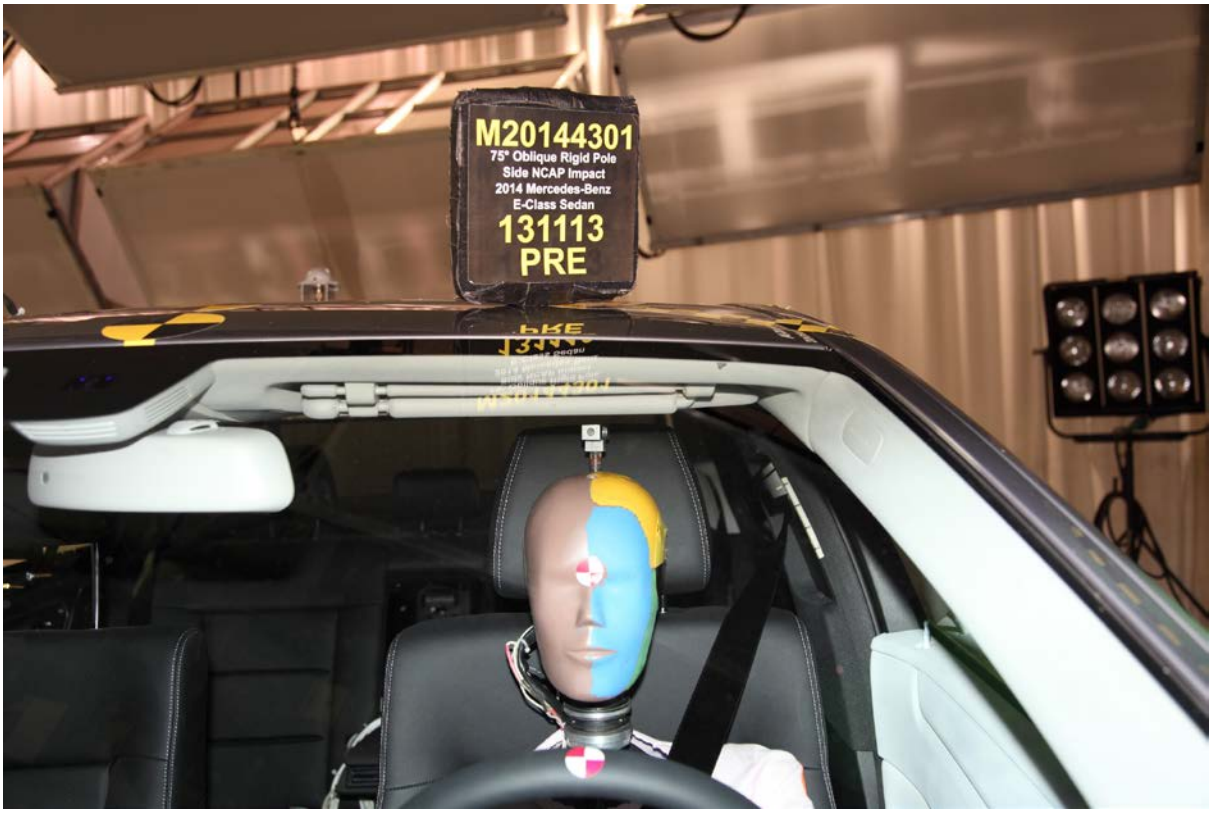
023 Pre-Test Left Side View of Dummy Showing Belt and Chalking



024 Pre-Test Left Side View of Dummy Shoulder and Door Top View

025 Post-Test Left Side View of Dummy Shoulder and Door Top View

026 Pre-Test Front View of Seat Back Prior to Dummy Positioning



027 Pre-Test Front View of Dummy Head and Shoulders in Relation to Head Restraint

028 Pre-Test Front View of Seat Pan Prior to Dummy Positioning

029 Pre-Test Overhead View of Dummy Thighs on Seat Pan

030 Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket

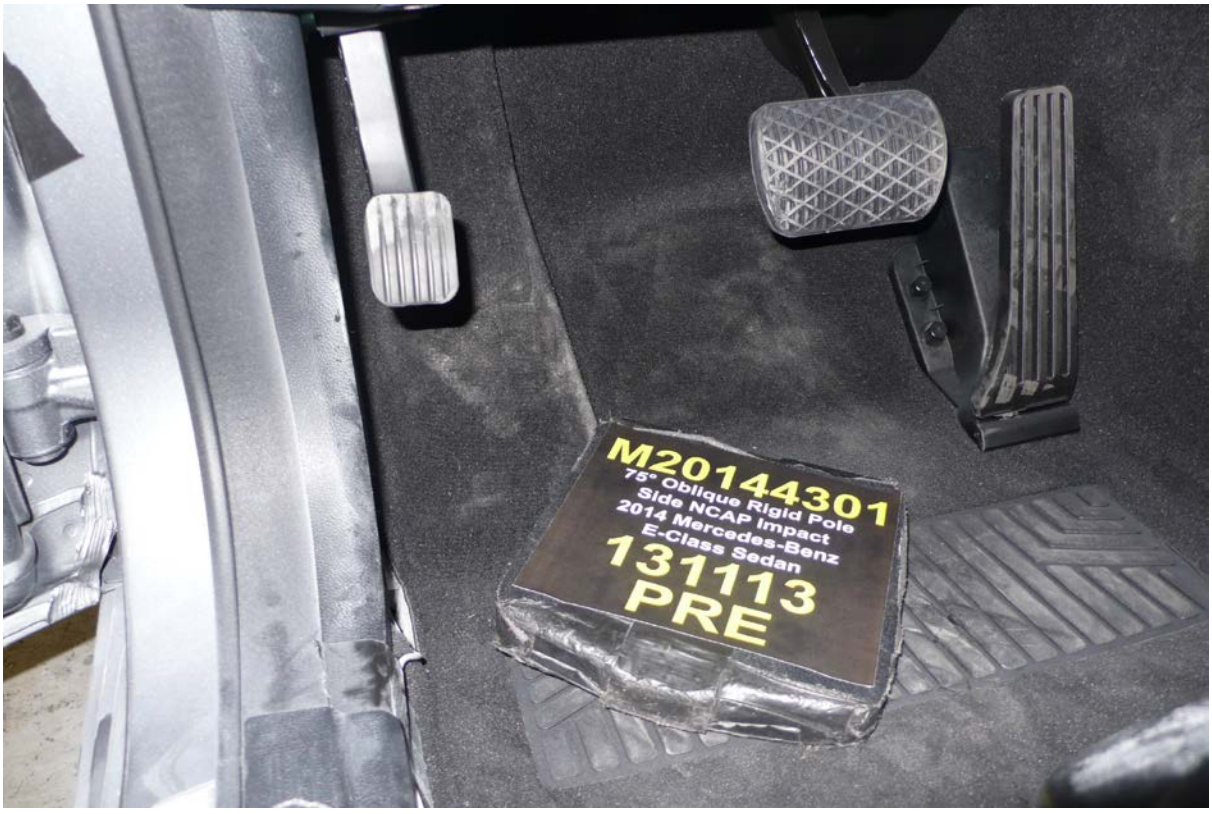
031 Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level

032 Pre-Test Placement of Dummy Feet

033 Pre-Test View of Belt Anchorage for Dummy

034 Pre-Test Left Side View of Steering Wheel

035 Pre-Test View of Disengaged Parking Brake

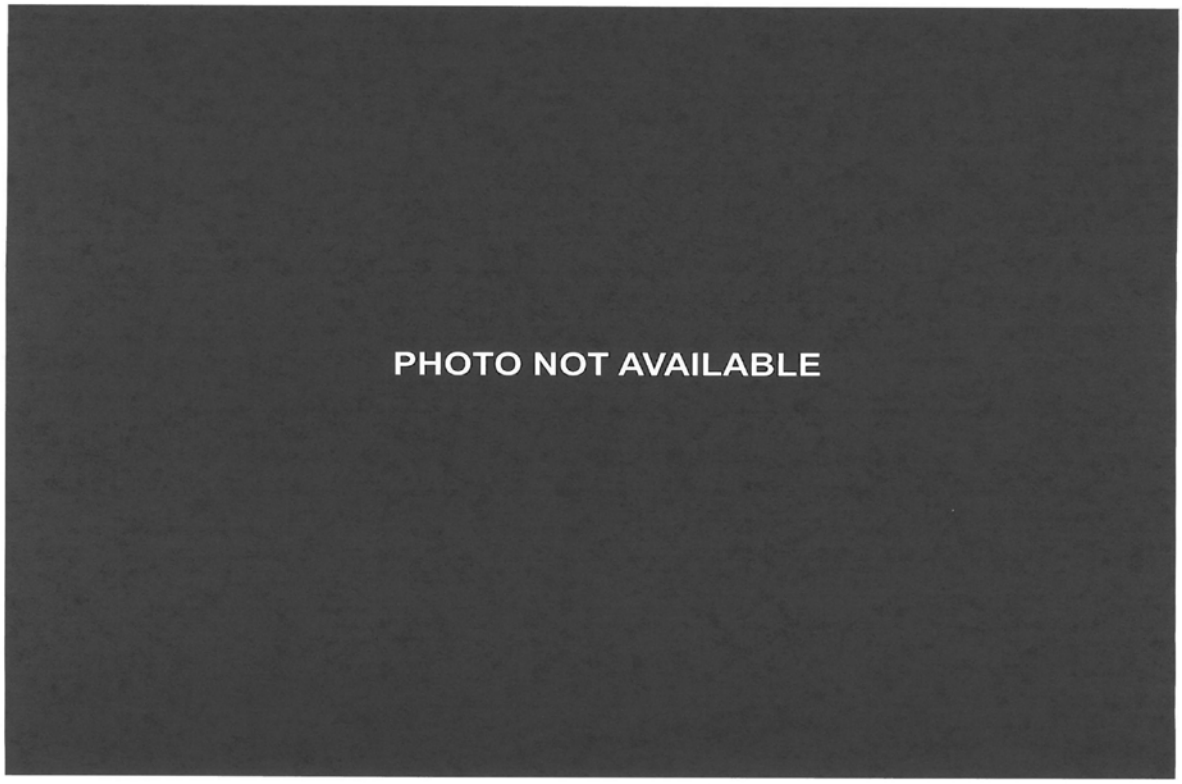


036 Pre-Test View of Parking Brake

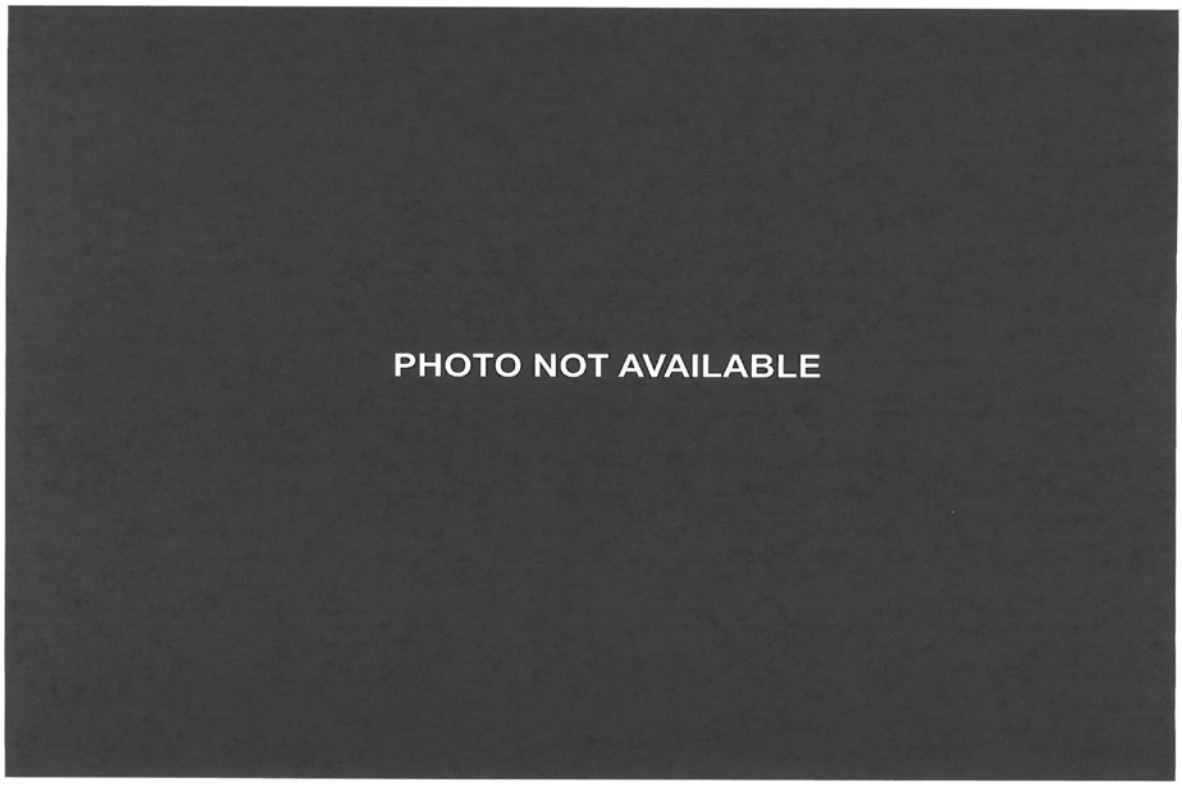
037 Pre-Test Close-Up Left Side View of Driver Seat Track

038 Pre-Test Close-Up Left Side View of Driver Seat Back

039 Pre-Test Close-Up View of Driver Seat Back or Head Restraint

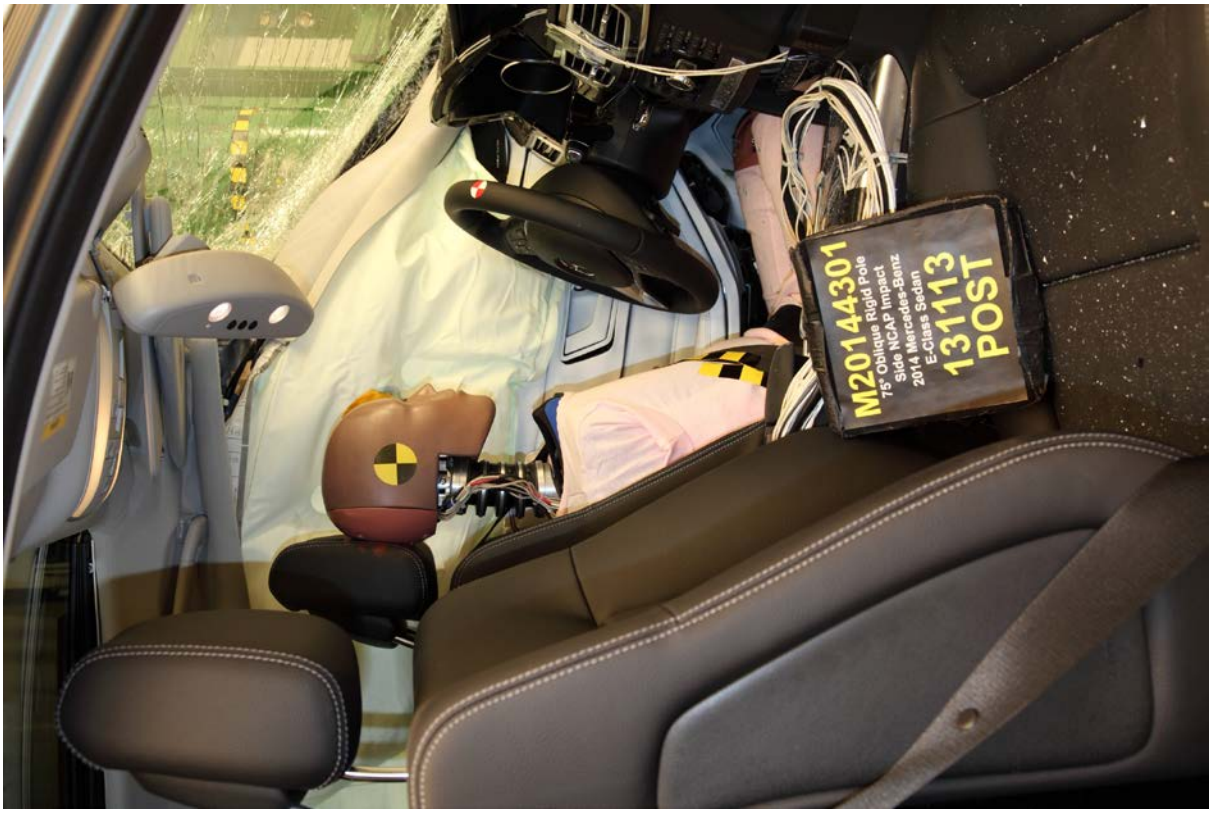


040 Pre-Test Dummy and Door Clearance View



041 Post-Test Dummy and Door Clearance View

042 Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



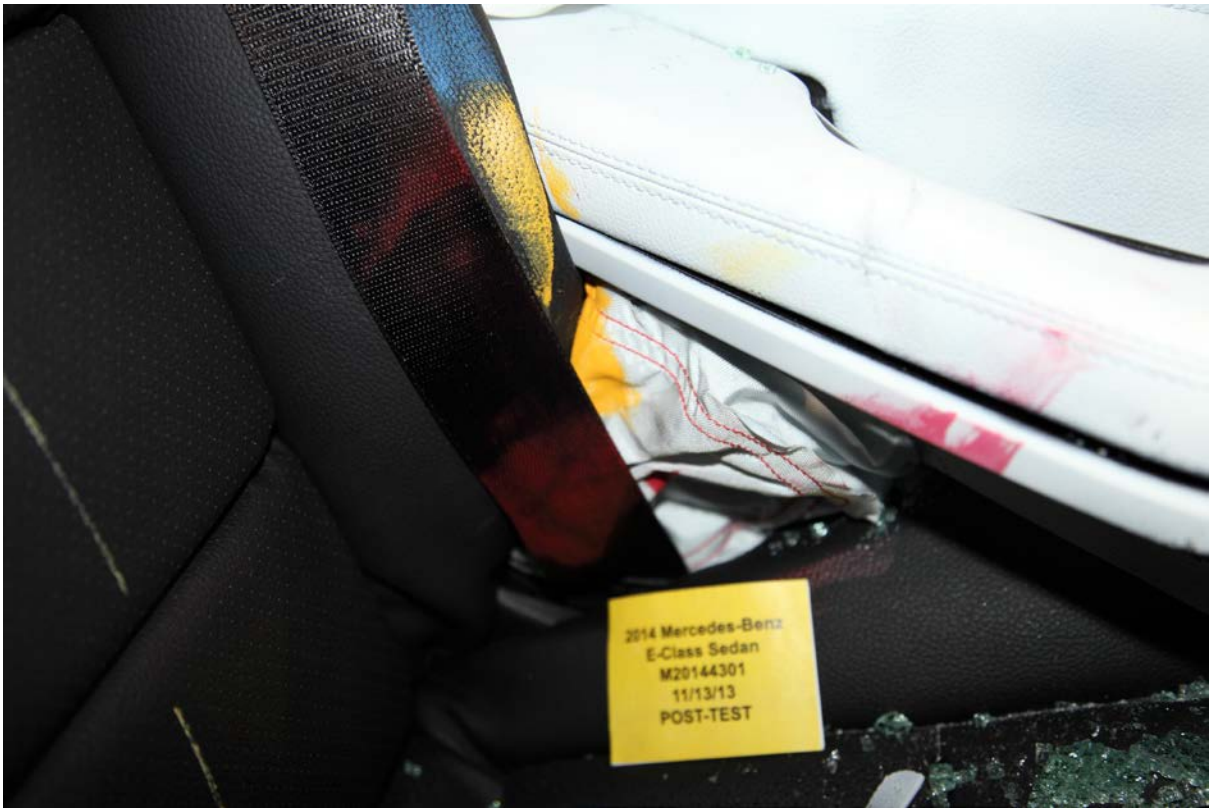
043 Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment

044 Pre-Test Inner Driver Door Panel View

045 Post-Test Inner Driver Door Panel View Showing Dummy Contact Location

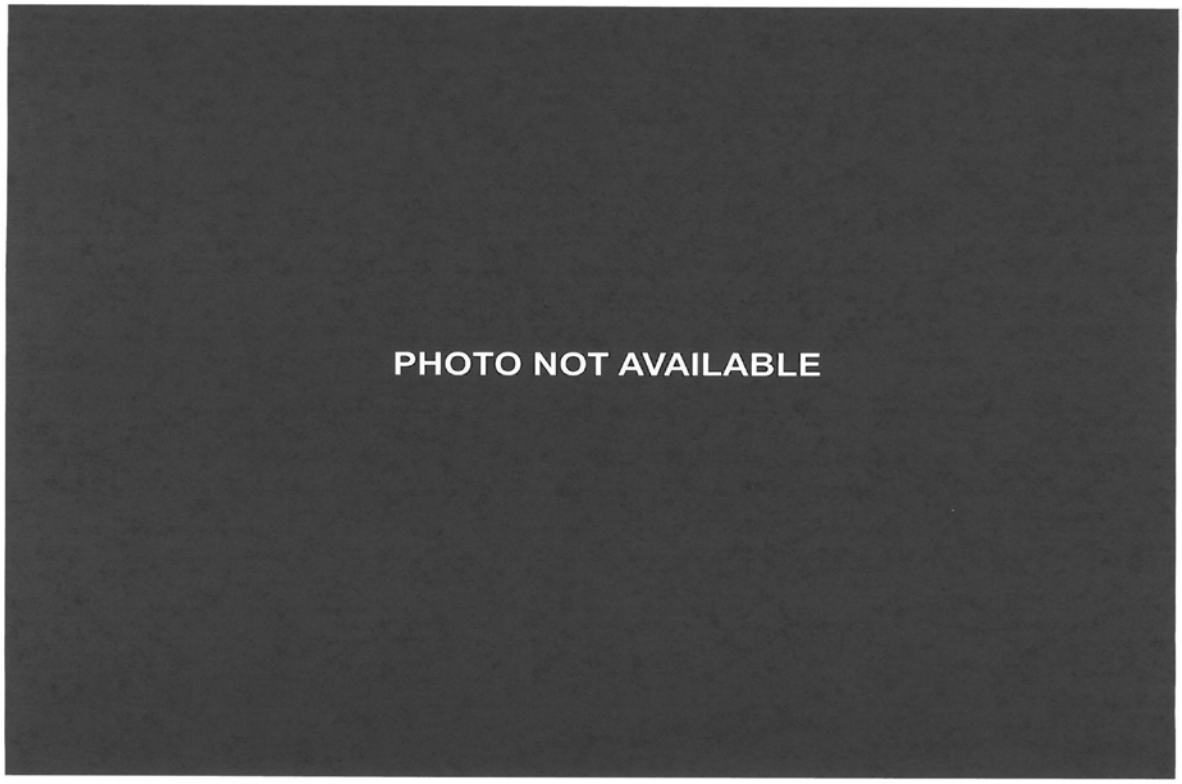
046 Post-Test Dummy Close-Up Head Contact with Vehicle View

047 Post-Test Dummy Close-Up Head Contact with Side Airbag View

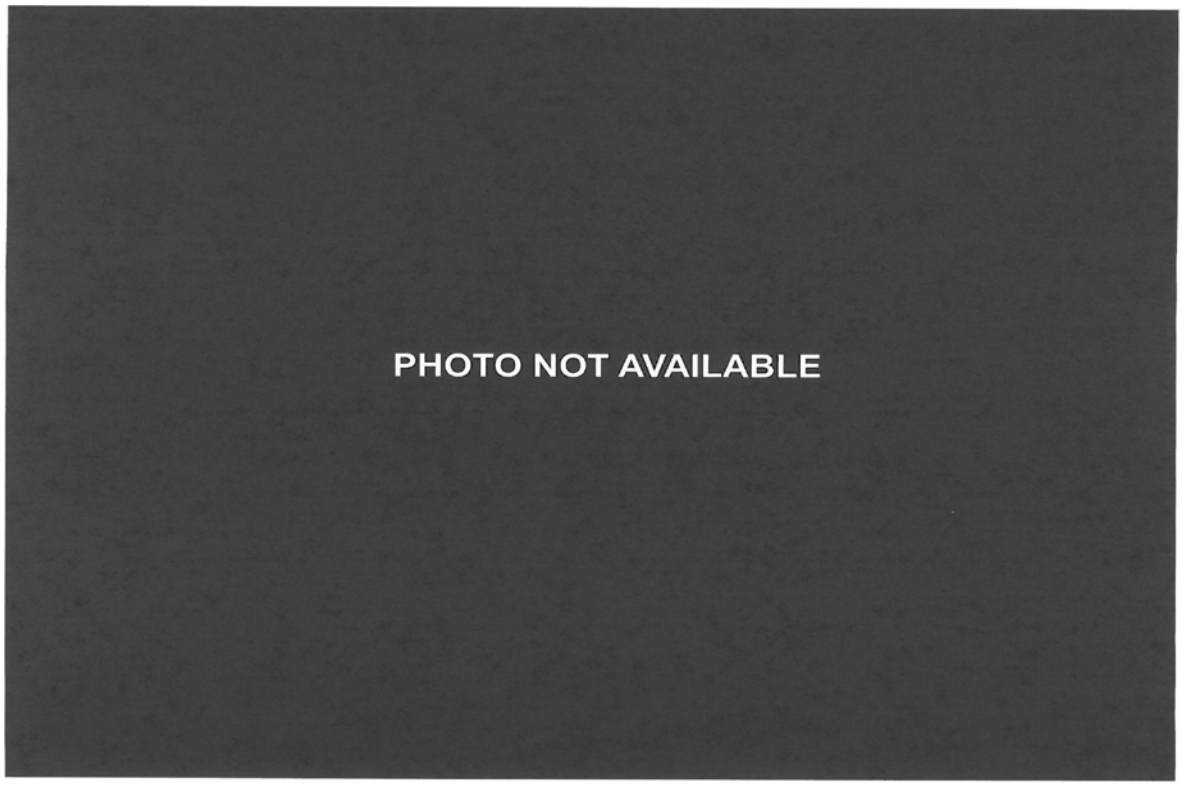


048 Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View

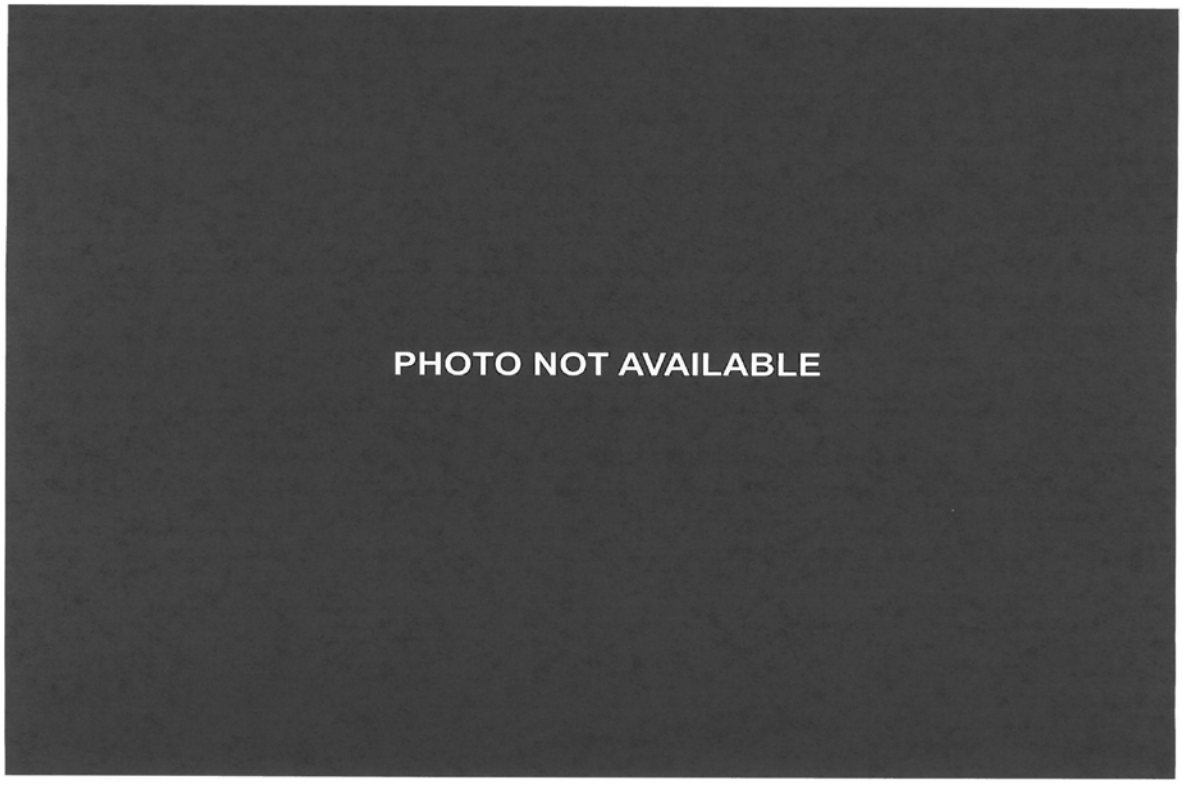
049 Post-Test Dummy Close-Up Torso Contact with Side Airbag View



050 Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



051 Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View



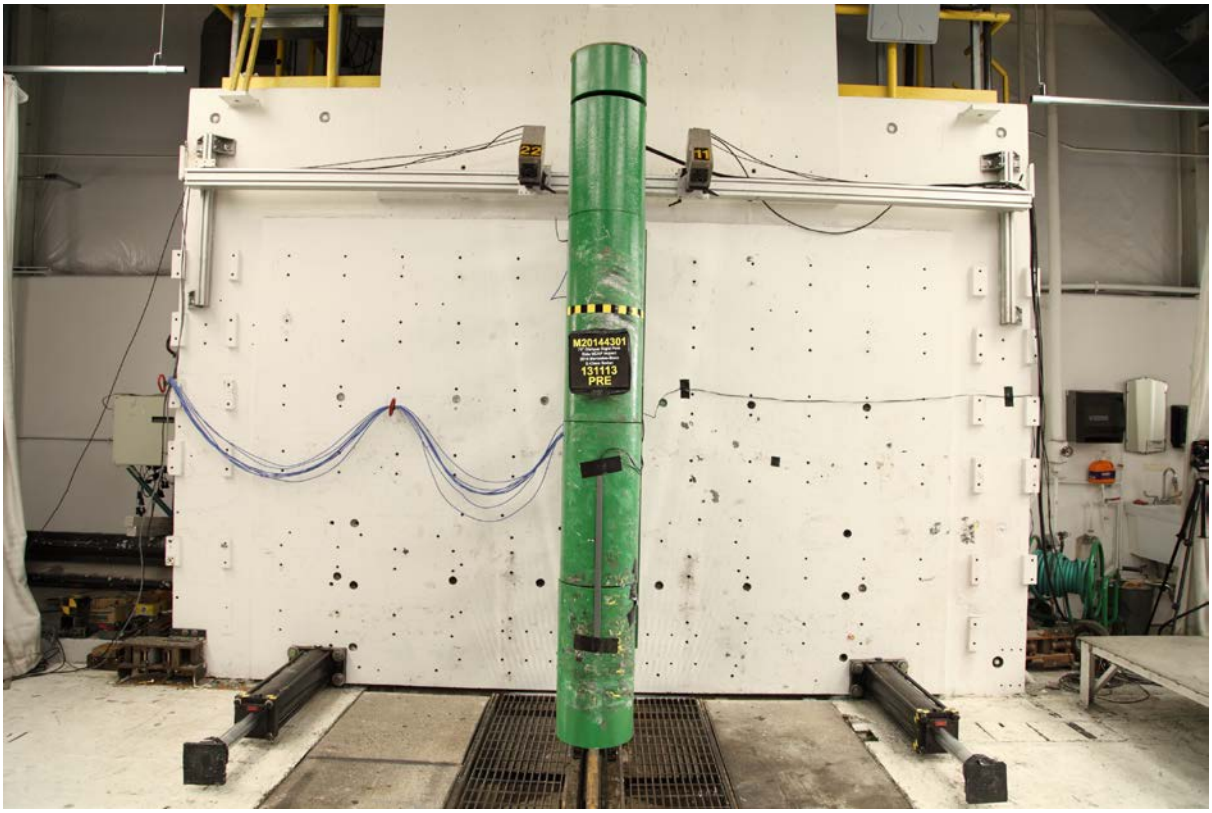
052 Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View

053 Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

054 Post-Test View of Fuel Filler Cap or Fuel Filler Neck

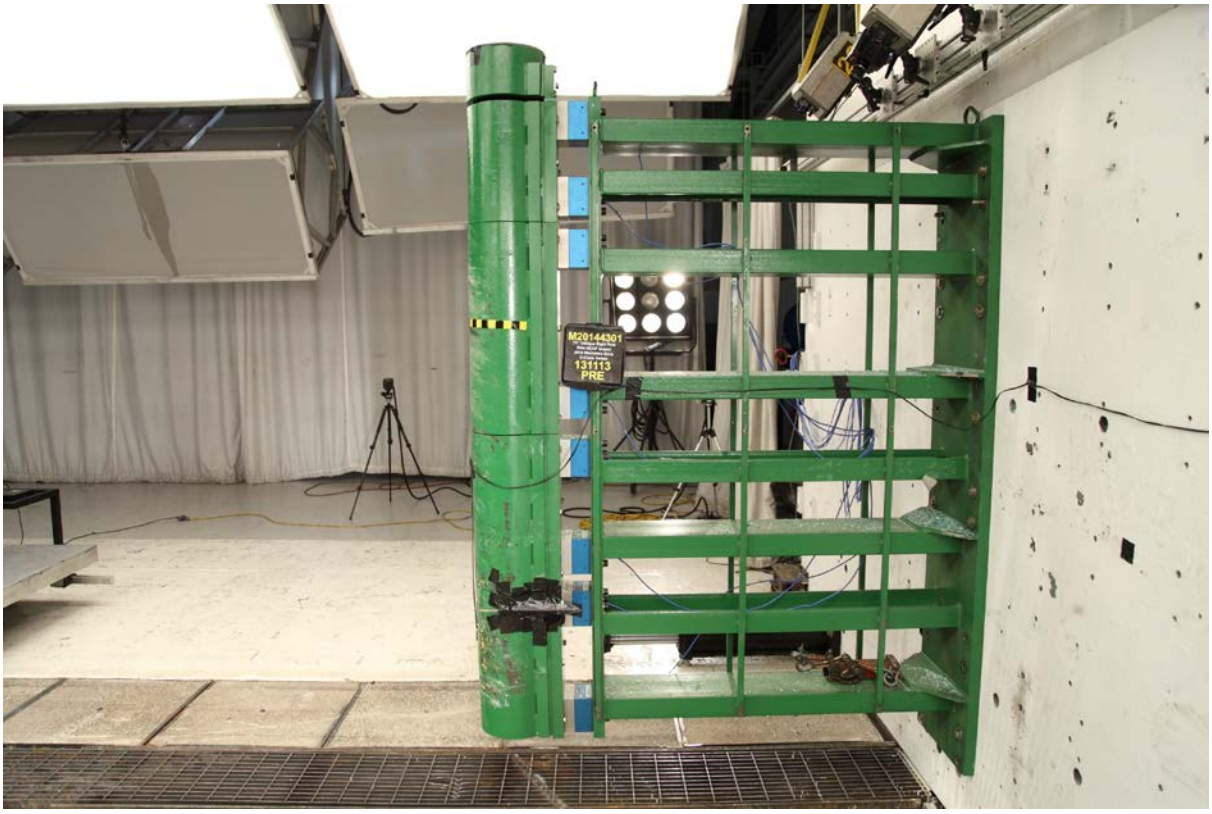
055 Close-Up View of Vehicle Certification Label

056 Close-Up View of Vehicle Tire Information Placard or Label



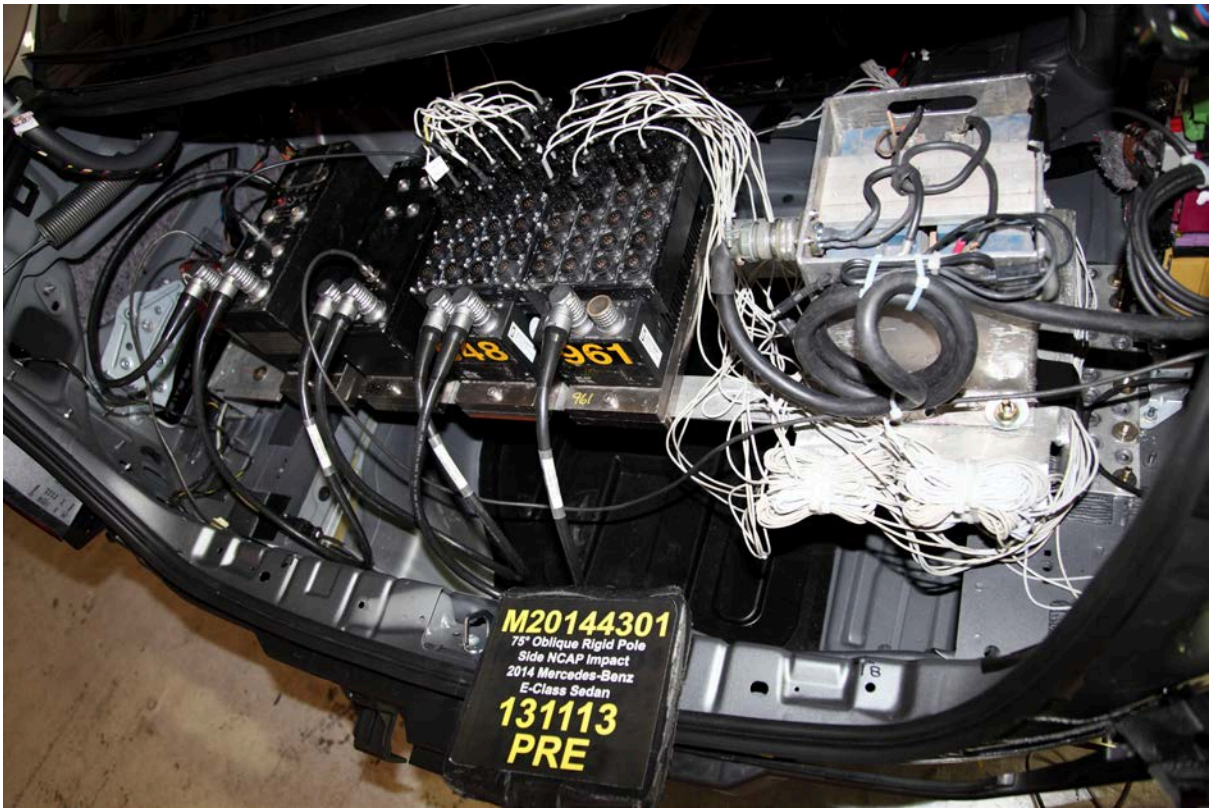
057 Pre-Test Pole Barrier Front View

058 Post-Test Pole Barrier Front View

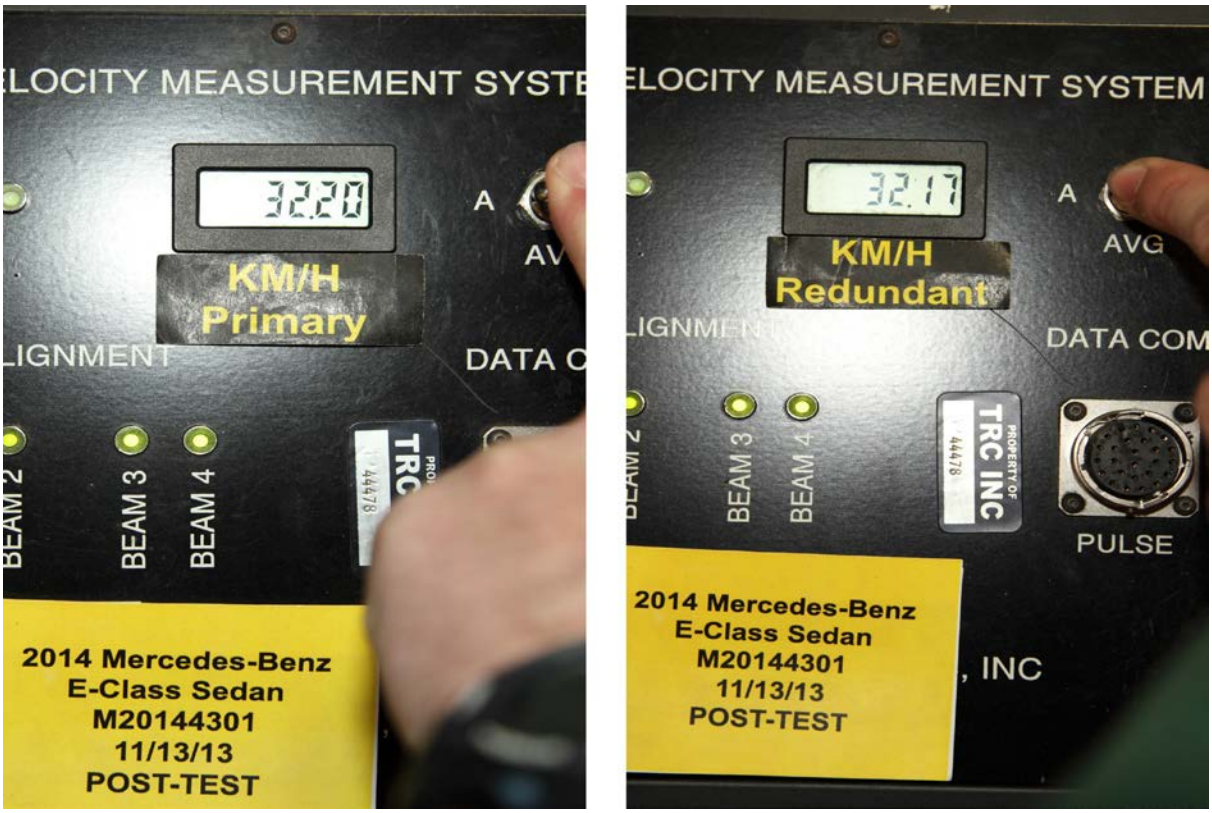


059 Pre-Test Pole Barrier Side View

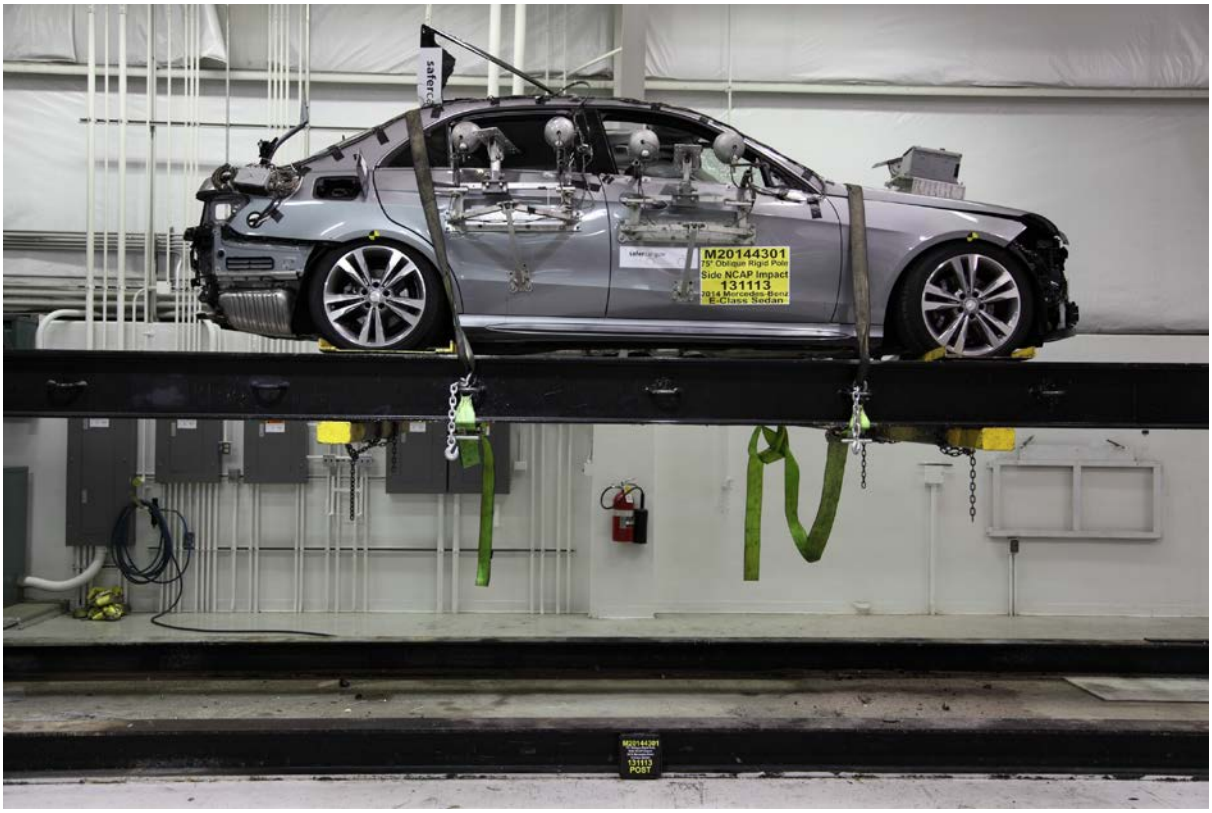
060 Post-Test Pole Barrier Side View



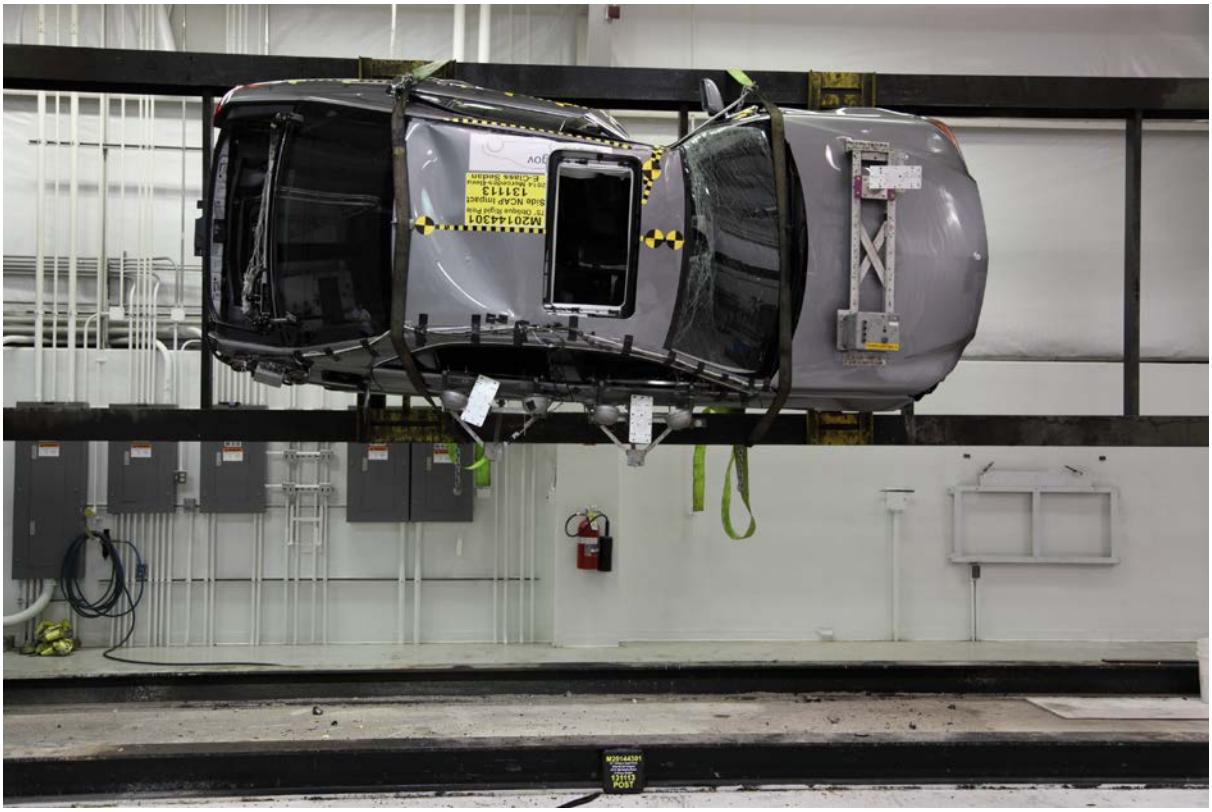
061 Pre-Test Ballast View



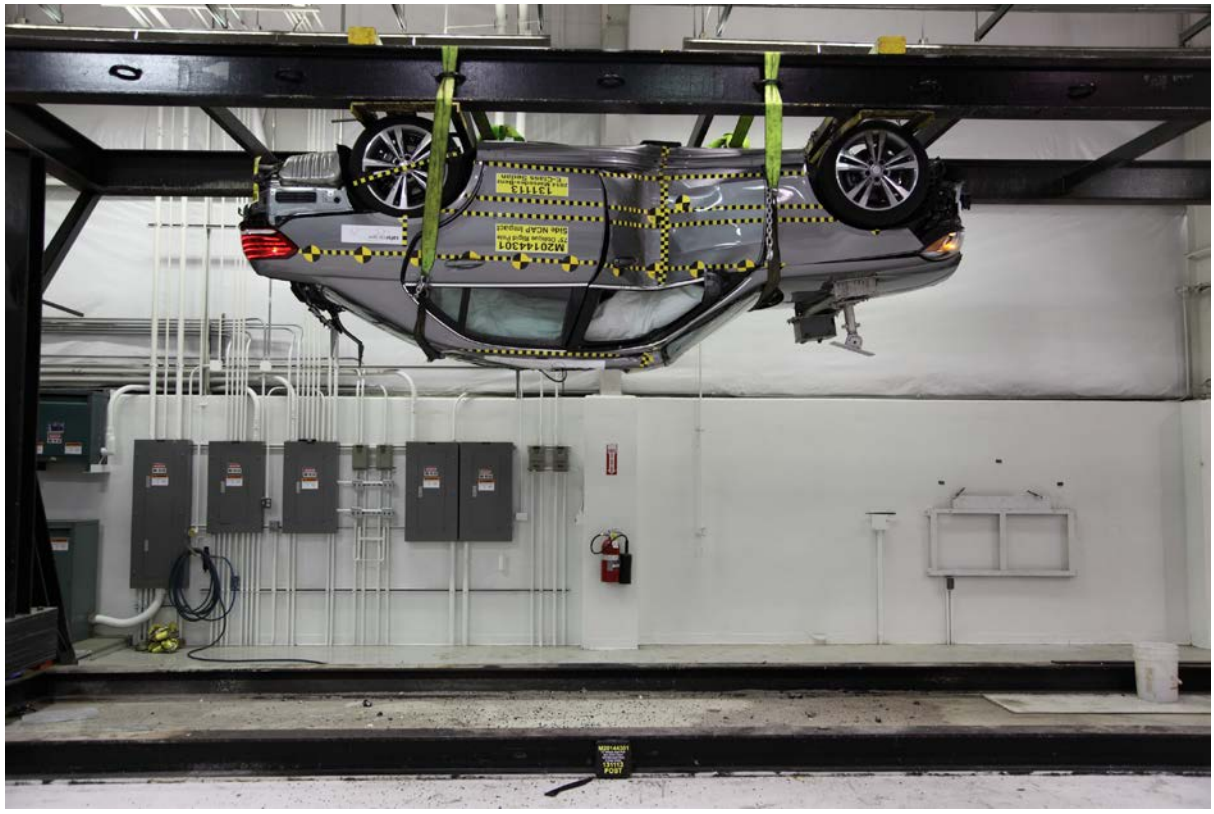
062 Post-Test Primary and Redundant Speed Trap Read-Out



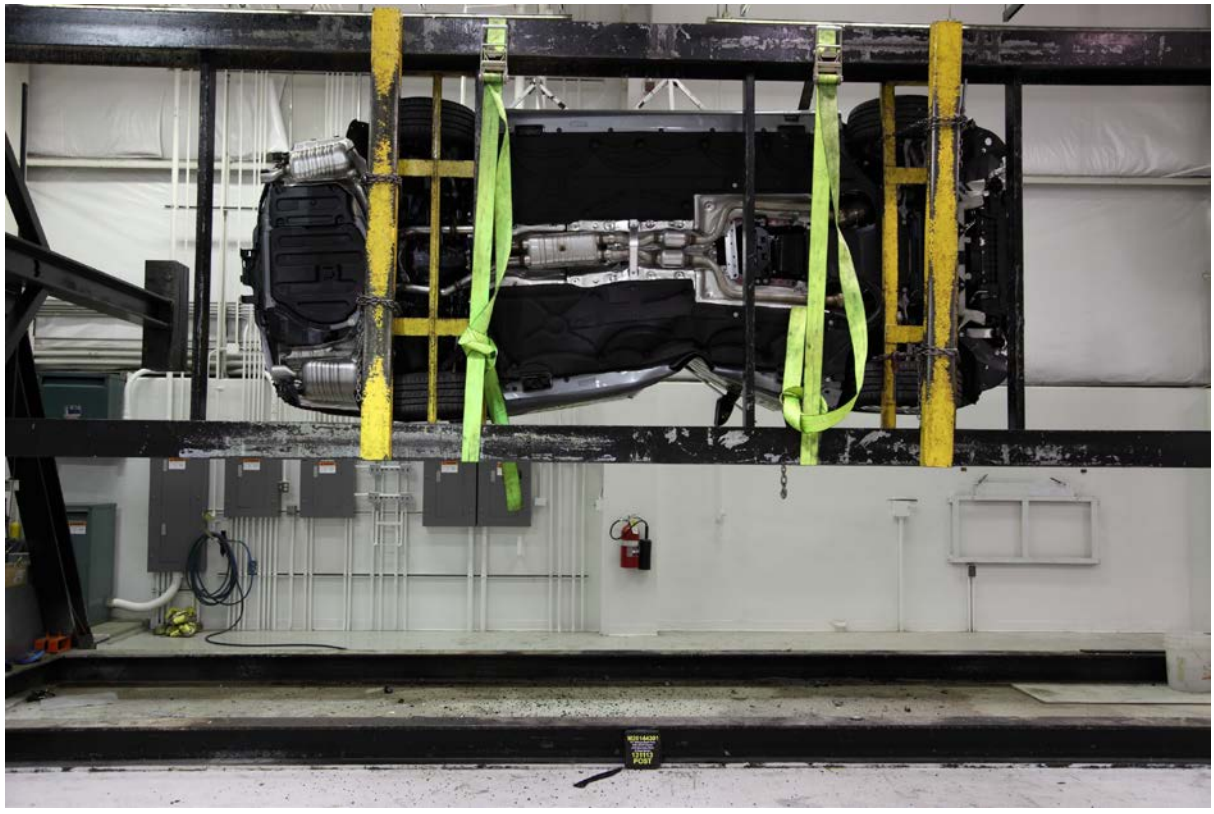
063 FMVSS No. 301 Static Rollover 0 Degrees



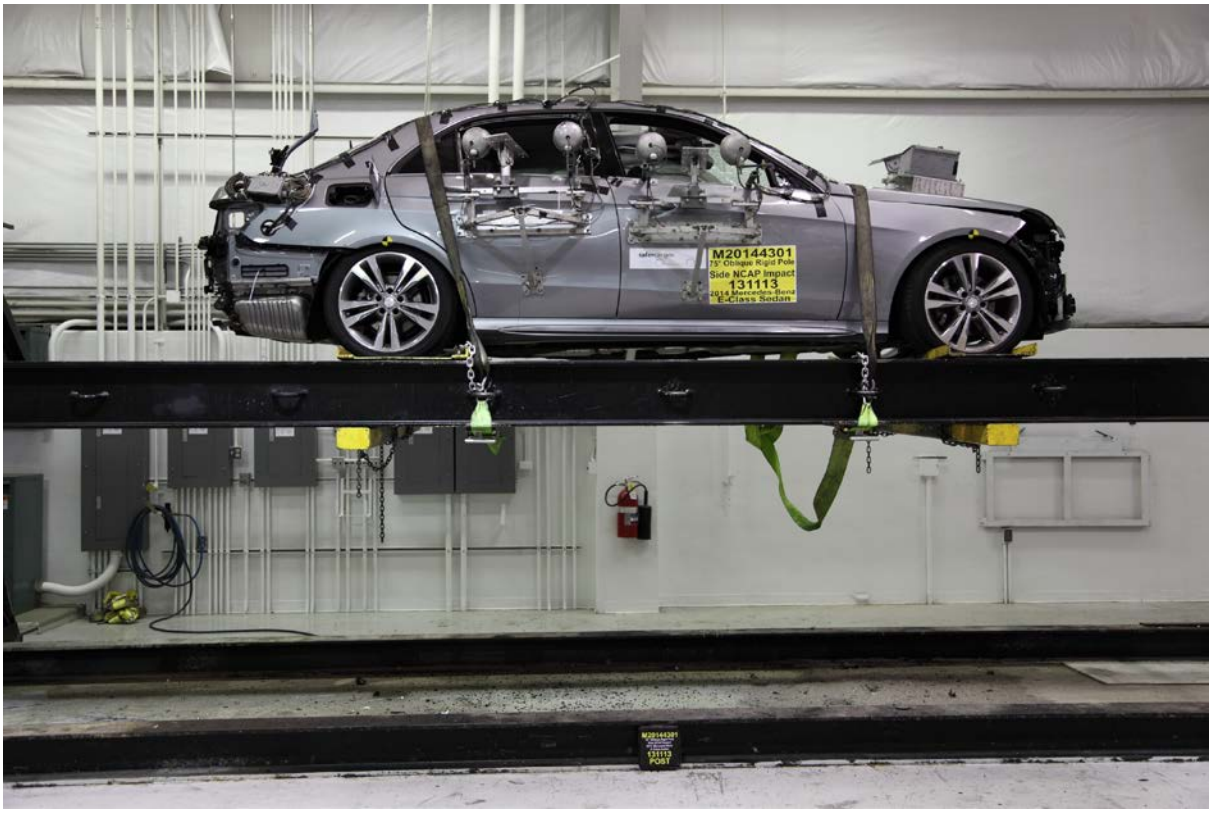
064 FMVSS No. 301 Static Rollover 90 Degrees



065 FMVSS No. 301 Static Rollover 180 Degrees

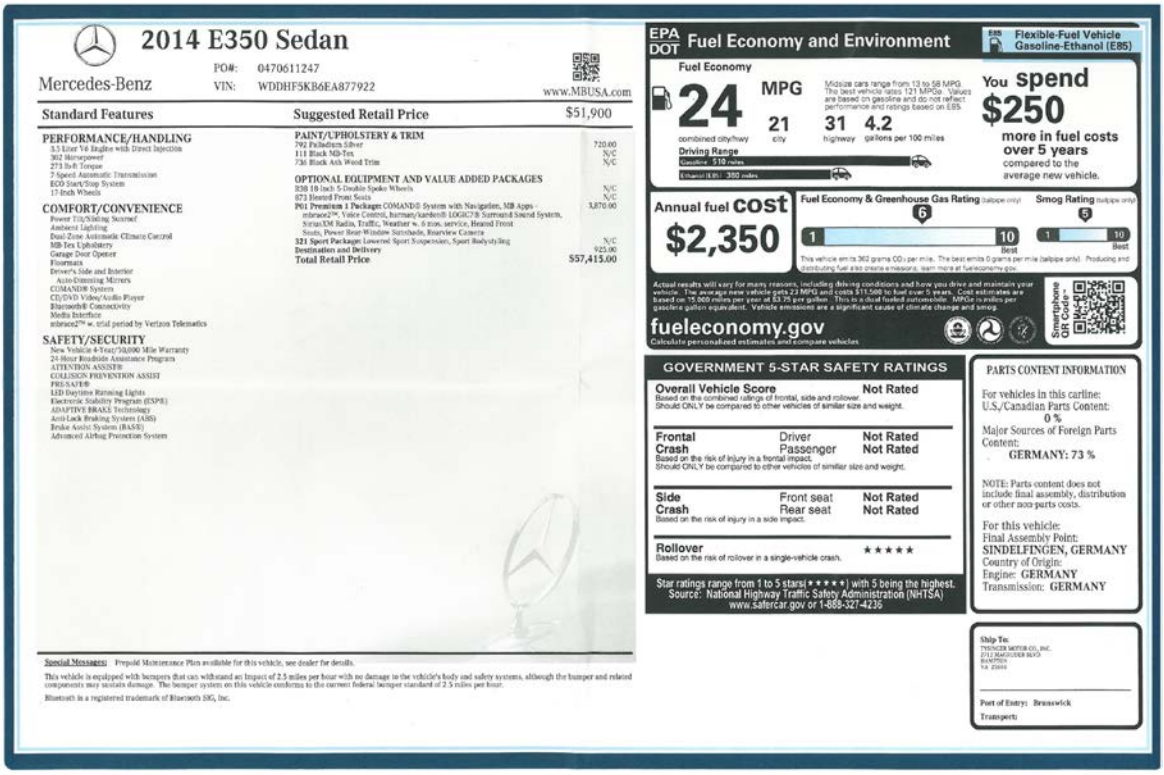


066 FMVSS No. 301 Static Rollover 270 Degrees



067 FMVSS No. 301 Static Rollover 360 Degrees

068 Impact Event



2014 E350 Sedan

PO#: 0470611247
VIN: WDDHF5KB6EA877922
Mercedes-Benz
www.MBUSA.com

Standard Features

PERFORMANCE/HANDLING
3.5 Liter V6 Engine with Direct Injection
302 Horsepower
273 lb-ft Torque
7-Speed Automatic Transmission
ECO Start/Stop System
17-Inch Wheels

COMFORT/CONVENIENCE
Power Tilt/Sliding Sunroof
Ambient Lighting
Dual-Zone Automatic Climate Control
MB-Tex Upholstery
Garage Door Opener
Floormats
Driver's Side and Interior Auto-Dimming Mirrors
COMAND® System
CD/DVD Video/Audio Player
Bluetooth® Connectivity
Media Interface
mbrace2™ w. trial period by Verizon Telematics

SAFETY/SECURITY
New Vehicle 4-Year/50,000 Mile Warranty
24-Hour Roadside Assistance Program
ATTENTION ASSIST®
COLLISION PREVENTION ASSIST
PRE-SAFE®
LED Daytime Running Lights
Electronic Stability Program (ESP®)
ADAPTIVE BRAKE Technology
Anti-Lock Braking System (ABS)
Brake Assist System (BAS®)
Advanced Airbag Protection System

Suggested Retail Price $51,900

PAINT/UPHOLSTERY & TRIM
792 Palladium Silver — 720.00
111 Black MB-Tex — N/C
736 Black Ash Wood Trim — N/C

OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES
R30 18-Inch 5-Double Spoke Wheels — N/C
873 Heated Front Seats — N/C
P01 **Premium 1 Package:** COMAND® System with Navigation, MB Apps - mbrace2™, Voice Control, Harman/Kardon® LOGIC7® Surround Sound System, SiriusXM Radio, Traffic, Weather w. 6 mos. service, Heated Front Seats, Power Rear Window Sunshade, Rearview Camera — 3,870.00
321 **Sport Package:** Lowered Sport Suspension, Sport Bodystyling — N/C
Destination and Delivery — 925.00
Total Retail Price — 57,415.00

Special Messages: Prepaid Maintenance Plan available for this vehicle, see dealer for details.

This vehicle is equipped with bumpers that can withstand an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

Bluetooth is a registered trademark of Bluetooth SIG, Inc.

EPA DOT Fuel Economy and Environment

Flexible-Fuel Vehicle Gasoline-Ethanol (E85)

Fuel Economy
24 MPG combined city/hwy
21 city
31 highway
4.2 gallons per 100 miles

Midsize cars range from 13 to 58 MPG. The best vehicle rates 121 MPGe. Values are based on gasoline and do not reflect performance and ratings based on E85.

Driving Range
Gasoline: 510 miles
Ethanol (E85): 360 miles

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

Annual fuel cost **$2,350**

Fuel Economy & Greenhouse Gas Rating (tailpipe only) 6
1 — 10 Best

Smog Rating (tailpipe only) 5
1 — 10 Best

This vehicle emits 362 grams CO2 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 23 MPG and costs $11,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.75 per gallon. This is a dual-fueled automobile. 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

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 — ★★★★★
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

PARTS CONTENT INFORMATION

For vehicles in this carline:
U.S./Canadian Parts Content: 0 %
Major Sources of Foreign Parts Content:
GERMANY: 73 %

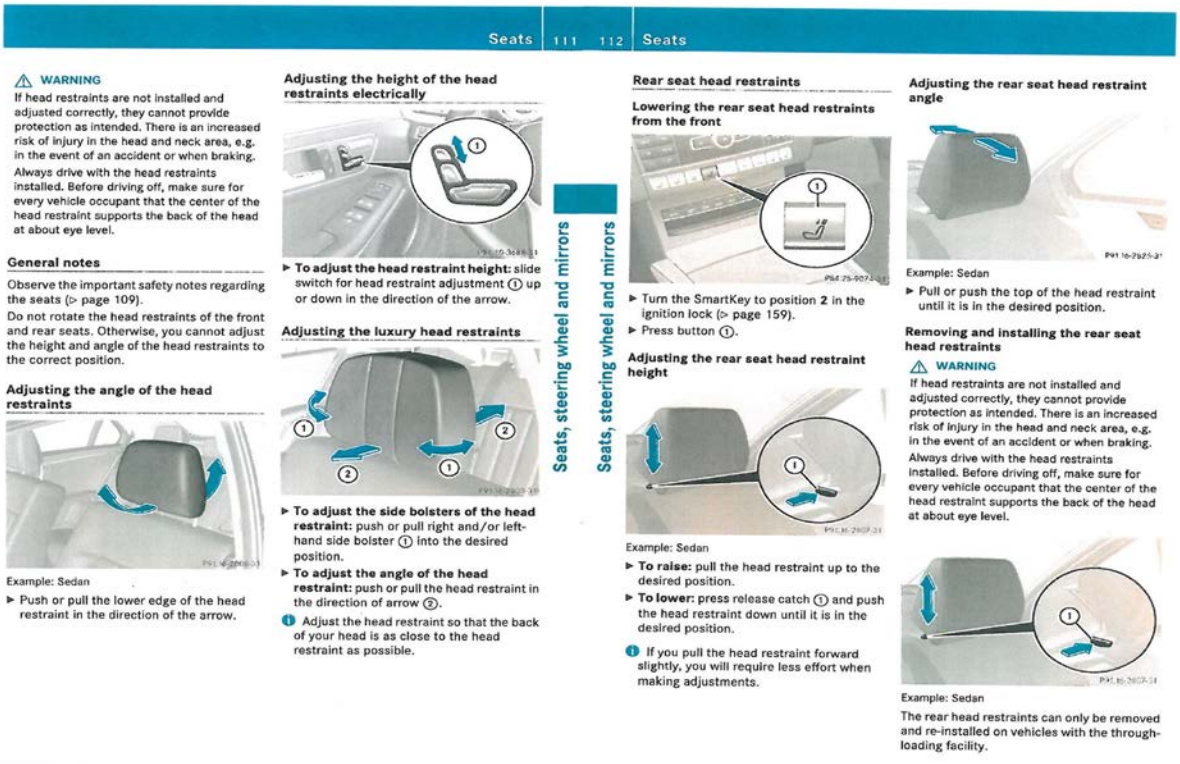
NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

For this vehicle:
Final Assembly Point: SINDELFINGEN, GERMANY
Country of Origin:
Engine: GERMANY
Transmission: GERMANY

Ship To:
[illegible]

Port of Entry: Brunswick
Transport:

069 Monroney Label



Seats 111 112 Seats

Seats, steering wheel and mirrors

Seats, steering wheel and mirrors

WARNING
If head restraints are not installed and adjusted correctly, they cannot provide protection as intended. There is an increased risk of injury in the head and neck area, e.g. in the event of an accident or when braking.
Always drive with the head restraints installed. Before driving off, make sure for every vehicle occupant that the center of the head restraint supports the back of the head at about eye level.

General notes

Observe the important safety notes regarding the seats (▷ page 109).
Do not rotate the head restraints of the front and rear seats. Otherwise, you cannot adjust the height and angle of the head restraints to the correct position.

Adjusting the angle of the head restraints

Example: Sedan

▶ Push or pull the lower edge of the head restraint in the direction of the arrow.

Adjusting the height of the head restraints electrically

▶ **To adjust the head restraint height:** slide switch for head restraint adjustment ① up or down in the direction of the arrow.

Adjusting the luxury head restraints

▶ **To adjust the side bolsters of the head restraint:** push or pull right and/or left-hand side bolster ① into the desired position.
▶ **To adjust the angle of the head restraint:** push or pull the head restraint in the direction of arrow ②.

ⓘ Adjust the head restraint so that the back of your head is as close to the head restraint as possible.

Rear seat head restraints

Lowering the rear seat head restraints from the front

▶ Turn the SmartKey to position 2 in the ignition lock (▷ page 159).
▶ Press button ①.

Adjusting the rear seat head restraint height

Example: Sedan

▶ **To raise:** pull the head restraint up to the desired position.
▶ **To lower:** press release catch ① and push the head restraint down until it is in the desired position.

ⓘ If you pull the head restraint forward slightly, you will require less effort when making adjustments.

Adjusting the rear seat head restraint angle

Example: Sedan

▶ Pull or push the top of the head restraint until it is in the desired position.

Removing and installing the rear seat head restraints

WARNING
If head restraints are not installed and adjusted correctly, they cannot provide protection as intended. There is an increased risk of injury in the head and neck area, e.g. in the event of an accident or when braking.
Always drive with the head restraints installed. Before driving off, make sure for every vehicle occupant that the center of the head restraint supports the back of the head at about eye level.

Example: Sedan

The rear head restraints can only be removed and re-installed on vehicles with the through-loading facility.

070 Head Restraint Use and Adjustment Information from Vehicle Owner Manual

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)

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

NHTSA

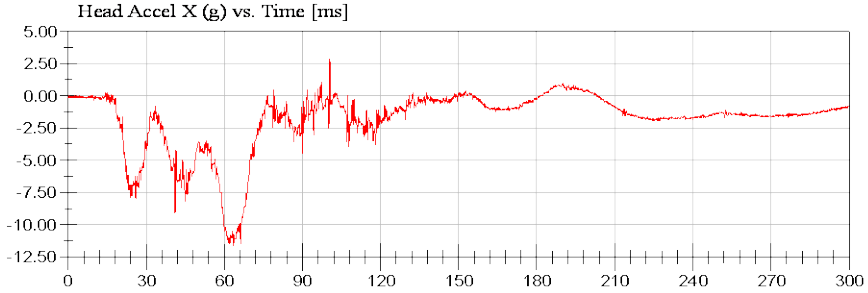
Test Date: 11/13/2013

Position #1 SID IIs Dummy (DI8818)

Test Lab: CTF

Test Number: 131113 (M20144301)

Head Accel X (g) vs. Time [ms]



<Max>

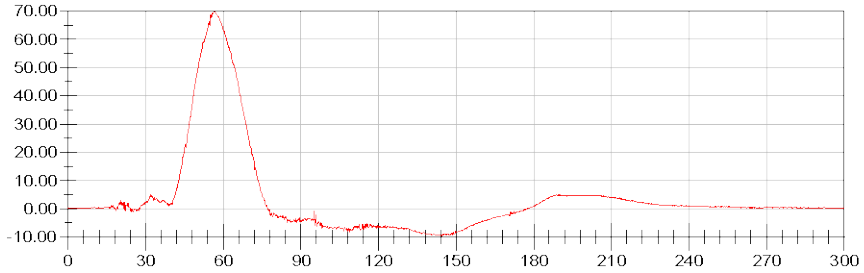
2.88 g at 100.48 ms

<Min>

-11.62 g at 63.52 ms

CFC_1000

Head Accel Y (g) vs. Time [ms]



<Max>

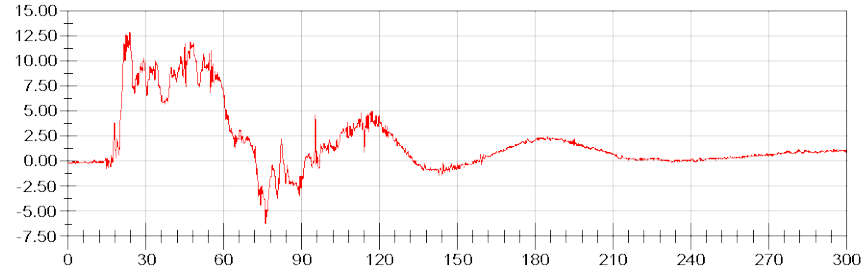
69.81 g at 56.56 ms

<Min>

-9.65 g at 144.56 ms

CFC_1000

Head Accel Z (g) vs. Time [ms]



<Max>

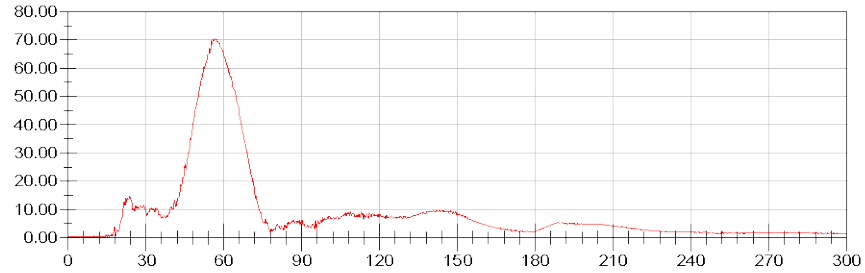
12.97 g at 23.76 ms

<Min>

-6.29 g at 76.08 ms

CFC_1000

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



<Max>

70.62 g at 56.64 ms

<Min>

0.13 g at 13.36 ms

CFC_1000

NHTSA

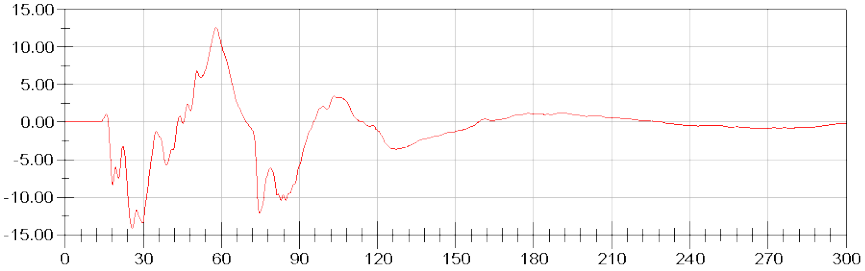
Test Date: 11/13/2013

Position #1 SID IIs Dummy (DI8818)

Test Lab: CTF

Test Number: 131113 (M20144301)

Abdominal Spine X (T12) (g) vs. Time [ms]



<Max>

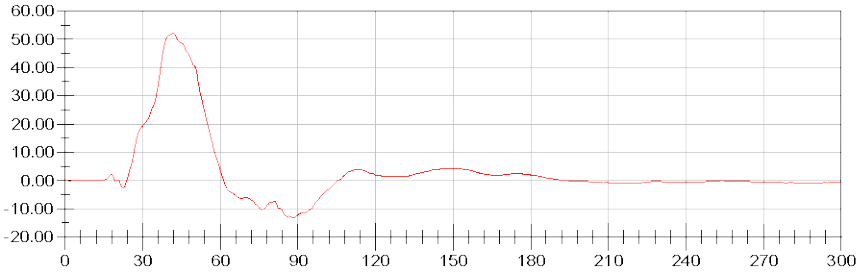
12.58 g at 58.00 ms

<Min>

-14.07 g at 25.84 ms

CFC_180

Abdominal Spine Y (T12) (g) vs. Time [ms]



<Max>

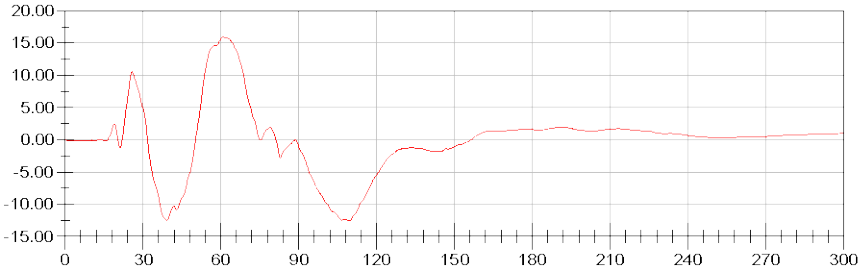
52.09 g at 41.76 ms

<Min>

-13.43 g at 88.08 ms

CFC_180

Abdominal Spine Z (T12) (g) vs. Time [ms]



<Max>

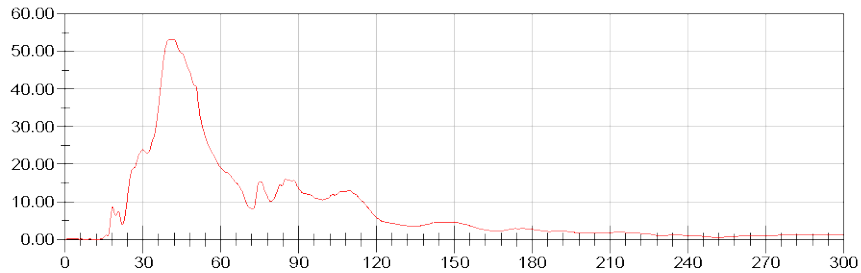
15.94 g at 60.72 ms

<Min>

-12.60 g at 109.52 ms

CFC_180

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



<Max>

53.21 g at 41.68 ms

<Min>

0.12 g at 12.48 ms

CFC_180

NHTSA

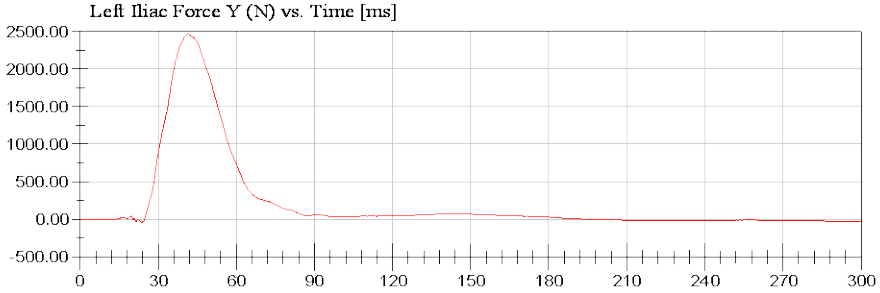
Test Date: 11/13/2013

Position #1 SID IIs Dummy (DI8818)

Test Lab: CTF

Test Number: 131113 (M20144301)

Left Iliac Force Y (N) vs. Time [ms]



<Max>

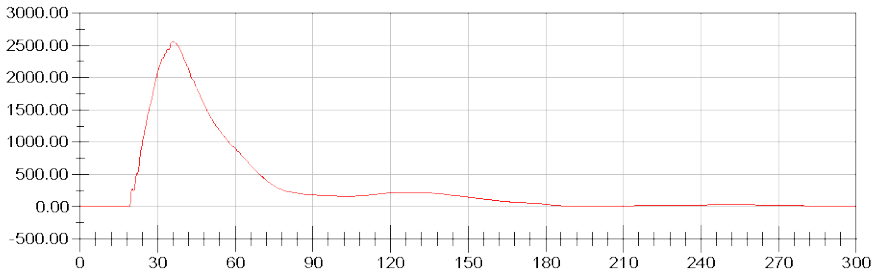
2,469.84 N at 41.44 ms

<Min>

-40.74 N at 23.60 ms

CFC_600

Left Acetabulum Force Y (N) vs. Time [ms]



<Max>

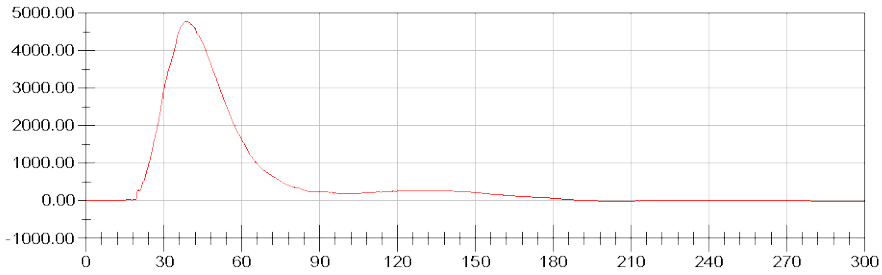
2,560.65 N at 35.76 ms

<Min>

-1.49 N at 197.28 ms

CFC_600

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



<Max>

4,770.65 N at 38.96 ms

<Min>

-20.10 N at 300.00 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 DI8818

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. DI8818 Calibration No.05

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	780	Yes
B	Shoulder Pivot Height	437.0 - 453.0	441	Yes
C	H-Point Height	79.0 - 89.0	82	Yes
D	H-Point from Seat Back	141.0 - 151.0	142	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	129	Yes
G	Head Breadth	140.0 - 148.0	143	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	182	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	536	Yes
L	Popliteal Height	343.0 - 369.0	352	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	397	Yes
N	Buttock Popliteal Length	416.0 - 442.0	427	Yes
O	Chest Depth without Jacket	195.0 - 211.0	203	Yes
P	Foot Length (right)	216.0 - 232.0	220	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	313	Yes
R	Arm Length	249.0 - 259.0	255	Yes
S	Knee Joint to seat Back	478.0 - 493.0	483	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	350	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
W	Foot Width (left)	78.0 - 94.0	84	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	771	Yes

Technician

Approved

Revised 9/29/2005

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/6/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	37 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	128.8 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	4.3 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

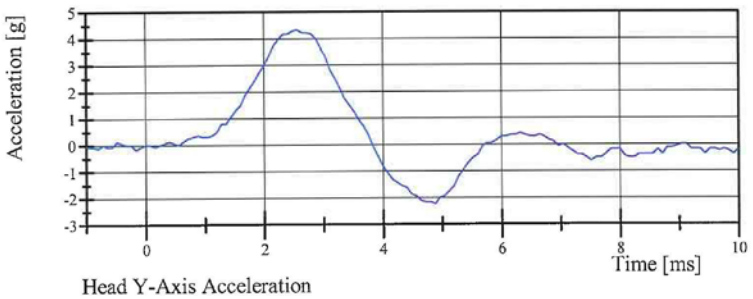
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:42:18 233

Transportation Research Center Inc.

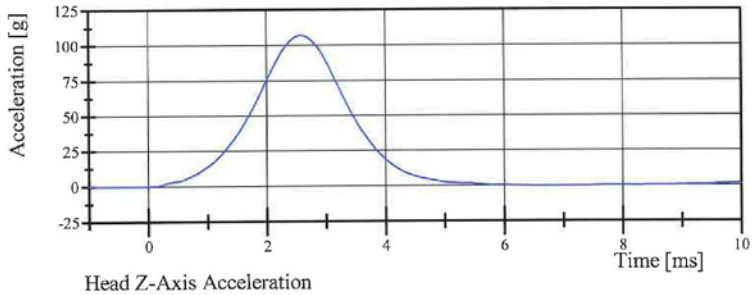
Left Lateral Head Drop
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/6/2013

Head X-Axis Acceleration



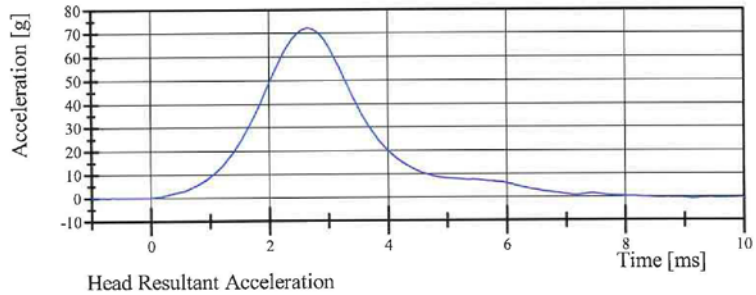
Filter Class: CFC_1000
Max: 4.3 g at 2.6 ms
Min: -2.2 g at 4.9 ms

Head Y-Axis Acceleration



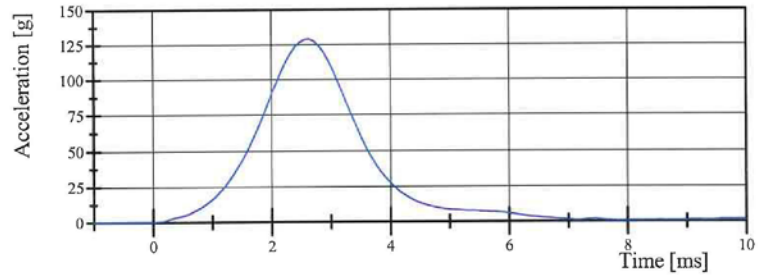
Filter Class: CFC_1000
Max: 107.0 g at 2.6 ms
Min: -0.5 g at 7.1 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 72.2 g at 2.6 ms
Min: -1.0 g at 9.1 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 128.8 g at 2.6 ms
Min: 0.0 g at 0.0 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:42:25 233

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 5-4
Test Date: 11/7/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.0 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.622 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.326 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.392 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.567 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.563 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.815 m/s	Yes
Maximum Headform Flexion occurring between 50ms and 70ms.			
Peak	(-71) - (-81) deg	-73.6 deg	Yes
Time of Peak	50 - 70 ms	62.6 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	40.8 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	112.9 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

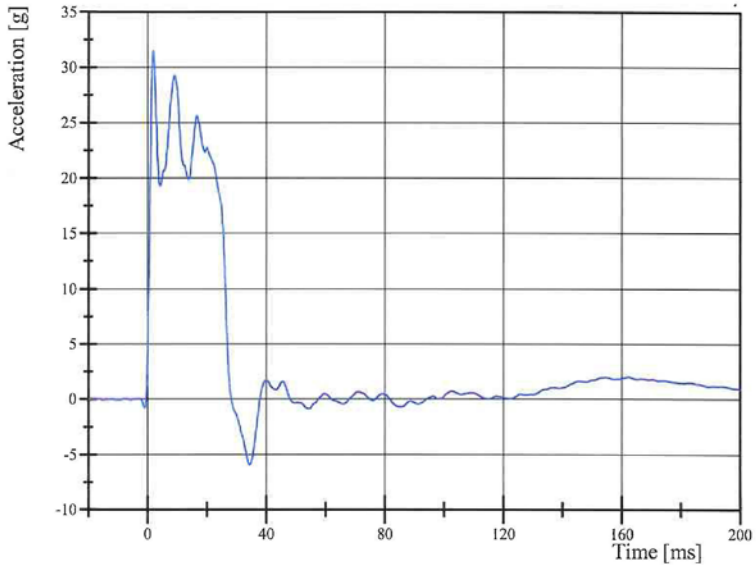
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:45:47 640

Transportation Research Center Inc.

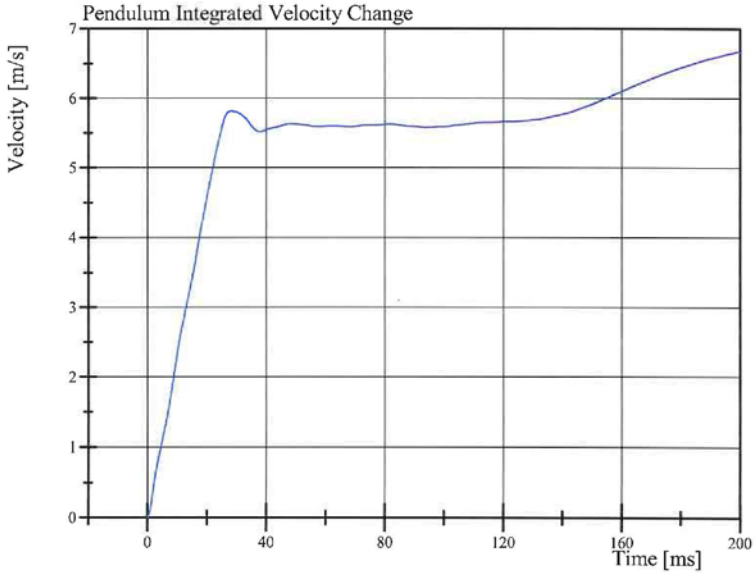
Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 5-4
Test Date: 11/7/2013

Pendulum Acceleration



Filter Class: CFC_180
Max: 31.5 g at 1.8 ms
Min: -5.9 g at 34.4 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.7 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

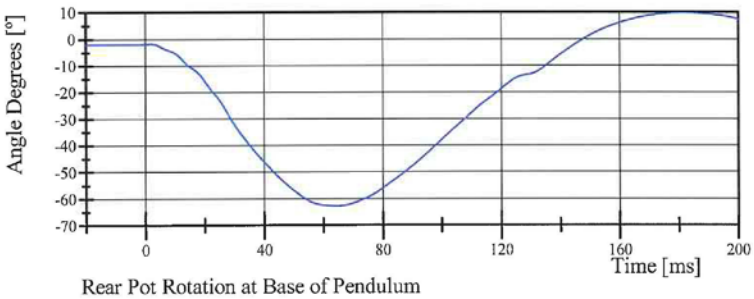
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:45:54 640

Transportation Research Center Inc.

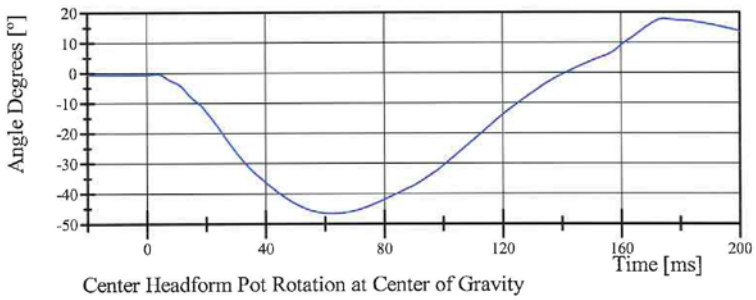
Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 5-4
Test Date: 11/7/2013

Forward Pot Rotation at Base of Pendulum



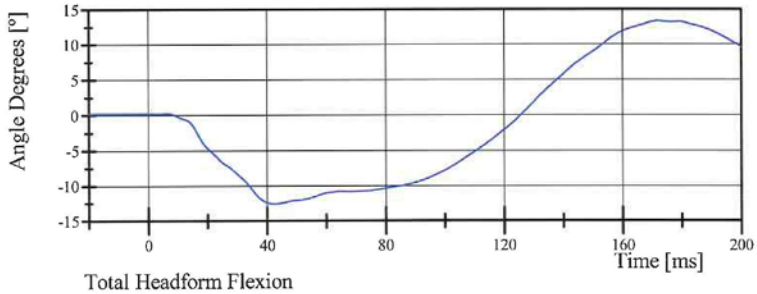
Filter Class: CFC_60
Max: 9.7 ° at 181.4 ms
Min: -62.7 ° at 64.4 ms

Rear Pot Rotation at Base of Pendulum



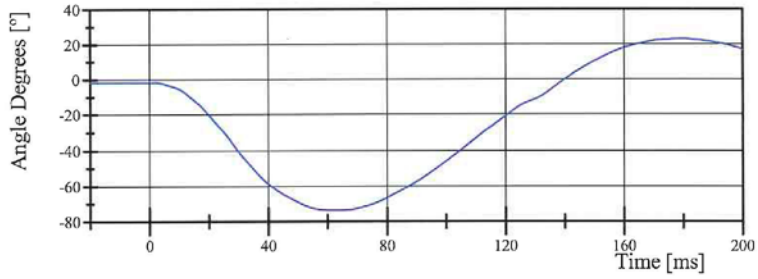
Filter Class: CFC_60
Max: 17.7 ° at 174.6 ms
Min: -46.6 ° at 62.4 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 13.3 ° at 172.0 ms
Min: -12.6 ° at 42.5 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 22.8 ° at 179.7 ms
Min: -73.6 ° at 62.6 ms

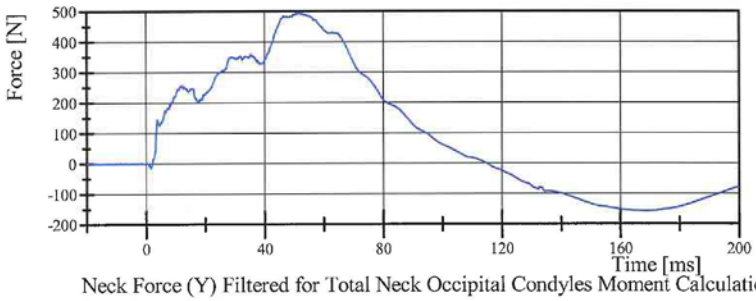
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:45:55 640

Transportation Research Center Inc.

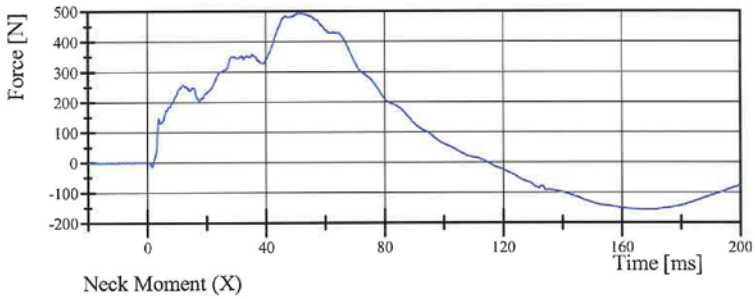
Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 5-4
Test Date: 11/7/2013

Neck Force (Y)



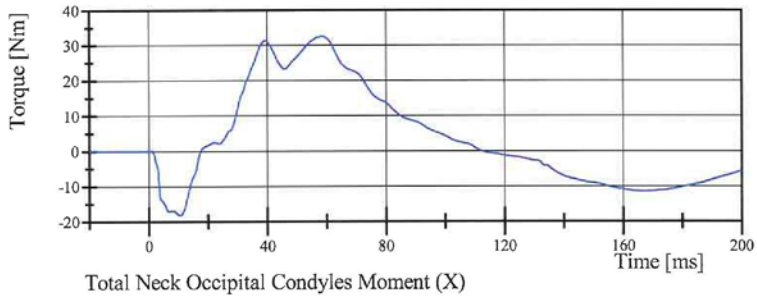
Filter Class: CFC_1000
Max: 494.6 N at 51.8 ms
Min: -158.8 N at 168.1 ms

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



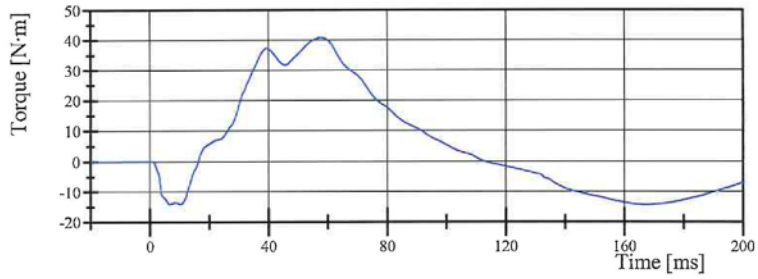
Filter Class: CFC_600
Max: 494.0 N at 51.8 ms
Min: -158.3 N at 168.1 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 32.6 Nm at 58.5 ms
Min: -18.3 Nm at 10.6 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Constai
Max: 40.8 N·m at 57.3 ms
Min: -14.3 N·m at 167.8 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:45:56 640

Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	36 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-14.5 g	Yes
Shoulder Displacement	28 - 37 mm	32.4 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	18.9 g	Yes

Test meets specifications.

Comments:

Technician

Approved

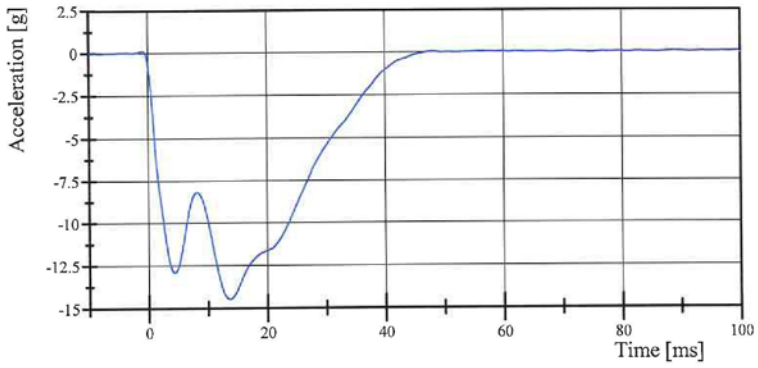
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:47:35 884

Transportation Research Center Inc.

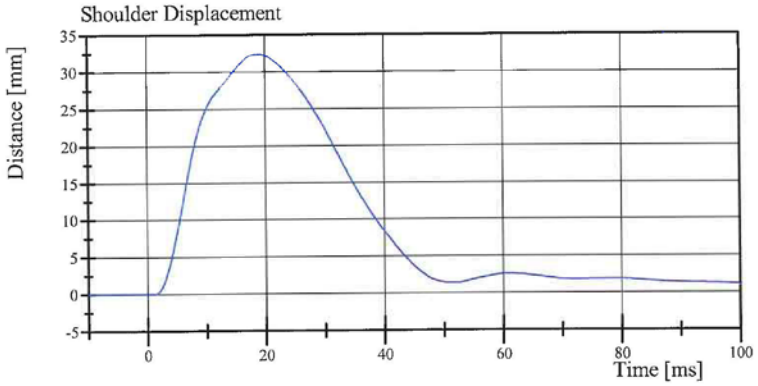
Left Lateral Shoulder
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Probe Acceleration



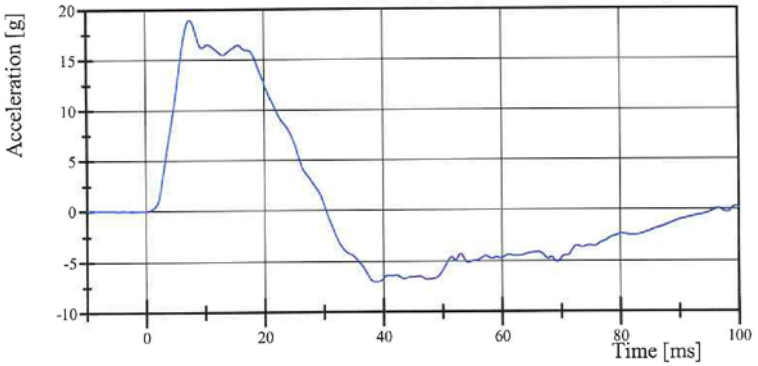
Filter Class: CFC_180
Max: 0.1 g at -1.0 ms
Min: -14.5 g at 13.7 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 32.4 mm at 18.7 ms
Min: -0.0 mm at 1.1 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 18.9 g at 7.5 ms
Min: -7.0 g at 38.6 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:47:42 884

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.762 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-33.0 g	Yes
Shoulder Displacement	31 - 40 mm	37.8 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	29.6 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.9 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	33.0 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	36.5 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	34.2 g	Yes

Test meets specifications.

Comments:

Technician

Approved

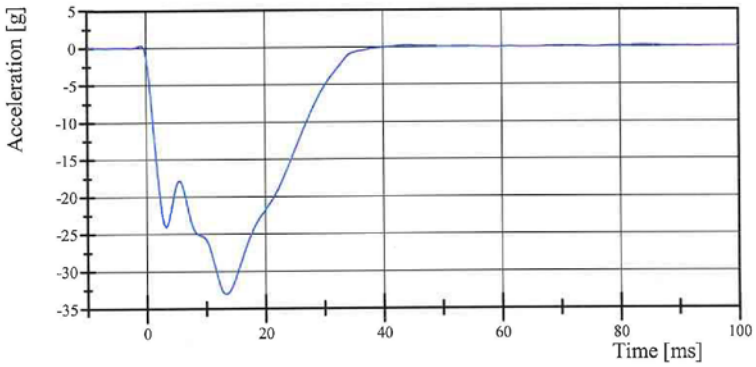
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:49:27 615

Transportation Research Center Inc.

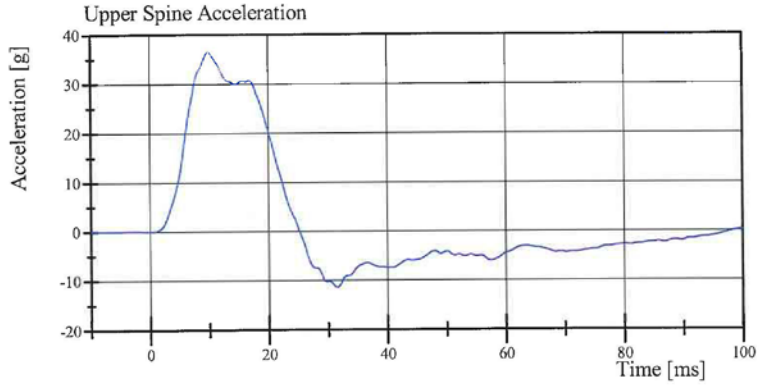
Left Lateral Thorax with Arm
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Probe Acceleration



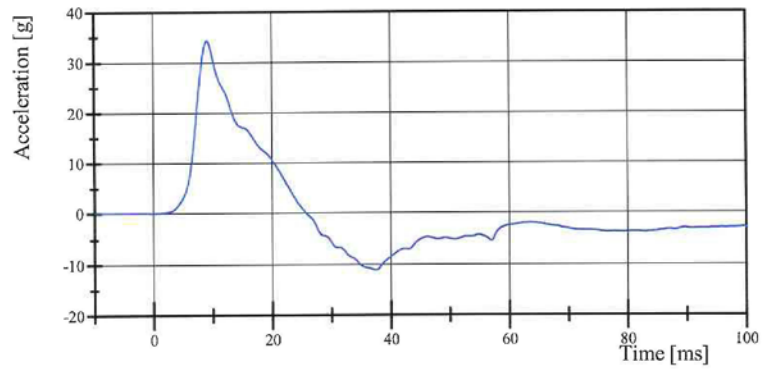
Filter Class: CFC_180
Max: 0.3 g at -0.9 ms
Min: -33.0 g at 13.4 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 36.5 g at 9.8 ms
Min: -11.4 g at 31.5 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 34.2 g at 9.1 ms
Min: -11.1 g at 37.5 ms

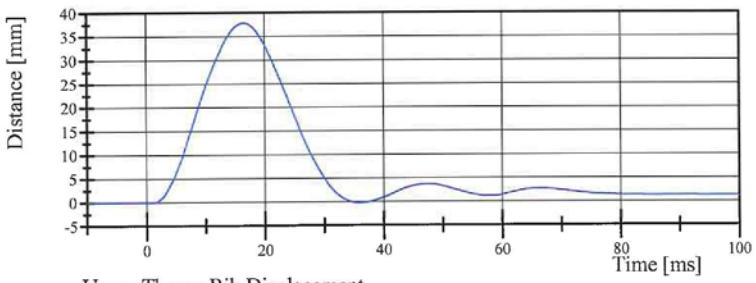
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:49:35 615

Transportation Research Center Inc.

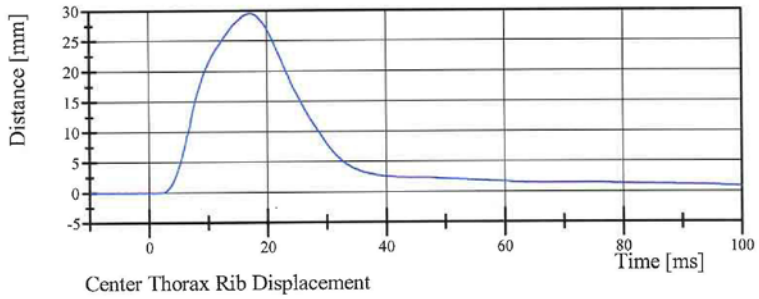
Left Lateral Thorax with Arm
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Shoulder Rib Displacement



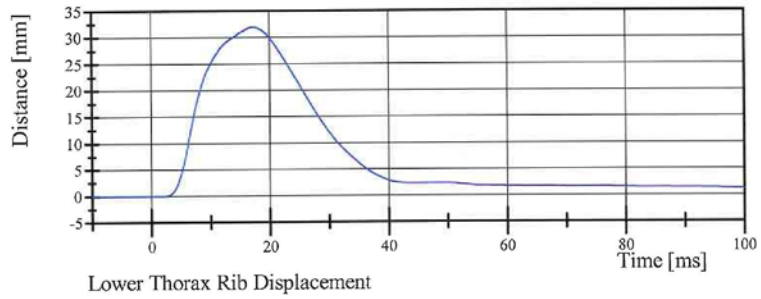
Filter Class: CFC_600
Max: 37.8 mm at 16.6 ms
Min: -0.3 mm at 35.8 ms

Upper Thorax Rib Displacement



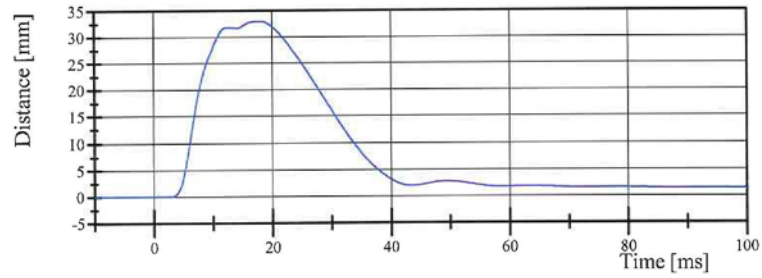
Filter Class: CFC_600
Max: 29.6 mm at 17.2 ms
Min: -0.0 mm at -9.3 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.9 mm at 17.3 ms
Min: -0.0 mm at -9.2 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 33.0 mm at 17.7 ms
Min: -0.0 mm at -2.7 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:49:36 615

Transportation Research Center Inc.

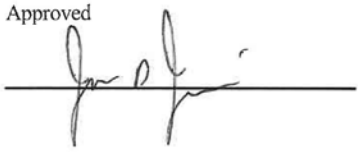
Left Lateral Thorax without Arm
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.244 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-14.9 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	39.1 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	41.3 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	36.9 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	13.9 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	8.7 g	Yes

Test meets specifications.

Comments:

Technician 

Approved 

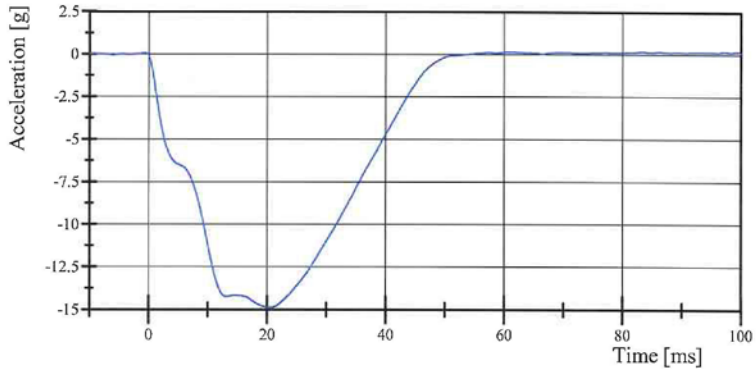
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:51:02 853

Transportation Research Center Inc.

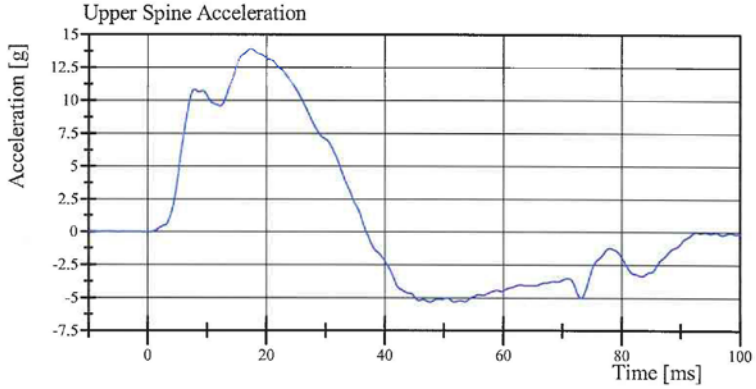
Left Lateral Thorax without Arm
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Probe Acceleration



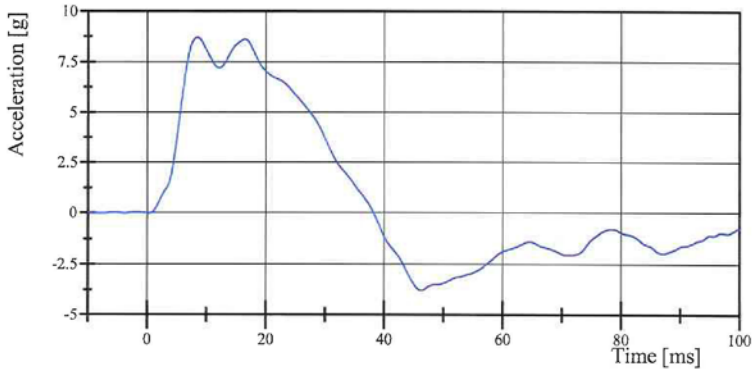
Filter Class: CFC_180
Max: 0.1 g at 83.4 ms
Min: -14.9 g at 20.4 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 13.9 g at 17.4 ms
Min: -5.3 g at 47.6 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 8.7 g at 8.5 ms
Min: -3.8 g at 46.3 ms

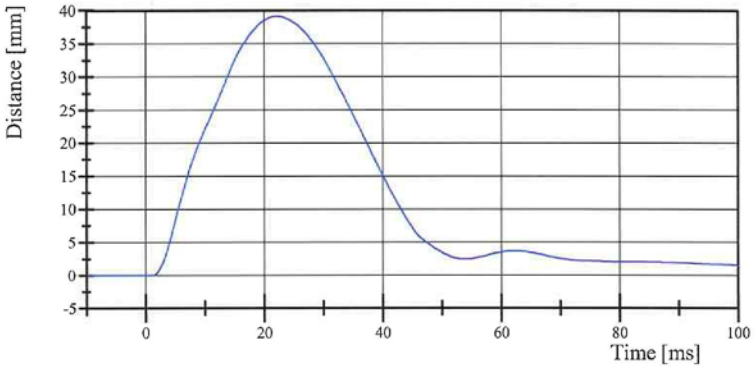
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:51:10 853

Transportation Research Center Inc.

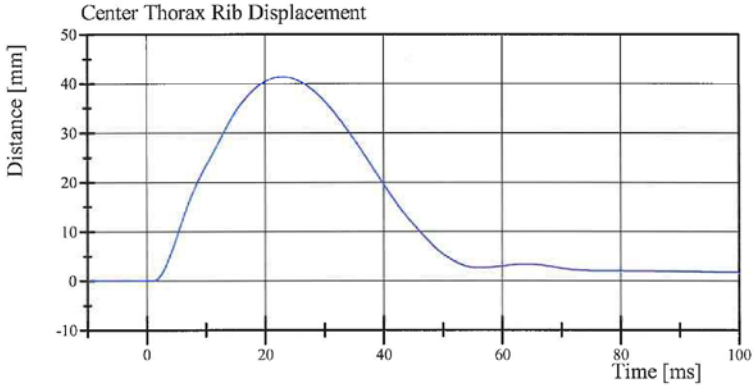
Left Lateral Thorax without Arm
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Upper Thorax Rib Displacement



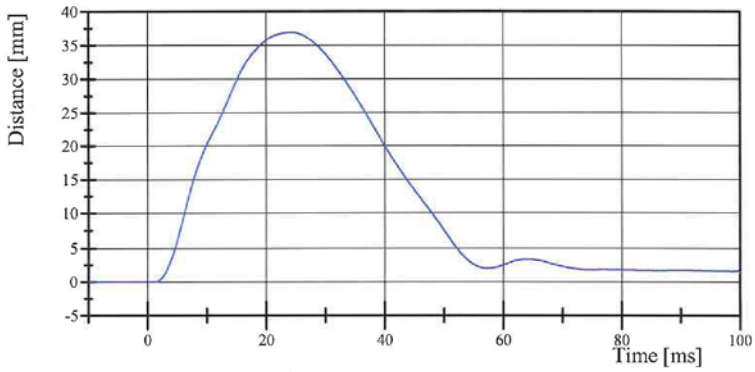
Filter Class: CFC_600
Max: 39.1 mm at 22.1 ms
Min: -0.0 mm at -3.4 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 41.3 mm at 23.0 ms
Min: -0.0 mm at 1.0 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 36.9 mm at 24.2 ms
Min: -0.0 mm at -3.6 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:51:10 853

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.3 °C	Yes
Relative Humidity	10 - 70 %	38 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.28 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.2 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	40.6 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	34.6 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.96 g	Yes

Test meets specifications.

Comments:

Technician

Approved

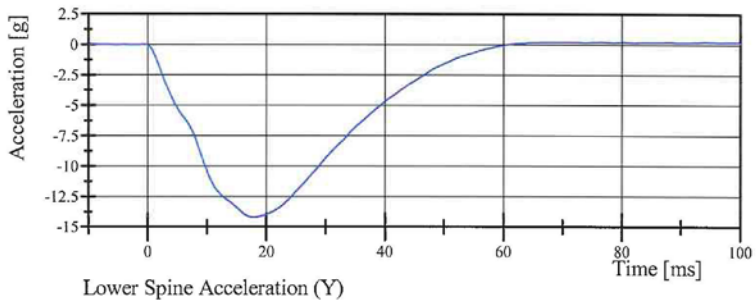
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:39:57 676

Transportation Research Center Inc.

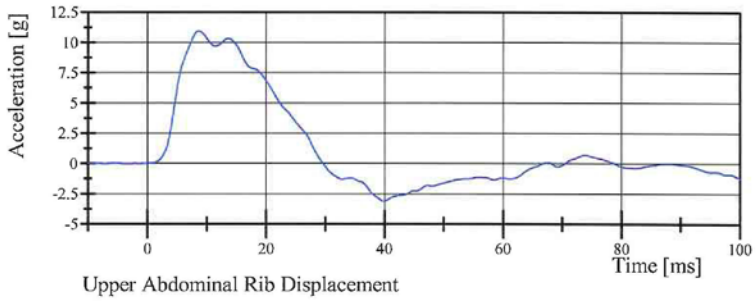
Left Lateral Abdomen
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Probe Acceleration



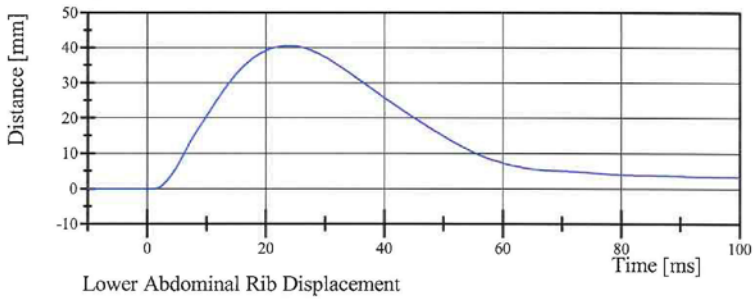
Filter Class: CFC_180
Max: 0.2 g at 94.1 ms
Min: -14.2 g at 17.9 ms

Lower Spine Acceleration (Y)



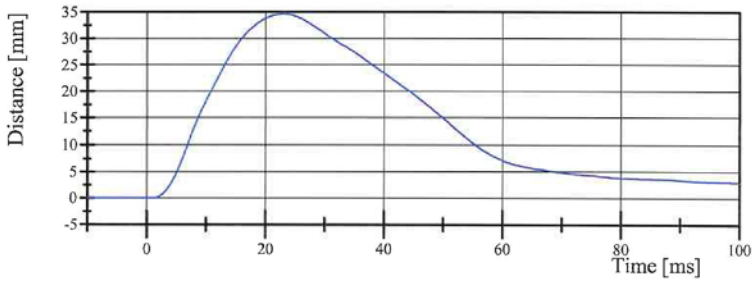
Filter Class: CFC_180
Max: 11.0 g at 8.6 ms
Min: -3.1 g at 39.8 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 40.6 mm at 24.2 ms
Min: -0.0 mm at -8.2 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 34.6 mm at 23.0 ms
Min: -0.0 mm at 1.2 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:40:04 676

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.39 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-43.3 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	34.6 g	Yes
Iliac Force	4,100 - 5,100 N	4,956.8 N	Yes

Test meets specifications.

Comments:

Technician

Approved

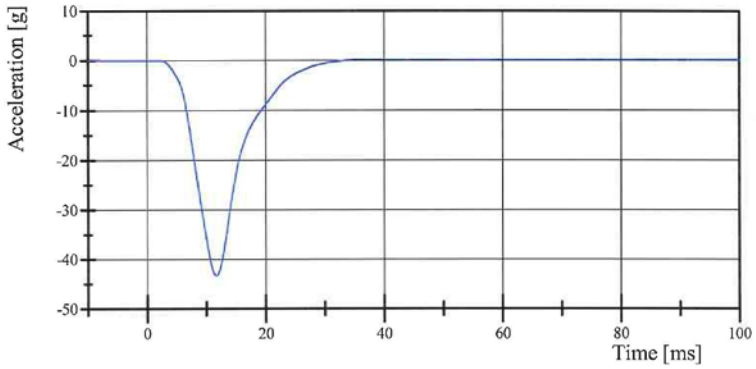
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:44:03 633

Transportation Research Center Inc.

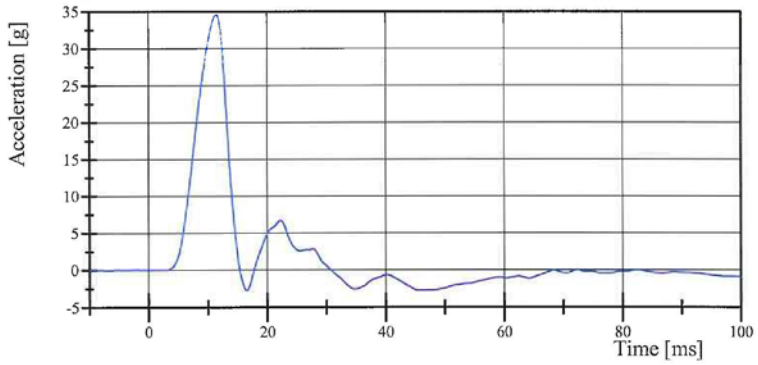
Left Lateral Iliac
SID IIs Serial No. DI8818 Certification No. 5-1
Test Date: 11/7/2013

Probe Acceleration



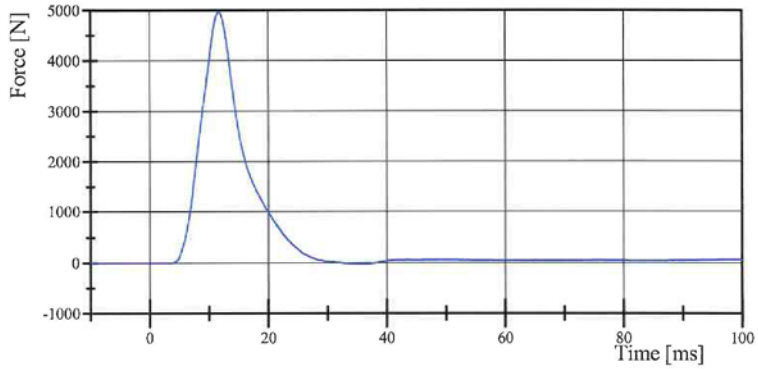
Filter Class: CFC_180
Max: 0.2 g at 36.5 ms
Min: -43.3 g at 11.7 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 34.6 g at 11.4 ms
Min: -2.8 g at 16.6 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 4,956.8 N at 11.7 ms
Min: -24.1 N at 35.9 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.07.2013 17:44:10 633

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. DI8818 Certification No. 5-4
Test Date: 11/8/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	35 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.67 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-43.79 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	41.8 g	Yes
Acetabulum Force	3,600 - 4,300 N	3,822.2 N	Yes

Test meets specifications.

Comments:

Technician

Approved

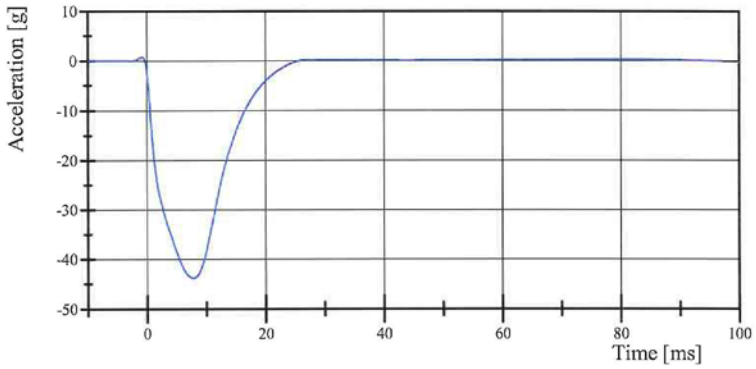
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.08.2013 14:54:36 445

Transportation Research Center Inc.

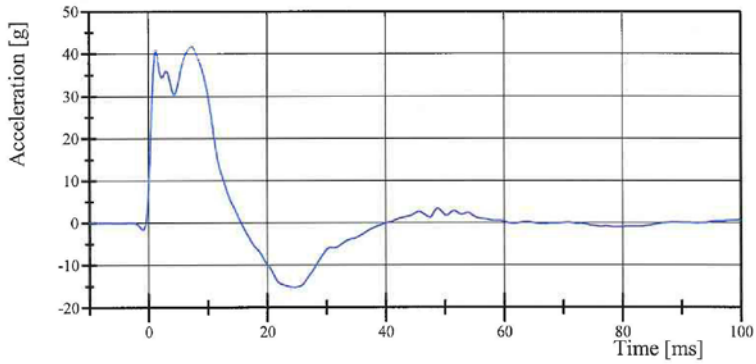
Left Lateral Pelvis
SID IIs Serial No. DI8818 Certification No. 5-4
Test Date: 11/8/2013

Probe Acceleration



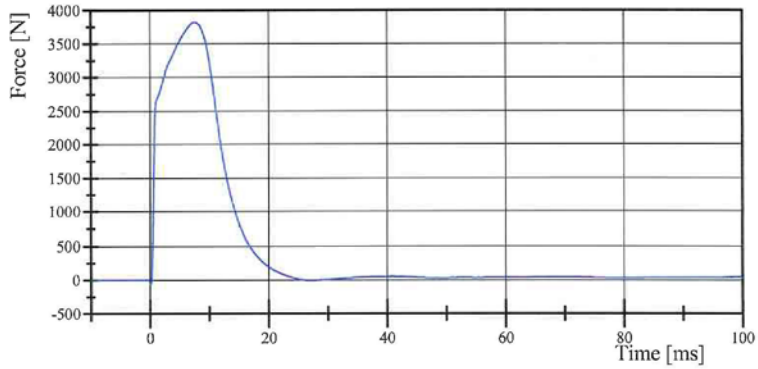
Filter Class: CFC_180
Max: 0.6 g at -0.9 ms
Min: -43.8 g at 7.8 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 41.8 g at 7.3 ms
Min: -15.3 g at 24.4 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 3,822.2 N at 7.6 ms
Min: -64.1 N at 0.2 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.08.2013 14:55:11 445

Driver S/N DI8818

Post-Test Calibration Sheets

Transportation Research Center Inc.
SIDIIs Dummy - Level D
External Dimensions
Serial No. DI8818 Calibration No.06

Symbol	Description	Specification	Results	Pass
		mm	mm	
A	Sitting Height	772.0 - 788.0	780	Yes
B	Shoulder Pivot Height	437.0 - 453.0	440	Yes
C	H-Point Height	79.0 - 89.0	82	Yes
D	H-Point from Seat Back	141.0 - 151.0	142	Yes
E	Shoulder Pivot from Backline	97.0 - 107.0	100	Yes
F	Thigh Clearance	119.0 - 135.0	129	Yes
G	Head Breadth	140.0 - 148.0	143	Yes
H	Head Back from Backline	40.0 - 46.0	45	Yes
I	Head Depth	178.0 - 188.0	182	Yes
J	Head Circumference	541.0 - 551.0	544	Yes
K	Buttock to Knee Length	514.0 - 540.0	536	Yes
L	Popliteal Height	343.0 - 369.0	352	Yes
M	Knee Pivot to Floor Height	393.0 - 409.0	397	Yes
N	Buttock Popliteal Length	416.0 - 442.0	427	Yes
O	Chest Depth without Jacket	195.0 - 211.0	203	Yes
P	Foot Length (right)	216.0 - 232.0	220	Yes
P	Foot Length (left)	216.0 - 232.0	220	Yes
Q	Hip Breadth	313.0 - 323.0	313	Yes
R	Arm Length	249.0 - 259.0	255	Yes
S	Knee Joint to seat Back	478.0 - 493.0	483	Yes
V	Shoulder Width (only one arm installed)	341.0 - 357.0	350	Yes
W	Foot Width (right)	78.0 - 94.0	84	Yes
W	Foot Width (left)	78.0 - 94.0	84	Yes
Y	Chest Circumference with Jacket	851.0 - 881.0	870	Yes
Z	Waist Circumference	761.0 - 791.0	771	Yes

Technician

Approved

Revised 9/29/2005

Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. DI8818 Certification No. 6-2
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	18.9 - 25.6 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	40 %	Yes
Peak Head Resultant Acceleration	115 - 137 g	120.9 g	Yes
Peak Head Longitudinal Acceleration	(-15) - 15 g	3.4 g	Yes
Is Head Resultant Acceleration Curve Unimodal within 15% of Peak?	Yes	Yes	Yes

Test meets specifications.

Comments:

Technician

Approved

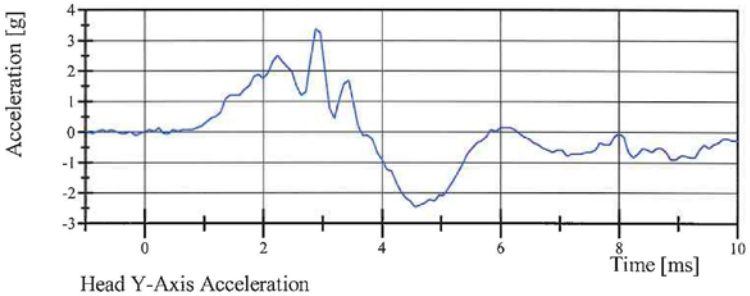
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 15:09:34 235

Transportation Research Center Inc.

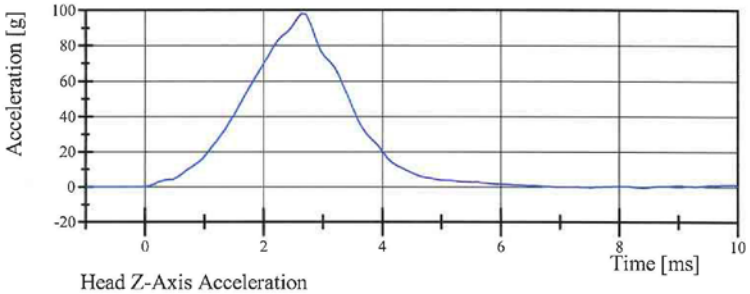
Left Lateral Head Drop
SID IIs Serial No. DI8818 Certification No. 6-2
Test Date: 11/14/2013

Head X-Axis Acceleration



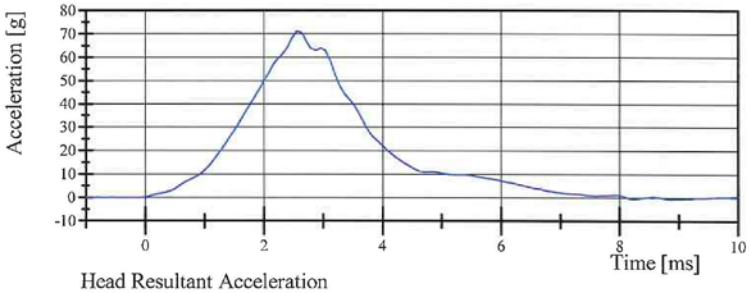
Filter Class: CFC_1000
Max: 3.4 g at 2.9 ms
Min: -2.5 g at 4.6 ms

Head Y-Axis Acceleration



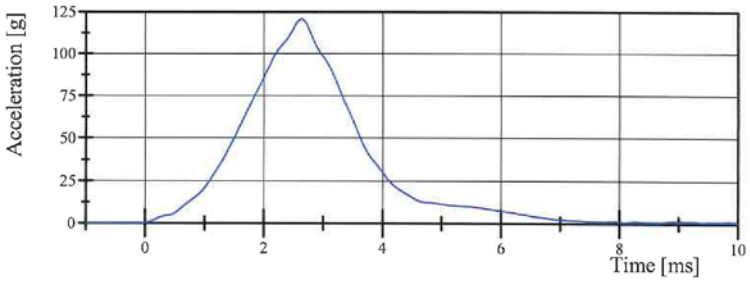
Filter Class: CFC_1000
Max: 98.2 g at 2.6 ms
Min: -0.6 g at 8.4 ms

Head Z-Axis Acceleration



Filter Class: CFC_1000
Max: 71.2 g at 2.6 ms
Min: -0.8 g at 8.9 ms

Head Resultant Acceleration



Filter Class: CFC_1000
Max: 120.9 g at 2.6 ms
Min: 0.0 g at -1.0 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 15:09:50 235

Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 6-7
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	41 %	Yes
Pendulum Velocity	(-5.51) - (-5.63) m/s	-5.621 m/s	Yes
Pendulum Integrated Velocity Change at 10 ms	2.20 - 2.80 m/s	2.396 m/s	Yes
Change at 15 ms	3.30 - 4.10 m/s	3.477 m/s	Yes
Change at 20 ms	4.40 - 5.40 m/s	4.611 m/s	Yes
Change at 25 ms	5.40 - 6.10 m/s	5.558 m/s	Yes
Change at 25 to 100 ms	5.50 - 6.20 m/s	5.797 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	63.0 ms	Yes
Total Neck Occipital Condyles Moment	36 - 44 N·m	40.7 N·m	Yes
Total Neck Occipital Condyles Moment Decay Time to 0 N·m	102 - 126 ms	116.6 ms	Yes

Test meets specifications.

Comments:

Technician 

Approved 

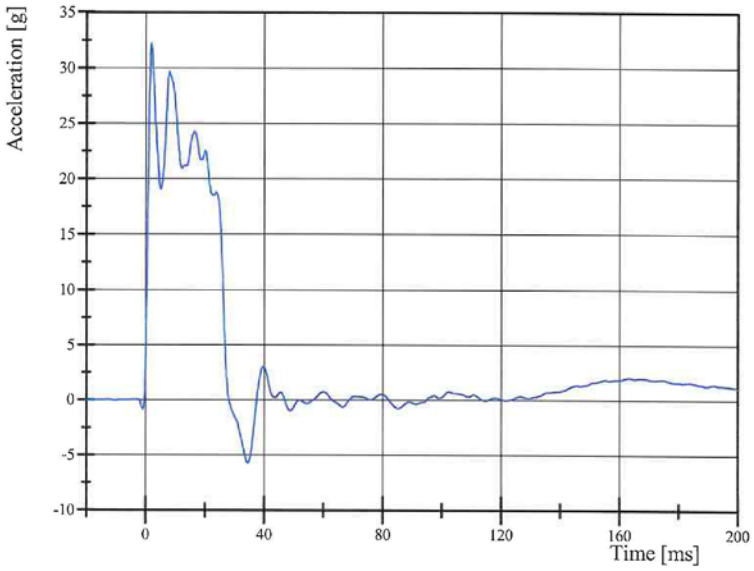
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 16:47:11 638

Transportation Research Center Inc.

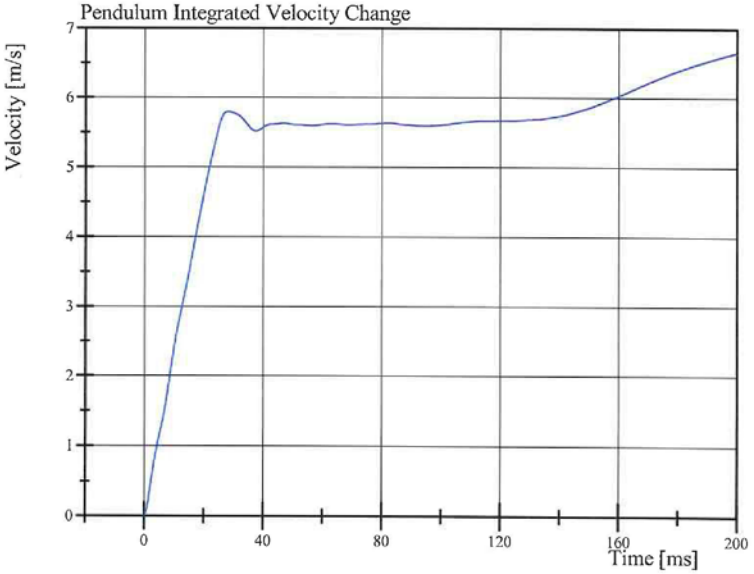
Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 6-7
Test Date: 11/14/2013

Pendulum Acceleration



Filter Class: CFC_180
Max: 32.2 g at 1.9 ms
Min: -5.7 g at 34.5 ms

Pendulum Integrated Velocity Change



Filter Class: CFC_180
Max: 6.6 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

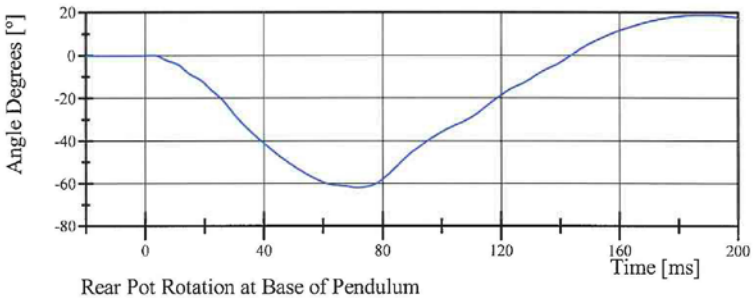
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 16:47:18 638

Transportation Research Center Inc.

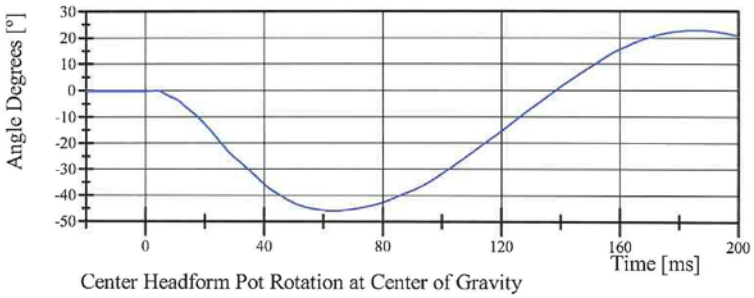
Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 6-7
Test Date: 11/14/2013

Forward Pot Rotation at Base of Pendulum



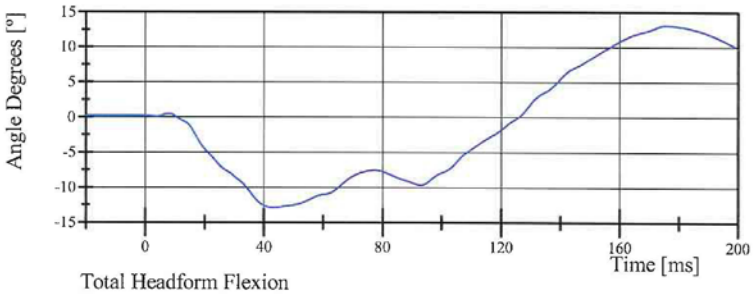
Filter Class: CFC_60
Max: 18.5 ° at 188.6 ms
Min: -62.1 ° at 71.4 ms

Rear Pot Rotation at Base of Pendulum



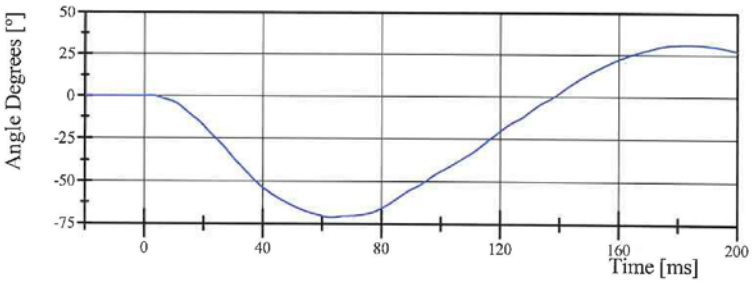
Filter Class: CFC_60
Max: 22.7 ° at 185.2 ms
Min: -45.9 ° at 63.3 ms

Center Headform Pot Rotation at Center of Gravity



Filter Class: CFC_60
Max: 13.1 ° at 175.8 ms
Min: -12.9 ° at 43.1 ms

Total Headform Flexion



Filter Class: CFC_60
Max: 31.0 ° at 182.9 ms
Min: -71.4 ° at 63.0 ms

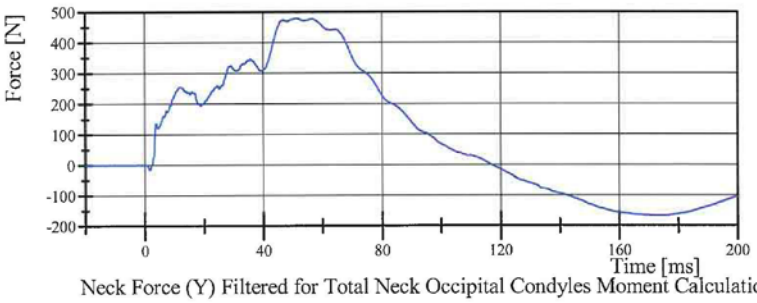
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 16:47:19 638

Transportation Research Center Inc.

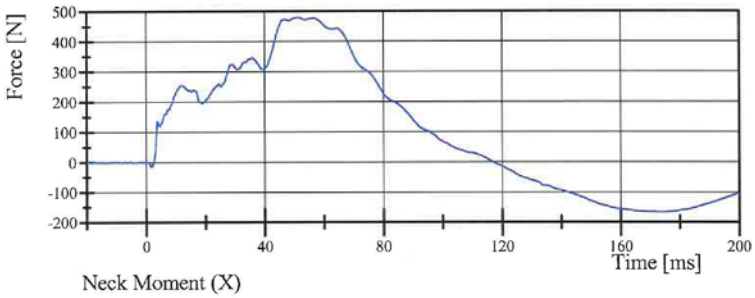
Left Lateral Neck
SID IIs Serial No. DI8818 Certification No. 6-7
Test Date: 11/14/2013

Neck Force (Y)



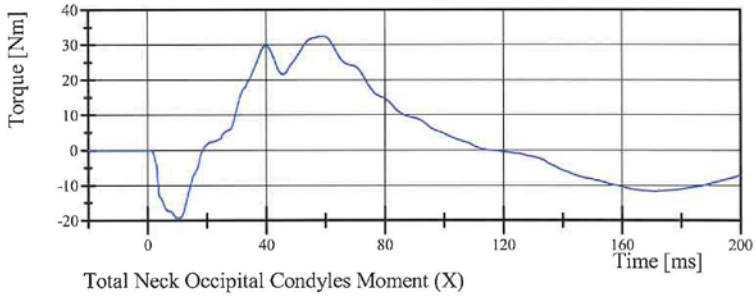
Filter Class: CFC_1000
Max: 479.9 N at 51.2 ms
Min: -168.3 N at 172.5 ms

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



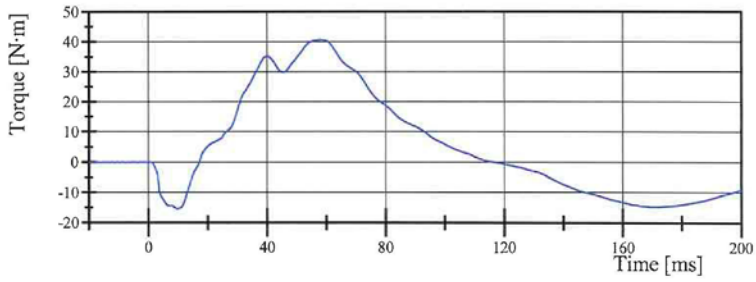
Filter Class: CFC_600
Max: 479.5 N at 51.1 ms
Min: -168.1 N at 174.5 ms

Neck Moment (X)



Filter Class: CFC_600
Max: 32.4 Nm at 58.8 ms
Min: -19.4 Nm at 10.6 ms

Total Neck Occipital Condyles Moment (X)



Filter Class: Without_(Consta
Max: 40.7 N·m at 57.8 ms
Min: -15.4 N·m at 9.7 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 16:47:20 638

Transportation Research Center Inc.

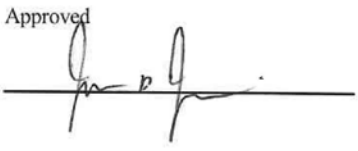
Left Lateral Shoulder
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.2 °C	Yes
Relative Humidity	10 - 70 %	24 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.33 m/s	Yes
Impactor Acceleration	(-13) - (-18) g	-14.2 g	Yes
Shoulder Displacement	28 - 37 mm	32.0 mm	Yes
Upper Spine Lateral Acceleration	17 - 22 g	19.0 g	Yes

Test meets specifications.

Comments:

Technician 

Approved 

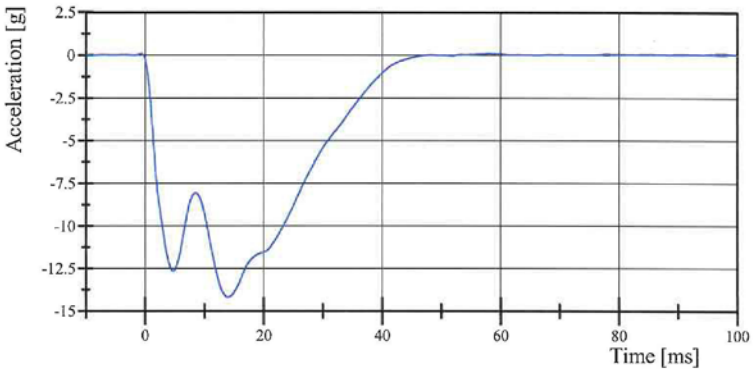
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 08:09:45 876

Transportation Research Center Inc.

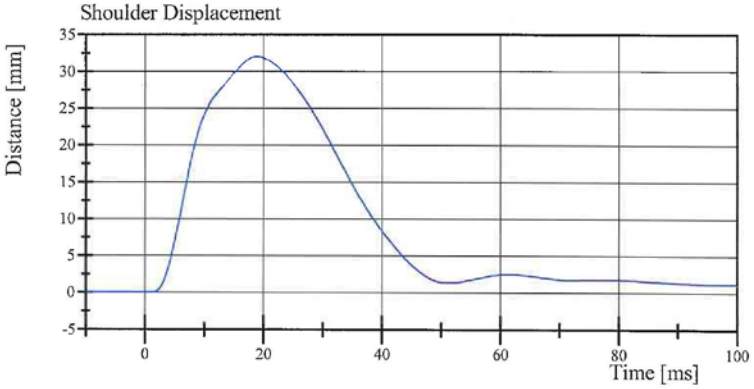
Left Lateral Shoulder
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Probe Acceleration



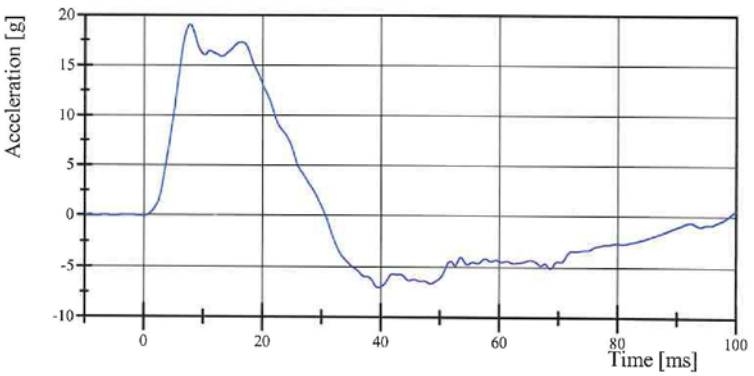
Filter Class: CFC_180
Max: 0.1 g at -0.6 ms
Min: -14.2 g at 14.0 ms

Shoulder Displacement



Filter Class: CFC_600
Max: 32.0 mm at 18.8 ms
Min: -0.0 mm at 1.2 ms

Upper Spine Acceleration (Y)



Filter Class: CFC_180
Max: 19.0 g at 7.8 ms
Min: -7.0 g at 39.6 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 08:10:04 876

Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.5 °C	Yes
Relative Humidity	10 - 70 %	23 %	Yes
Impactor Velocity	6.60 - 6.80 m/s	6.740 m/s	Yes
Impactor Acceleration	(-30) - (-36) g	-34.3 g	Yes
Shoulder Displacement	31 - 40 mm	37.8 mm	Yes
Upper Thorax Rib Displacement	25 - 32 mm	28.9 mm	Yes
Center Thorax Rib Displacement	30 - 36 mm	31.9 mm	Yes
Lower Thorax Rib Displacement	32 - 38 mm	33.2 mm	Yes
Upper Spine Lateral Acceleration	34 - 43 g	36.3 g	Yes
Lower Spine Lateral Acceleration	29 - 37 g	34.1 g	Yes

Test meets specifications.

Comments:

Technician

Approved

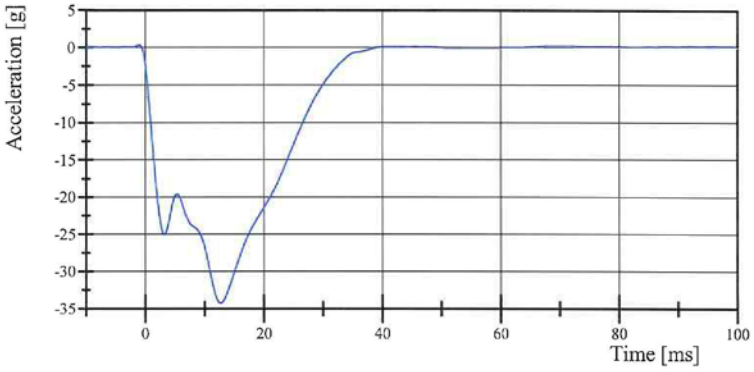
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 08:38:23 609

Transportation Research Center Inc.

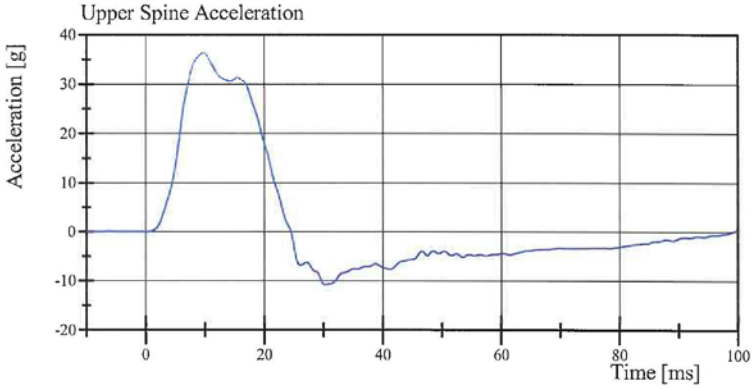
Left Lateral Thorax with Arm
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Probe Acceleration



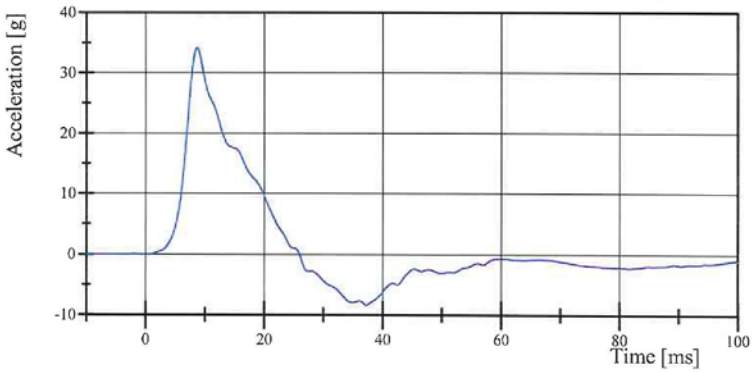
Filter Class: CFC_180
Max: 0.3 g at -1.0 ms
Min: -34.3 g at 12.7 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 36.3 g at 9.8 ms
Min: -10.8 g at 30.2 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 34.1 g at 8.7 ms
Min: -8.5 g at 37.3 ms

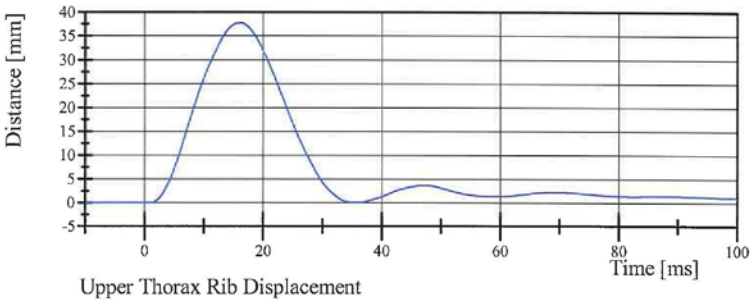
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 08:38:40 609

Transportation Research Center Inc.

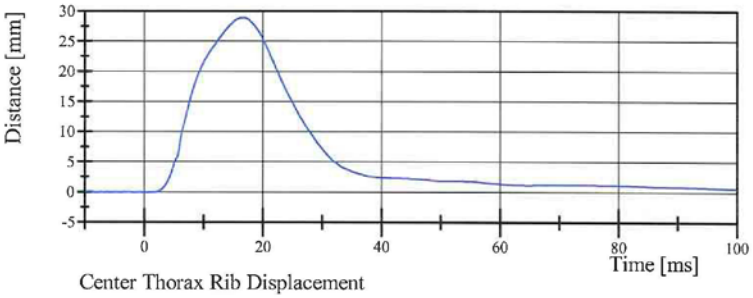
Left Lateral Thorax with Arm
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Shoulder Rib Displacement



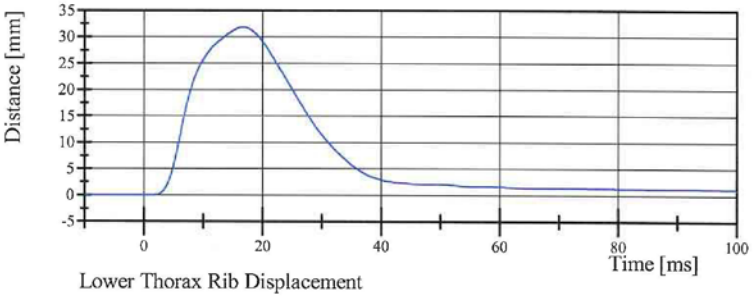
Filter Class: CFC_600
Max: 37.8 mm at 16.2 ms
Min: -0.0 mm at 1.0 ms

Upper Thorax Rib Displacement



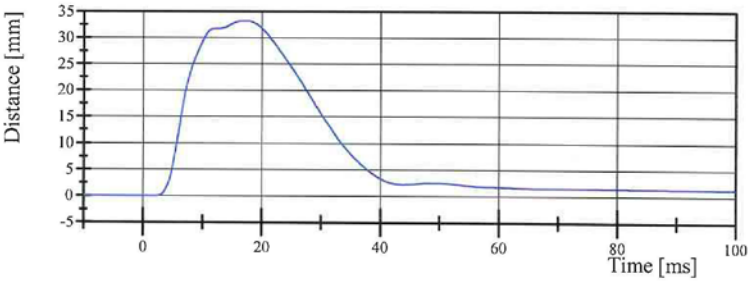
Filter Class: CFC_600
Max: 28.9 mm at 16.6 ms
Min: -0.0 mm at -4.1 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 31.9 mm at 16.6 ms
Min: -0.0 mm at -8.2 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 33.2 mm at 17.4 ms
Min: -0.0 mm at -7.8 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 08:38:41 609

Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.7 °C	Yes
Relative Humidity	10 - 70 %	22 %	Yes
Impactor Velocity	4.20 - 4.40 m/s	4.244 m/s	Yes
Impactor Acceleration	(-14) - (-18) g	-15.7 g	Yes
Upper Thorax Rib Displacement	32 - 40 mm	37.1 mm	Yes
Center Thorax Rib Displacement	39 - 45 mm	41.2 mm	Yes
Lower Thorax Rib Displacement	35 - 43 mm	38.3 mm	Yes
Upper Spine Lateral Acceleration	13 - 17 g	14.1 g	Yes
Lower Spine Lateral Acceleration	7 - 11 g	9.3 g	Yes

Test meets specifications.

Comments:

Technician

Approved

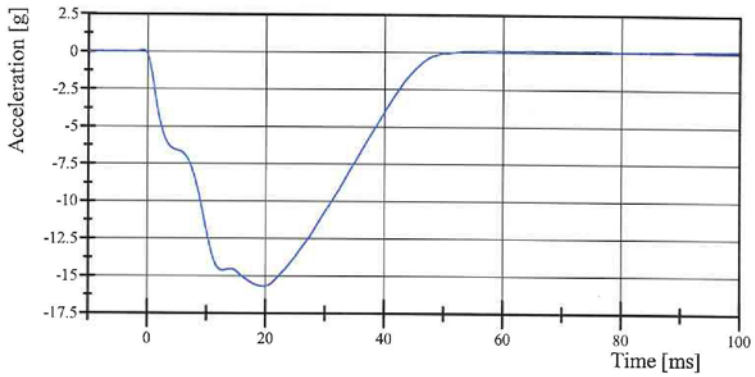
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 09:09:56 834

Transportation Research Center Inc.

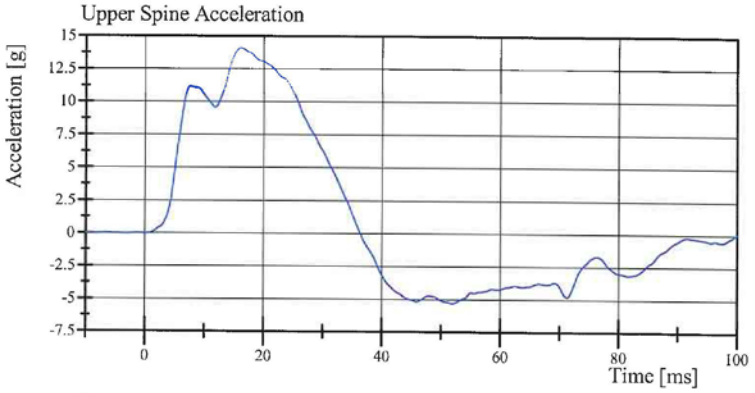
Left Lateral Thorax without Arm
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Probe Acceleration



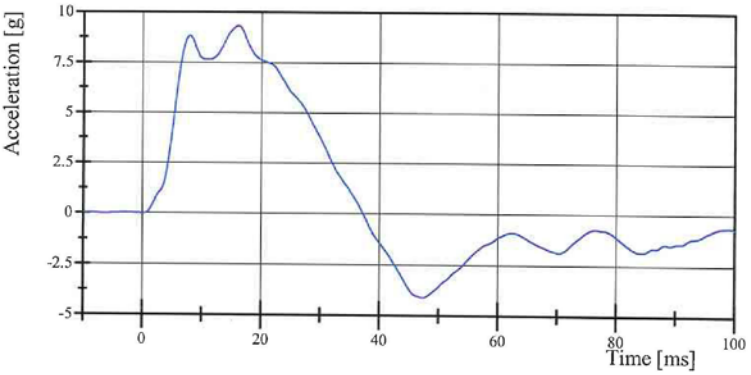
Filter Class: CFC_180
Max: 0.1 g at 58.1 ms
Min: -15.7 g at 19.6 ms

Upper Spine Acceleration



Filter Class: CFC_180
Max: 14.1 g at 16.1 ms
Min: -5.3 g at 51.9 ms

Lower Spine Acceleration



Filter Class: CFC_180
Max: 9.3 g at 16.1 ms
Min: -4.1 g at 47.4 ms

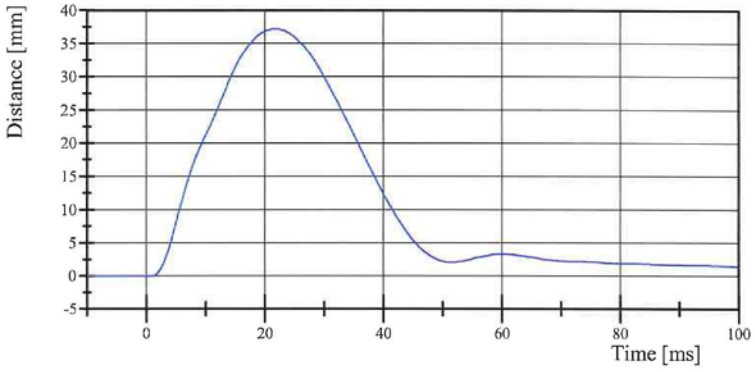
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 09:10:14 834

Transportation Research Center Inc.

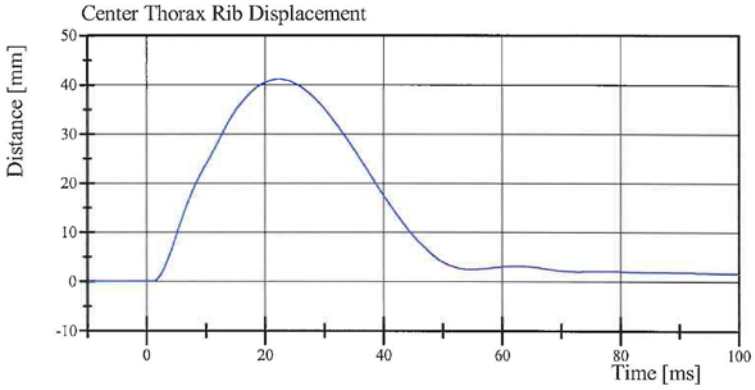
Left Lateral Thorax without Arm
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Upper Thorax Rib Displacement



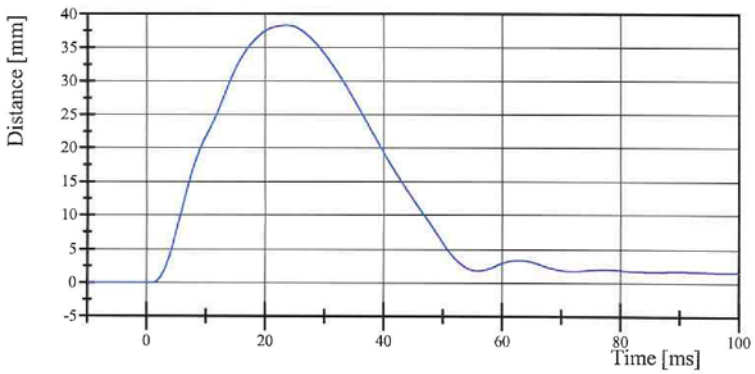
Filter Class: CFC_600
Max: 37.1 mm at 21.8 ms
Min: -0.0 mm at 1.0 ms

Center Thorax Rib Displacement



Filter Class: CFC_600
Max: 41.2 mm at 22.4 ms
Min: -0.0 mm at -5.8 ms

Lower Thorax Rib Displacement



Filter Class: CFC_600
Max: 38.3 mm at 23.5 ms
Min: -0.0 mm at -7.4 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 09:10:15 834

Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	21 %	Yes
Impactor Velocity	4.2 - 4.4 m/s	4.24 m/s	Yes
Impactor Acceleration	(-12) - (-16) g	-14.4 g	Yes
Upper Abdominal Rib Displacement	36 - 47 mm	39.0 mm	Yes
Lower Abdominal Rib Displacement	33 - 44 mm	35.2 mm	Yes
Lower Spine Lateral Acceleration	9 - 14.0 g	10.90 g	Yes

Test meets specifications.

Comments:

Technician

Approved

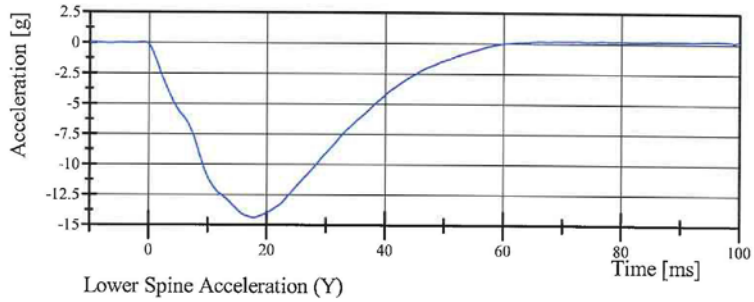
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 10:33:54 641

Transportation Research Center Inc.

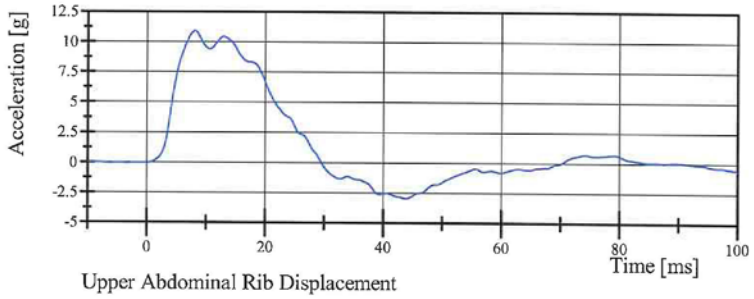
Left Lateral Abdomen
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Probe Acceleration



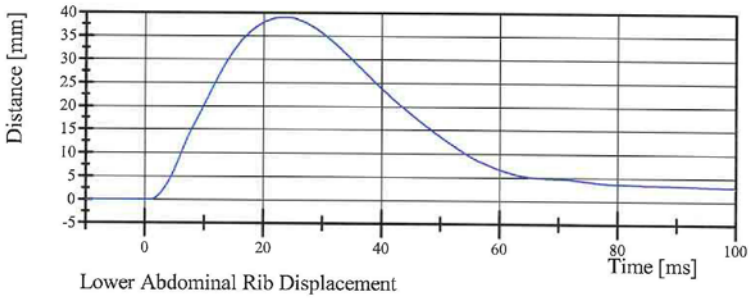
Filter Class: CFC_180
Max: 0.2 g at 76.6 ms
Min: -14.4 g at 17.8 ms

Lower Spine Acceleration (Y)



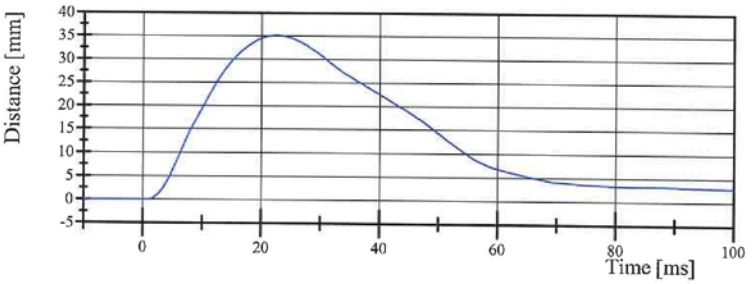
Filter Class: CFC_180
Max: 10.9 g at 8.1 ms
Min: -3.0 g at 43.8 ms

Upper Abdominal Rib Displacement



Filter Class: CFC_600
Max: 39.0 mm at 23.6 ms
Min: -0.0 mm at 1.0 ms

Lower Abdominal Rib Displacement



Filter Class: CFC_600
Max: 35.2 mm at 22.5 ms
Min: -0.0 mm at 1.0 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 10:34:04 641

Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. DI8818 Certification No. 6-3
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.6 °C	Yes
Relative Humidity	10 - 70 %	39 %	Yes
Pendulum Velocity	6.6 - 6.8 m/s	6.67 m/s	Yes
Impactor Acceleration	(-38.0) - (-47.0) g	-42.89 g	Yes
Peak Pelvis Lateral Acceleration after 6ms	34 - 42 g	38.3 g	Yes
Acetabulum Force	3,600 - 4,300 N	4,001.1 N	Yes

Test meets specifications.

Comments:

Technician

Approved

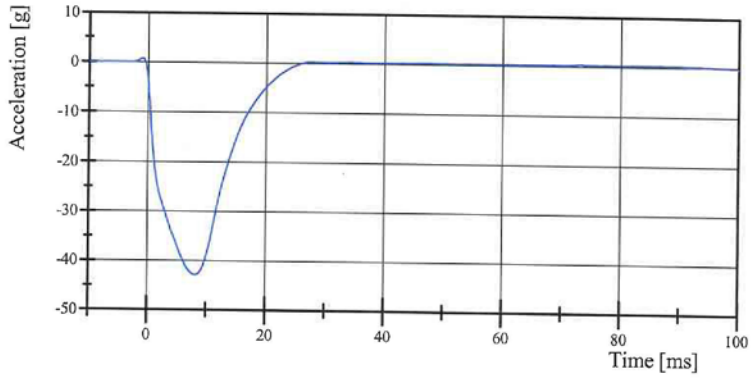
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 15:16:08 518

Transportation Research Center Inc.

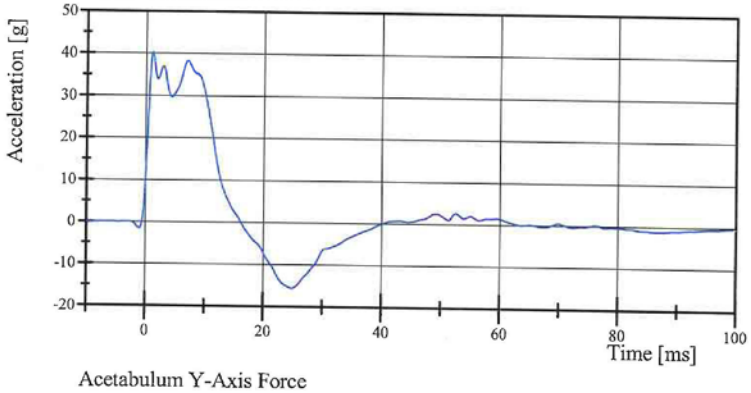
Left Lateral Pelvis
SID IIs Serial No. DI8818 Certification No. 6-3
Test Date: 11/14/2013

Probe Acceleration



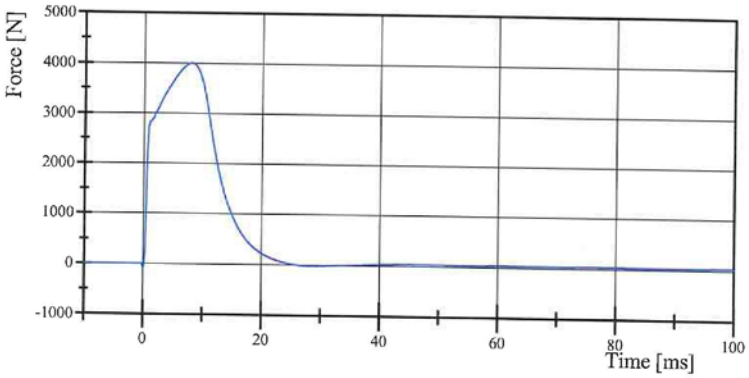
Filter Class: CFC_180
Max: 0.7 g at -1.0 ms
Min: -42.9 g at 8.2 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 40.3 g at 1.1 ms
Min: -15.6 g at 24.9 ms

Acetabulum Y-Axis Force



Filter Class: CFC_600
Max: 4,001.1 N at 7.9 ms
Min: -67.8 N at 0.0 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 15:16:26 518

Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Test Parameter	Specification	Test Results	Pass
Temperature	20.6 - 22.2 °C	21.4 °C	Yes
Relative Humidity	10 - 70 %	25 %	Yes
Pendulum Velocity	4.2 - 4.4 m/s	4.39 m/s	Yes
Impactor Acceleration	(-36) - (-45) g	-42.7 g	Yes
Peak Pelvis Lateral Acceleration	28 - 39 g	34.5 g	Yes
Iliac Force	4,100 - 5,100 N	4,847.9 N	Yes

Test meets specifications.

Comments:

Technician

Approved

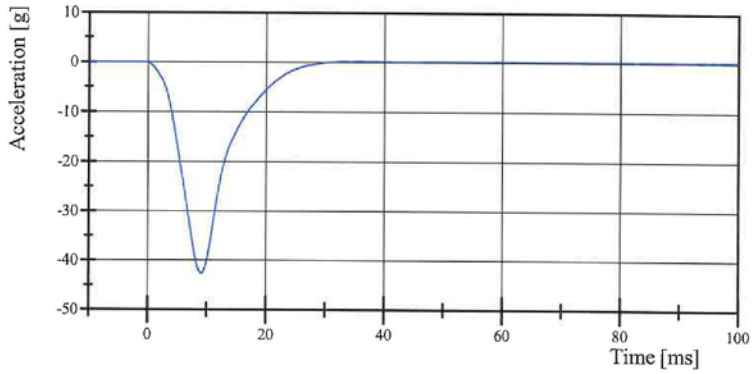
Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 10:50:50 572

Transportation Research Center Inc.

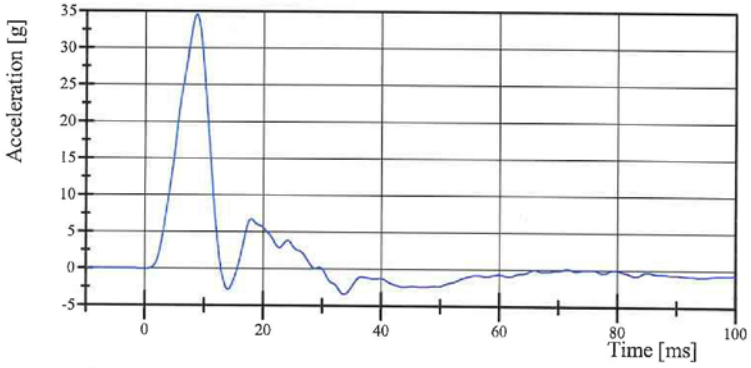
Left Lateral Iliac
SID IIs Serial No. DI8818 Certification No. 6-1
Test Date: 11/14/2013

Probe Acceleration



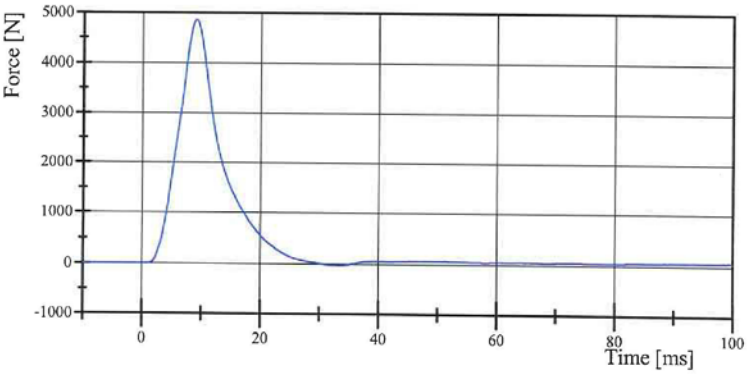
Filter Class: CFC_180
Max: 0.2 g at 35.8 ms
Min: -42.7 g at 9.0 ms

Pelvis Y-Axis Acceleration



Filter Class: CFC_180
Max: 34.5 g at 8.6 ms
Min: -3.4 g at 33.7 ms

Iliac Y-Axis Force



Filter Class: CFC_600
Max: 4,847.9 N at 9.0 ms
Min: -27.9 N at 33.3 ms

Specification Source: Procedures based on Final Rule effective 8/24/2009
Polarity in accordance with SAE J211.

11.14.2013 10:51:00 572

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N DI8818		
				Serial Number	**Manufacturer**	**Calibration Date**
Head Accelerometers			X	J32214	Endevco	12-Jun-13
			Y	J27040	Endevco	13-Jun-13
			Z	AGAC4	Endevco	13-Jun-13
Displacement Potentiometers	Shoulder		Y	NA	NA	NA
	Thoracic Rib	Upper	Y	3745-00564	Servo	13-Jun-13
		Middle	Y	3745-01815	Servo	13-Jun-13
		Lower	Y	3745-01803	Servo	13-Jun-13
	Abdominal Rib	Upper	Y	3745-01811	Servo	13-Jun-13
		Lower	Y	3745-00557	Servo	13-Jun-13
Lower Spine Accelerometers (T12)			X	00L13-F05	Entran	13-Jun-13
			Y	04J04I20-A17	Entran	13-Jun-13
			Z	P64093	Endevco	13-Jun-13
Acetabulum Load Cell			Y	235-FY	FTSS	6-Nov-13
Iliac Wing Load Cell			Y	113-FY	FTSS	6-Nov-13
Pelvis Plug (struck side)				45952	FTSS	6-Nov-13
Pelvis Plug (non-struck side)				46014	FTSS	20-Sep-11

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	P80473	Endevco	15-Oct-13
Vehicle Center of Gravity	Y	P80472	Endevco	15-Oct-13
Vehicle Center of Gravity	Z	P80478	Endevco	15-Oct-13
Left Floor Sill	Y	P81534	Endevco	05-Nov-13
A-Pillar Sill	Y	P82051	Endevco	05-Nov-13
A-Pillar Low	Y	P74483	Endevco	21-Aug-13
A-Pillar Mid	Y	P78116	Endevco	21-Jun-13
B-Pillar Sill	Y	P81006	Endevco	09-Sep-13
B-Pillar Low	Y	P63198	Endevco	16-May-13
B-Pillar Mid	Y	P75254	Endevco	15-Oct-13
Driver Seat	Y	P73596	Endevco	28-May-13
Engine Top	X	P81023	Endevco	10-Sep-13
Engine Top	Y	P80693	Endevco	19-Sep-13
Firewall	Y	P81091	Endevco	05-Nov-13
Right Roof	Y	P81997	Endevco	05-Nov-13
Right Floor Sill	Y	P82048	Endevco	05-Nov-13
Rear Floor Pan	X	P80481	Endevco	09-Aug-13
Rear Floor Pan	Y	P80479	Endevco	23-Oct-13

TABLE 3 – Pole Instrumentation

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	5763-78-FX	Denton	05-Nov-12
Load Cell 2	5763-90-FX	Denton	05-Nov-12
Load Cell 3	5763-92-FX	Denton	05-Nov-12
Load Cell 4	5764-81-FX	Denton	25-Jan-13
Load Cell 5	5763-89-FX	Denton	05-Nov-12
Load Cell 6	5763-77-FX	Denton	05-Nov-12
Load Cell 7	5764-89-FX	Denton	05-Nov-12
Load Cell 8	5764-77-FX	Denton	05-Nov-12