

REPORT NUMBER: SPNCAP-KAR-13-054

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

**TESLA MOTORS, INC.
2013 TESLA MODEL S 5-DOOR HATCHBACK**

NHTSA No: MD5001

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



AUGUST 7, 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**

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. SPNCAP-KAR-13-054	2. Government Accession No.	3. Recipient's Catalog No.																												
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact Pole Testing of a 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001		5. Report Date August 7, 2013																												
		6. Performing Organization Code KAR																												
7. Authors Mr. Matthew S. Hubbard, Test Engineer, KARCO Mr. Frank Richardson, Program Manager, KARCO		8. Performing Organization Report No. TR-P33004-04-NC																												
9. Performing Organization Name and Address KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301		10. Work Unit No.																												
		11. Contract or Grant No. DTNH22-09-D-00122																												
12. Sponsoring Agency Name and Address U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards (NVS-111) 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590		13. Type of Report and Period Covered Final Test Report, July 24 - August 7, 2013																												
		14. Sponsoring Agency Code NVS-111																												
15. Supplementary Notes																														
16. Abstract A 32.2 km/h (20 mph) 75 deg. oblique impact Side NCAP Test was conducted on the subject 2013 Tesla Model S 5-door hatchback in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on July 24, 2013. The impact velocity was 32.28 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 34.9 deg. C. The target vehicle's maximum post-test static crush was 210 mm located at level 3. The test vehicle's occupant performance data is as follows: <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₃₆)</td> <td></td> <td>1000</td> <td>449.4</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>46</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetabular and Iliac Forces)</td> <td>N</td> <td>5525</td> <td>3492</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>26</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45</td> <td>24</td> </tr> </tbody> </table> The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches. The opposite doors did not open during the side impact event.				Measurement Description	Driver ATD (ES-2re)			Units	Threshold	Result	Head Injury Criteria (HIC ₃₆)		1000	449.4	Resultant Lower Spine Acceleration	g	82	46	Total Pelvic Force (Sum of Acetabular and Iliac Forces)	N	5525	3492	Maximum Thoracic Rib Deflection	mm	38	26	Maximum Abdominal Rib Deflection	mm	45	24
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17. Key Words New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Admin. Technical Information Services Division, NPO-411 1200 New Jersey Ave, SE Washington, DC 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
19. Security Classification of this report UNCLASSIFIED	20. Security Classification of this page UNCLASSIFIED	21. No. of Pages 101	22. Price																											

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1	Test Purpose and Procedure	1
2	Summary of Test Results	2
3	Occupant and Vehicle Information / Data Sheets	4
<u>Data Sheet</u>		<u>Page</u>
1	General Test and Vehicle Parameter Data	5
2	Seat, Seat Belt, Steering Wheel Adjustment and Fuel System Data	9
3	Dummy Longitudinal Clearance Dimensions	13
4	Dummy Lateral Clearance Dimensions	14
5	Camera and Instrumentation Data	15
6	Test Vehicle Accelerometer Locations	16
7	Rigid Pole Load Cell Data	17
8	Post-Test Observations	18
9	Test Vehicle Profile Measurements	20
10	Test Vehicle Exterior Crush Measurements	21
11	FMVSS No. 301 Static Rollover Results	24
12	Dummy/Vehicle Temperature and Humidity Stabilization	25
<u>Appendix</u>		<u>Page</u>
A	Photographs	A
B	Vehicle and Dummy Response Data Plots	B
C	Dummy Configuration and Performance Verification Data	C
D	Test Equipment and Instrumentation Calibration Data	D

SECTION 1

TEST PURPOSE AND PROCEDURE

This side impact test is part of the MY 2013 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00122. The purpose of this test is to generate comparative side impact performance in a 2013 Tesla Model S 5-door hatchback. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated September 2012.

SECTION 2

SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2013 Tesla Model S 5-door hatchback. The subject vehicle was towed into the rigid pole at an angle of 74.9° and a velocity of 32.28 km/h. The test was conducted by KARCO Engineering, LLC. in Adelanto, California on July 24, 2013. Pre- and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated September 2012. Camera locations and other pertinent camera information are included in this report.

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

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

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

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

Measurement Description	Units	Passenger ATD (SID-IIs)	
		IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	449.4
Lower Spine (T12) Resultant Acceleration	g	82	46
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3492
Maximum Thoracic Rib Deflection	mm	38*	26
Maximum Abdominal Rib Deflection	mm	45*	24

*Proposed IARV

Supplemental restraint information is given below:

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

GENERAL COMMENTS

Both the front and rear doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. Both doors on the non-struck side remained closed and latched. There were no ATD values that exceeded limits.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

CONVERSION FACTORS

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

DATA SHEET NO. 1

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	MD5001
Model Year	2013
Make	Tesla
Model	Model S
Body Style	5-Door Hatchback
VIN	5YJSA1AG7DFP11290
Body Color	Silver
Odometer Reading (km / mi)	27 / 17
Engine Displacement (L)	N/A
Type / No. of Cylinders	Electric
Engine Placement	Rear Transverse
Transmission Type	Automatic
Transmission Speeds	1
Overdrive	No
Final Drive	Rear
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

Does Owner's Manual provide instructions to turn off automatic door locks? Yes

DATA FROM CERTIFICATION LABEL

Manufactured By	Tesla Motors, Inc.
Date of Manufacture	May-13
Vehicle Type	Passenger Car

GVWR (kg)	2590
GAWR Front (kg)	1276
GAWR Rear (kg)	1500

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				515.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				174.8

A

B

A-B

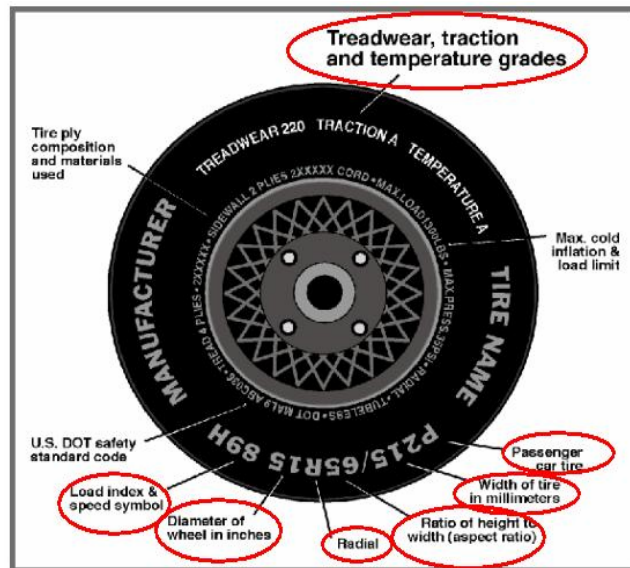
VEHICLE SEAT TYPE

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

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	290	290
Recommended Tire Size	P245/45R19	P245/45R19
Tire Size on Vehicle	P245/45R19	P245/45R19
Tire Manufacturer	Goodyear	Goodyear
Tire Model	Eagle RS-A ²	Eagle RS-A ²
Treadwear	440	440
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Polyester, 2 Steel, 1 Nylon	2 Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	98V	98V
Tire Material	Polyester, Steel, Nylon	Polyester, Steel, Nylon
DOT Safety Code Left	M67V JEIR 1613	M67V JEIR 1613
DOT Safety Code Right	M67V JEIR 1613	M67V JEIR 1613

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	310	310	310	310
Tire Placard	kPa	290	290	290	290
Owner's Manual	kPa	290	290	290	290
As Tested	kPa	290	290	290	290

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	467.0	526.5		472.5	636.5		468.5	639.5	
Right	kg	446.5	528.0		448.0	627.5		448.0	634.5	
Ratio	%	46.4%	53.6%	100.0%	42.1%	57.9%	100.0%	41.8%	58.2%	100.0%
Total	kg	913.5	1054.5	1968.0	920.5	1264.0	2184.5	916.5	1274.0	2190.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1968.0	A
Actual Weight of 1 P572 O ATD Used	kg	49.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	174.8	C
Calculated Vehicle Target Wt (TVTW)	kg	2191.8	A+B+C

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

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

TEST VEHICLE ATTITUDE AND CG

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Requirement***
Driver Door Sill Angle (front-to-rear)*	°	0.1	0.3	0.5	Yes
Front Passenger Sill Angle (front-to-rear)*	°	-0.1	0.4	0.5	Yes
Front Bumper-Line Angle (left-to-right)**	°	-0.7	-0.8	-0.9	Yes
Rear Bumper-Line Angle (left-to-right)**	°	0.0	-0.2	-0.5	Yes
Vehicle CG (Aft of Front Axle)	mm	1589	1716	1724	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	8	13	10	

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

***The "As Tested" vehicle attitude angle measurements must be within "As Delivered" and the "Fully Loaded" vehicle attitude measurements at each location. Indicate "Yes" or "No" for "Meets Requirement"

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Soft Trim	18.0
Non-Struck Side Door Panels	10.0
Non-Struck Side Windows	8.0
Ballast / Equipment Added	175.0

DATA SHEET NO. 2**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA**Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13**SEAT POSITIONING**

The driver's seat is set to the forward most position where the ATD will not contact any interior panels at the mid-height and mid-angle position. The front center seat (if applicable) and right front passenger's seat should be set in a similar manner as the driver's seat. The struck side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rearmost, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	12.0	0.0	6.0
Front Passenger Seat	12.0	0.0	6.0
Front Center Seat			
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

SEAT HEIGHT AND ANGLE

Seat	As Tested SCRL Angle	As Tested SCRP Height	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	6.0	523	Max	520	531	546
			Mid	498	510	523
			Min	476	488	500
Front Passenger Seat	6.0	519	Max	517	530	541
			Mid	496	508	519
			Min	475	486	497
Front Center Seat			Max			
			Mid			
			Min			
Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

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

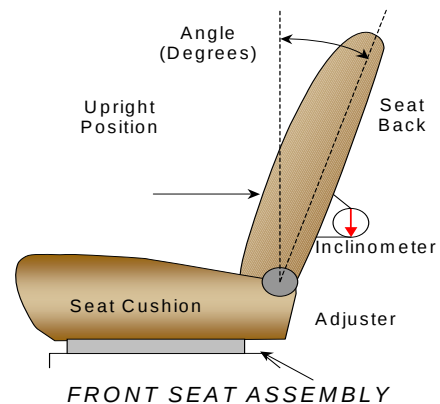
Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents	mm	Detent
Driver Seat	252		0	
Front Passenger Seat	240		0	
Front Center Seat				
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

SEAT BACK ADJUSTMENT

The driver's seat back is positioned such that the dummy's head is level. The right front passenger seat back is set to the same angle as the driver's seat. Seat back angle is measured on the seat back, 320 mm up from the base of the seat back using a digital inclinometer.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents	Degree	Detent
Driver Seat w/Seated Dummy	76.5		9.8	
Front Passenger Seat	74.9		9.8	
Front Center Seat				
Struck Side Rear Seat w/Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

SEAT BELT ANCHORAGE ADJUSTMENT

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

	Total No. of Positions	Placed in Position
Driver Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

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

	Total No. of Positions	Placed in Position
Driver Seat	Fixed	Fixed

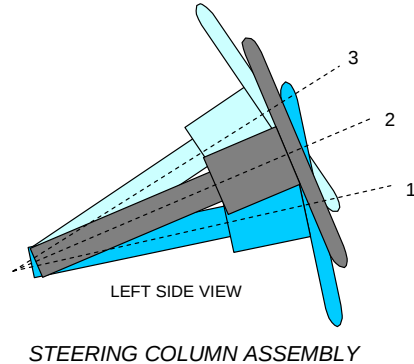
DATA SHEET NO. 2 ... (CONTINUED)

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

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

STEERING COLUMN ADJUSTMENT

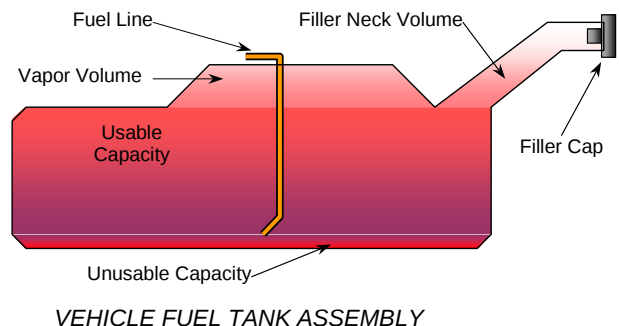
Steering wheel and column adjustments are made so that the steering wheel hub is at the center of the geometric locus it describes when it moves through its full range of motion.



	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	18.5	120
Geometric Center - Position 2	20.6	92
Uppermost - Position 3	22.8	64
Telescoping Steering Wheel Travel		56
Test Position	20.6	92

FUEL PUMP

The vehicle is electric and does not have a liquid fuel system.



FUEL TANK CAPACITY

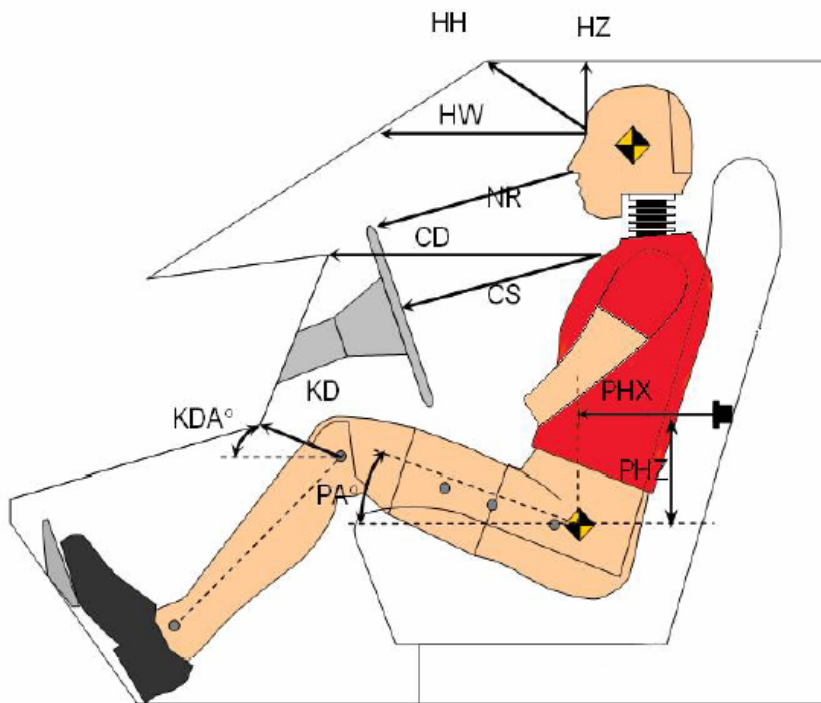
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	
Actual amount of Solvent Used in Test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

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

DATA SHEET NO. 3

DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



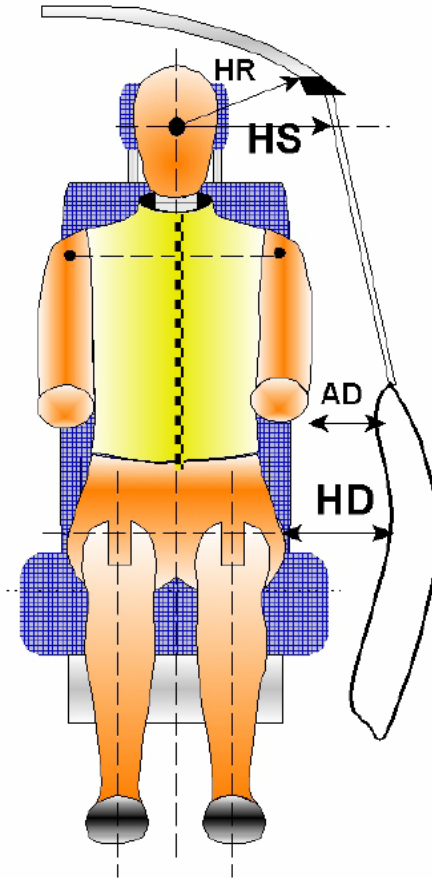
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Description	Driver	
		Length (mm)	Angle (°)
HH	Head to Header	230	
HW	Head to Windshield	635	
HZ	Head to Roof	151	
NR	Nose to Rim	192	
CD	Chest to Dash	370	
CS	Chest to Steering Wheel	140	
KD(L)/KDA(L)°	Left Knee to Dash	144	35.4
KD(R)/KDA(R)°	Right Knee to Dash	126	38.6
PAX°	Pelvic Tilt Angle (x-axis)		21.0
PAY°	Pelvic Tilt Angle (y-axis)		0.3
PHX	Hip Point to Striker (x-axis)	311	
PHZ	Hip Point to Striker (z-axis)	69	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



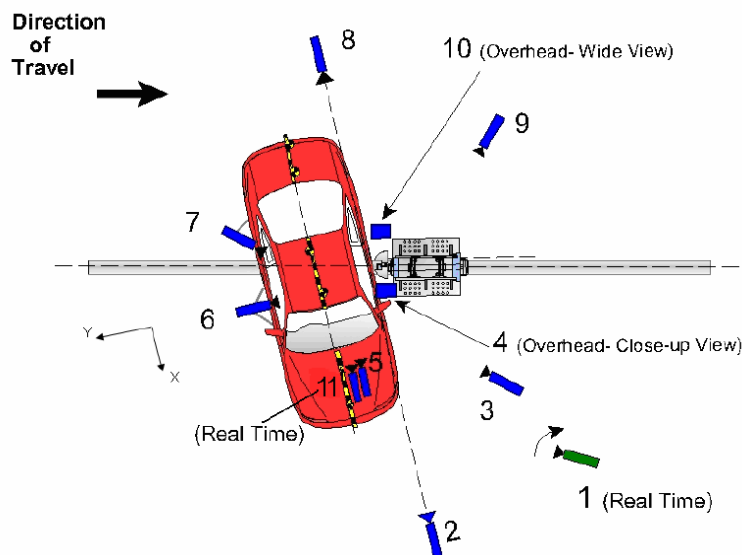
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver
HR	Head to Side Header	mm	274
HS	Head to Side Window	mm	392
AD	Arm to Door	mm	180
HD	H-Point to Door	mm	149

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



CAMERA LOCATIONS AND DATA

Camera No.	View	Coordinates (m)			Lens (mm)	Film Speed (fps)
		X*	Y*	Z*		
1	Real Time Pan View of Impact	8.89	46.57	-3.04		30
2	Front Ground Level - Impact View	8.34	-0.05	-0.93	24	1000
3	Impact Side 45° - Forward Pole View	4.10	-2.15	-1.15	8.5	1000
4	Overhead Close-Up View of Impact	0.00	0.00	-5.79	12.5	1000
5	On-Board - Dummy Front View	1.66	0.52	-1.30	24	1000
6	On-Board - Dummy Side View	-0.04	1.75	-1.04	14	1000
7	On-Board - Dummy Rear Oblique View	-0.94	1.73	-1.13	20	1000
8	Rear Ground Level - Impact View	-6.12	-6.23	-0.96	24	1000
9	Impact Side 45° - Rearward Pole View	-8.02	0.04	-1.01	35	1000
10	Overhead Wide View of Impact	-0.06	0.22	-5.79	14	1000
11	Real Time Dummy Front View	1.64	0.54	-1.31		30

Reference from Point of Impact for X and Y; from Ground for Z):

+X = Forward of Vehicle, +Y = Right of Vehicle, +Z = Down

*All measurements accurate to ± 6 mm

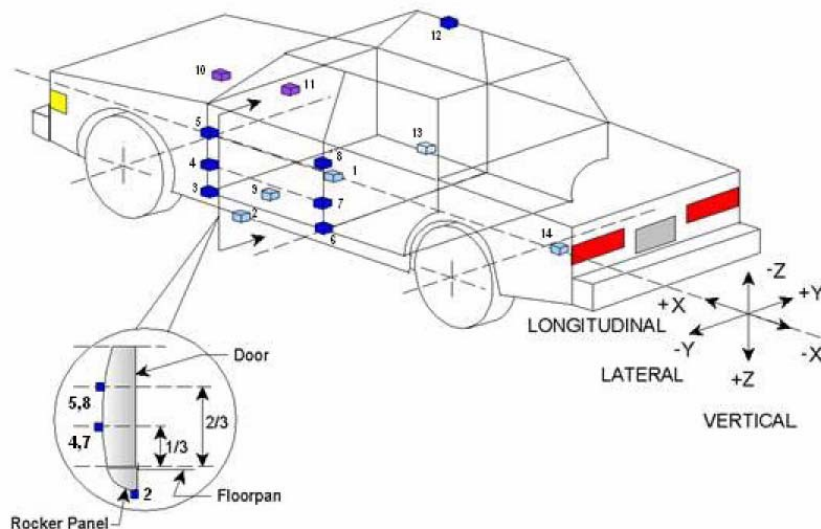
INSTRUMENTATION

Driver Dummy Channels	16
Vehicle Structure Accelerometers	18
Pole Load Cells	8
Total	42

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

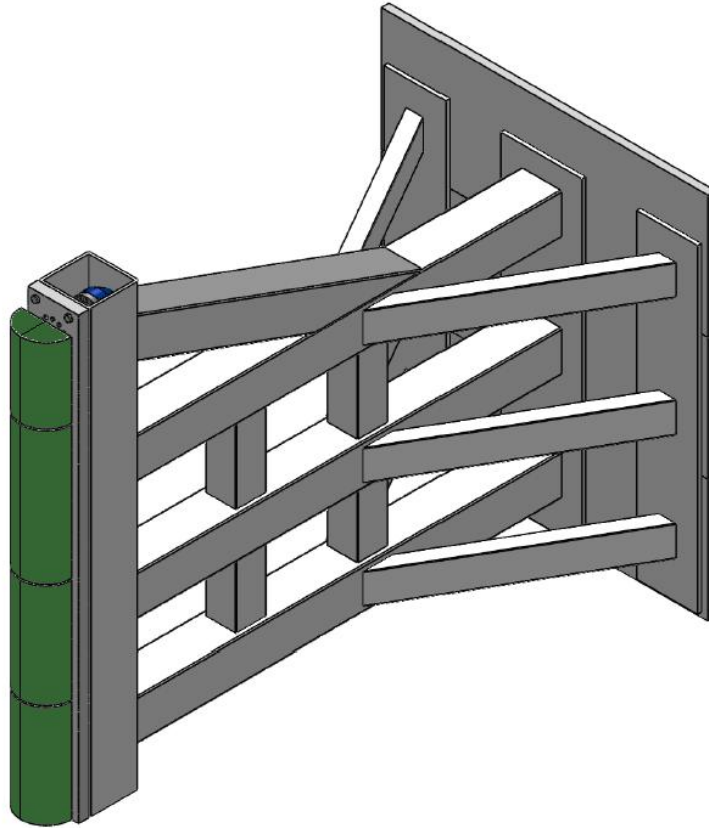
Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2257	0	-257
2	Left Floor Sill	3168	-738	-137
3	A-Pillar Sill	3279	-845	-325
4	A-Pillar Low	3279	-845	-523
5	A-Pillar Mid	3279	-845	-844
6	B-Pillar Sill	2175	-767	-319
7	B-Pillar Low	2175	-767	-622
8	B-Pillar Mid	2175	-767	-782
9	Driver Seat Track	2542	-588	-300
10	Engine Top	3832	0	-444
11	Firewall	3580	0	-685
12	Right Roof	2310	573	-1394
13	Right Floor Sill	2245	755	-392
14	Rear Floorpan	1510	0	-435

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

DATA SHEET NO. 7

RIGID POLE LOAD CELL DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



RIGID POLE LOAD CELL LOCATIONS

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

DATA SHEET NO. 8

POST-TEST OBSERVATIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Driver SID-IIs Dummy
Face	Curtain Airbag, Side Header
Top of Head	Side Header
Left Side of Head	Curtain Airbag, Side Header
Back of Head	Side Header, Headrest
Left Shoulder	Torso/Pelvis Airbag
Upper Torso	Seat, Torso/Pelvis Airbag
Lower Torso	Seat, Torso/Pelvis Airbag
Left Hip	Seat, Torso/Pelvis Airbag
Left Knee	Door Panel, Right Knee

POST-TEST DOOR PERFORMANCE

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

POST-TEST SEAT PERFORMANCE

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

POST-TEST STRUCTURAL OBSERVATIONS

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	No Separation
Windshield Damage	Broken
Side Window Damage	Left Front Window Broken
Other Notable Effects	Crack on Sill in Vicinity of Impact Area

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

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

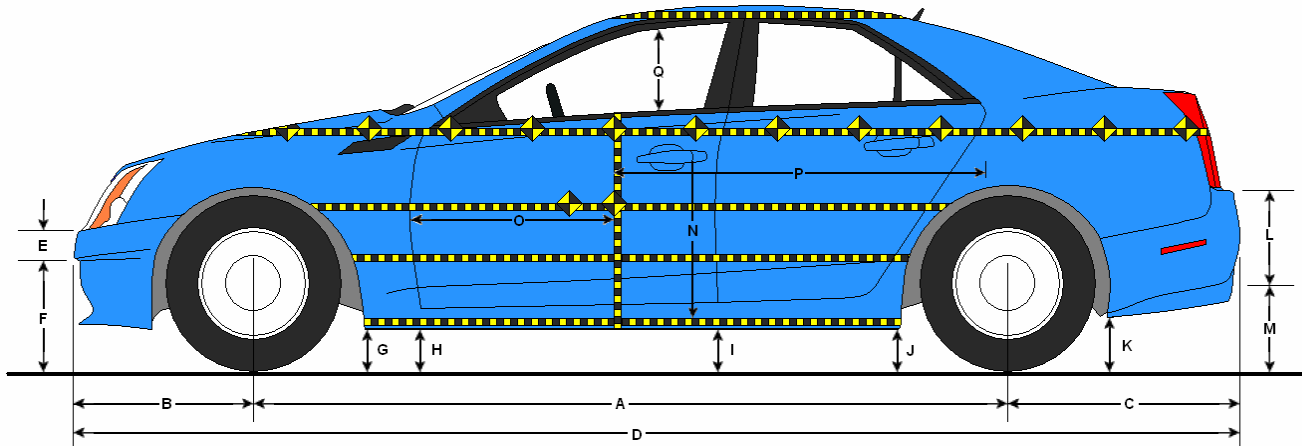
IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		1305
Actual Impact Point (Aft of Front Axle)	mm		1296
Horizontal Offset (+ forward / - rearward)	mm	± 38 of Intended Impact Point	9
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	°	75 ± 3	74.9
Trap No. 1 Velocity (Primary)	km/h	31.4 to 33.0	32.28
Trap No. 2 Velocity (Redundant)	km/h	31.4 to 33.0	32.34

DATA SHEET NO. 9

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

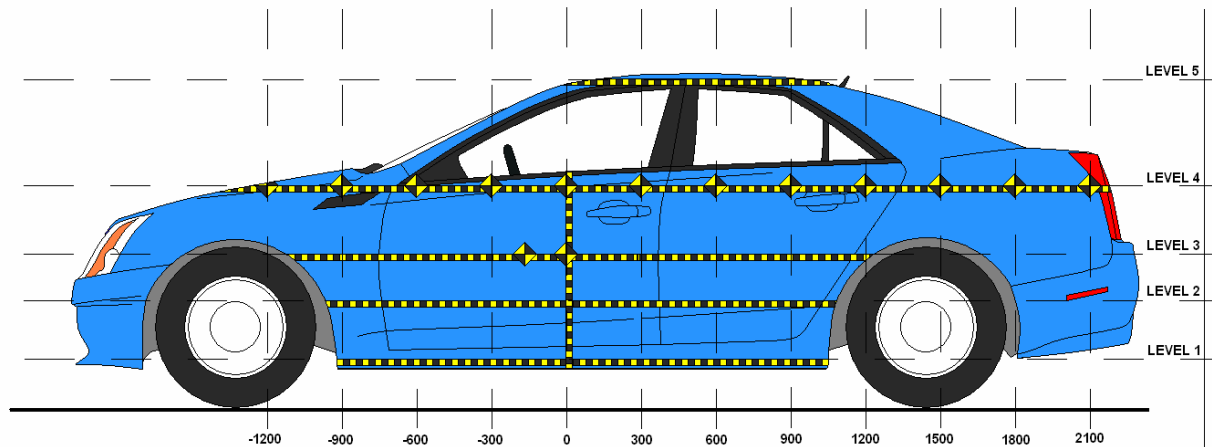
Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2965	2957	-8
B	Front Axle to FSOV	938	952	14
C	Rear Axle to RSOV	1082	1077	-5
D	Total Length at Centerline	4978	4986	8
E	Front Bumper Thickness	155	154	-1
F	Front Bumper Bottom to Ground	426	444	18
G	Sill Height at Front Wheel Well	249	242	-7
H	Sill Height at Front Door Leading Edge	258	250	-8
I	Sill Height at B-Pillar	258	237	-21
J1	Sill Height at Rear Wheel Well	317	297	-20
J2	Pinch Weld Height at Rear Wheel Well	163	146	-17
K	Sill Height Aft of Rear Wheel Well	321	294	-27
L	Rear Bumper Thickness	207	209	2
M	Rear Bumper Bottom to Ground	424	369	-55
N	Sill Height to Bottom of Front Window Sill	588	690	102
O	Front Door Leading Edge to Impact CL	648	616	-32
P	Rear Door Trailing Edge to Impact CL	1535	1525	-10
Q	Front Window Opening	414	393	-21
R	Right Side Length	3396	3402	6
S	Left Side Length	3395	3380	-15
T	Vehicle Width at B-Pillar	1888	1880	-8

All measurements in mm with tolerance of ± 3 mm

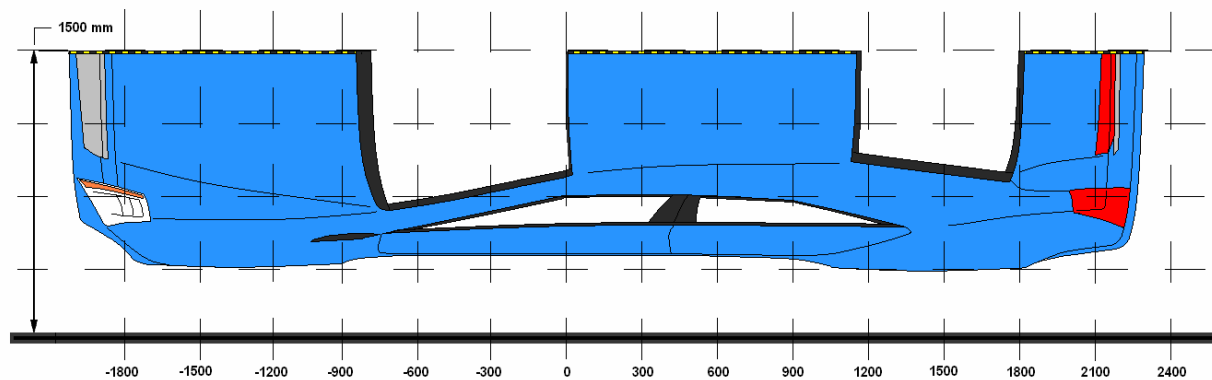
DATA SHEET NO. 10

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



LEFT SIDE VIEW



OVERHEAD VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	306	182	0
2	Occupant H-Point	553	200	0
3	Mid-Door	647	210	0
4	Window Sill	911	163	0
5	Window Top	1379	26	300

DATA SHEET NO. 10 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13

EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900	560	540	547	666		560	551	561	676		0	11	14	10	
-750	577	559	558	655		583	573	572	666		6	14	14	11	
-600	580	563	561	641		598	582	580	653		18	19	19	12	
-450	577	564	561	633		620	615	615	665		43	51	54	32	
-300	573	564	561	625		645	652	656	688		72	88	95	63	
-150	571	564	561	619		683	706	715	726		112	142	154	107	
0	568	565	562	613		750	765	772	776		182	200	210	163	
150	566	567	563	611		698	724	735	752		132	157	172	141	
300	566	569	565	608	853	602	634	652	686	879	36	65	87	78	26
450	564	571	566	606	845	533	563	566	625	870	-31	-8	0	19	25
600	565	576	571	605	848	587	599	595	631	867	22	23	24	26	19
750	565	580	575	607	855	583	599	595	629	873	18	19	20	22	18
900	564	583	579	607	865	578	599	595	625	880	14	16	16	18	15
1050	562	573	573	605	883	570	585	586	619	895	8	12	13	14	12
1200	551	547	554	597		557	556	564	579		6	9	10	-18	
1350			528	586				536	565				8	-21	
1500				573					578					5	
1650				571					578					7	
1800				576					582					6	
1950				590					594					4	
2100				611					614					3	
2250				644					644					0	
2400															
2550															
2700															
2850															

DATA SHEET NO. 10 ... (CONTINUED)

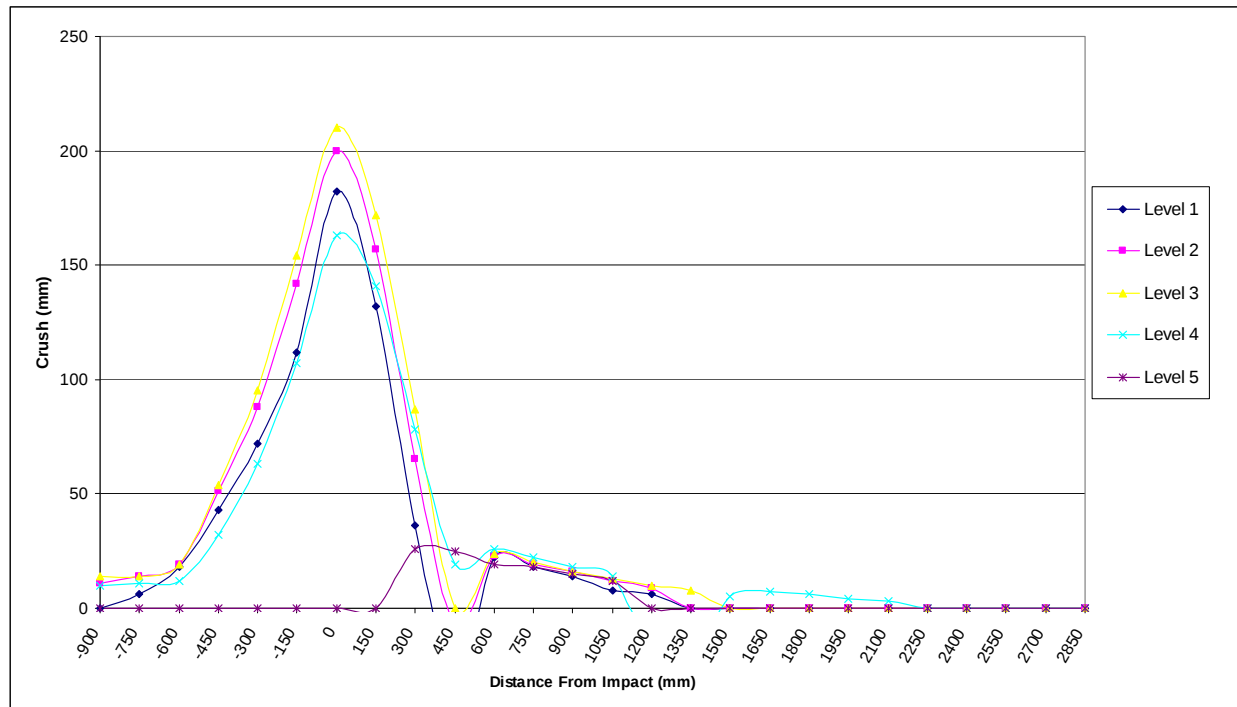
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No. MD5001

Test Program: NCAP Side Pole Impact Test

Test Date: 07/24/13

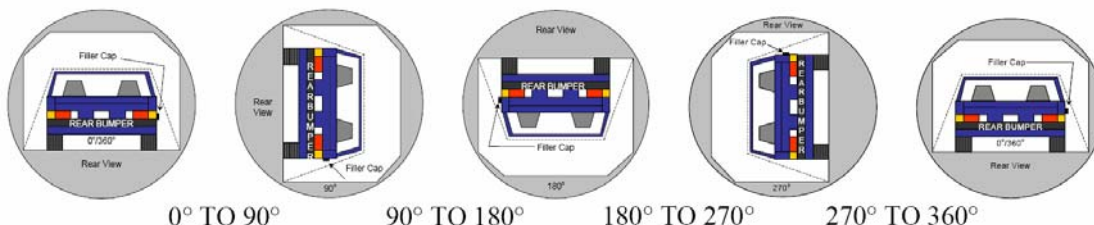


DATA SHEET NO. 11

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
 Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13
 Temperature at Time of Impact: 34.9°C Test Time: 10:38 AM

- A. From impact until vehicle motion ceases: N/A oz.
 (Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: N/A oz.
 (Maximum allowable = 5 oz.)
- C. For the following 25 minutes: N/A oz.
 (Maximum allowable = 1 oz./minute)
- D. Spillage Details: N/A



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°			
90° To 180°			
180° To 270°			
270° To 360°			

FMVSS 301 SPILLAGE TABLE

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

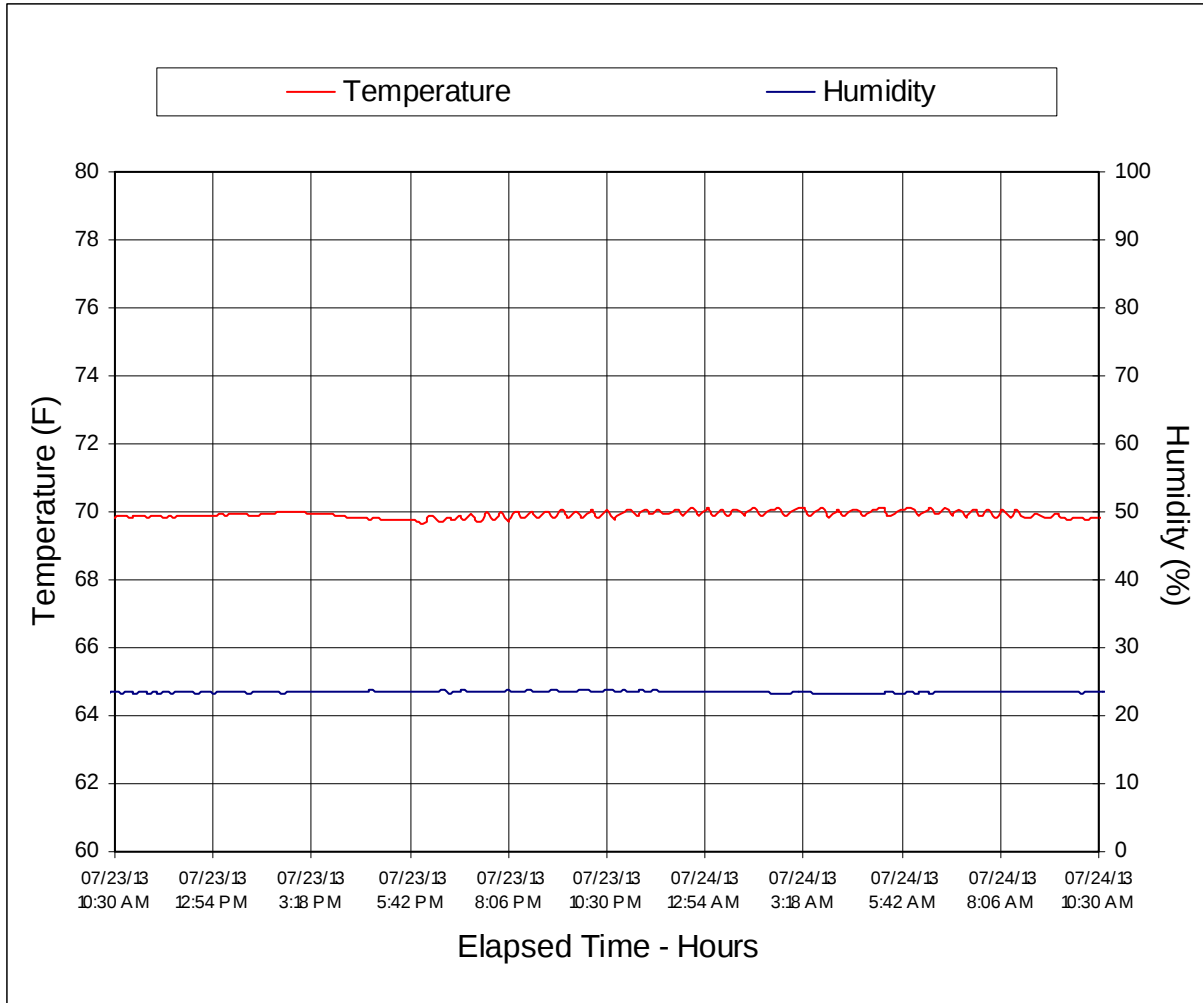
SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

DATA SHEET NO. 12

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No. MD5001
Test Program: NCAP Side Pole Impact Test Test Date: 07/24/13



APPENDIX A
PHOTOGRAPHS

TABLE OF PHOTOGRAPHS

Figure		Page
1	As-Delivered Right Front $\frac{3}{4}$ View of Test Vehicle	A-1
2	As-Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle	A-1
3	Pre-Test Frontal View of Test Vehicle	A-2
4	Post-Test Frontal View of Test Vehicle	A-2
5	Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
6	Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle	A-3
7	Pre-Test Left Side View of Test Vehicle	A-4
8	Post-Test Left Side View of Test Vehicle	A-4
9	Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
10	Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle	A-5
11	Pre-Test Rear View of Test Vehicle	A-6
12	Post-Test Rear View of Test Vehicle	A-6
13	Pre-Test Right Side View of Test Vehicle	A-7
14	Post-Test Right Side View of Test Vehicle	A-7
15	Pre-Test Overhead View of Test Area	A-8
16	Post-Test Overhead View of Test Area	A-8
17	Pre-Test Left Side View of Pole Positioned Against Side of Vehicle	A-9
18	Pre-Test Right Side View of Pole Positioned Against Side of Vehicle	A-9
19	Pre-Test Close-Up View of Impact Point Target	A-10
20	Post-Test Close-Up View of Impact Point Target Showing Impact Location	A-10
21	Pre-Test Front Close-Up View of Dummy Head and Chest	A-11
22	Post-Test Front Close-Up View of Dummy	A-11
23	Pre-Test Left Side View of Dummy Showing Belt and Chalking	A-12
24	Pre-Test Left Side View of Dummy Shoulder and Door Top View	A-12
25	Post-Test Left Side View of Dummy Shoulder and Door Top View	A-13
26	Pre-Test Frontal View of Seat Back Prior to Dummy Positioning	A-13
27	Pre-Test Frontal View of Dummy Head and Shoulders in Relation to Head Restraint	A-14
28	Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning	A-14
29	Pre-Test Overhead View of Dummy Thighs on Seat Pan	A-15
30	Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket	A-15
31	Pre-Test Left Side View of Dummy's Head Showing Head is Level	A-16
32	Pre-Test Placement of Dummy's Feet	A-16
33	Pre-Test View of Belt Anchorage for Dummy	A-17
34	Pre-Test Left Side View of Steering Wheel	A-17
35	View of Disengaged Parking Brake	A-18

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
36	Pre-Test View of Parking Brake	A-18
37	Pre-Test Close-Up Left Side View of Driver Seat Track	A-19
38	Pre-Test Close-Up Left Side View of Driver Seat Back	A-19
39	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-20
40	Pre-Test Dummy and Door Clearance View	A-20
41	Post-Test Dummy and Door Clearance View	A-21
42	Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-21
43	Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment	A-22
44	Pre-Test Inner Door Panel View	A-22
45	Post-Test Inner Door Panel View Showing Dummy Contact Locations	A-23
46	Post-Test Dummy Close-Up Head Contact With Vehicle Interior View	A-23
47	Post-Test Dummy Close-Up Head Contact With Side Airbag View	A-24
48	Post-Test Dummy Close-Up Torso Contact With Vehicle Interior View	A-24
49	Post-Test Dummy Close-Up Torso Contact With Side Airbag View	A-25
50	Post-Test Dummy Close-Up Pelvis Contact With Vehicle Interior View	A-25
51	Post-Test Dummy Close-Up Pelvis Contact With Side Airbag View	A-26
52	Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View	A-26
53	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-27
54	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-27
55	Close-Up View of Vehicle's Certification Label	A-28
56	Close-Up View of Vehicle's Tire Information Placard or Label	A-28
57	Pre-Test Pole Barrier Front View	A-29
58	Post-Test Pole Barrier Front View	A-29
59	Pre-Test Pole Barrier Side View	A-30
60	Post-Test Pole Barrier Side View	A-30
61	Pre-Test Ballast View	A-31
62	Post-Test Primary and Redundant Speed Trap Read-Out	A-31
63	FMVSS No. 301 Static Rollover 0 Degrees	A-32
64	FMVSS No. 301 Static Rollover 90 Degrees	A-32
65	FMVSS No. 301 Static Rollover 180 Degrees	A-33
66	FMVSS No. 301 Static Rollover 270 Degrees	A-33
67	FMVSS No. 301 Static Rollover 360 Degrees	A-34
68	Impact Event	A-34
69	Monroney Label	A-35
70	Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-35



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



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



FIGURE 3. Pre-Test Frontal View of Test Vehicle

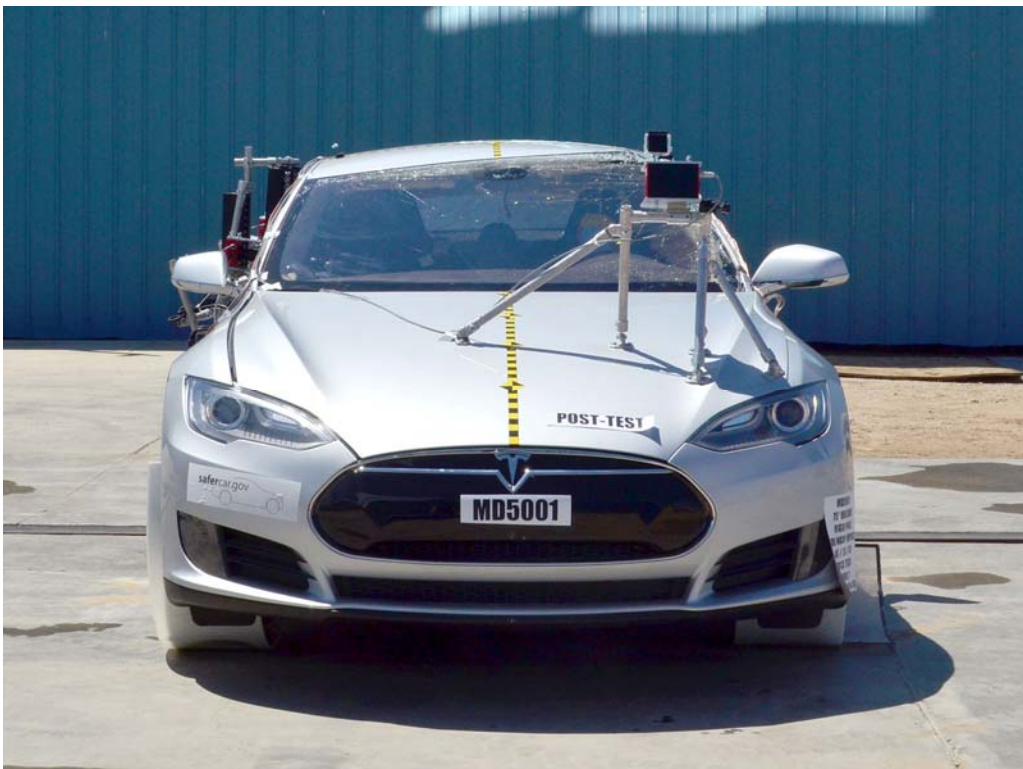


FIGURE 4. Post-Test Frontal View of Test Vehicle



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



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



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



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



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



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



FIGURE 11. Pre-Test Rear View of Test Vehicle



FIGURE 12. Post-Test Rear View of Test Vehicle



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



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

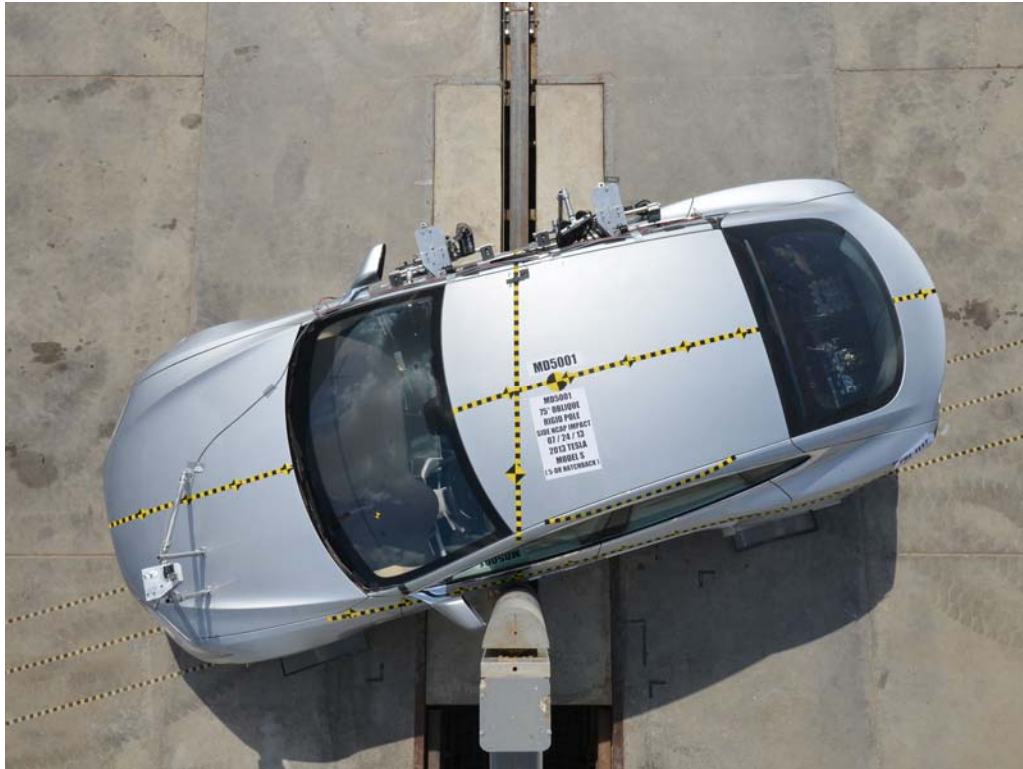


FIGURE 15. Pre-Test Overhead View of Test Area

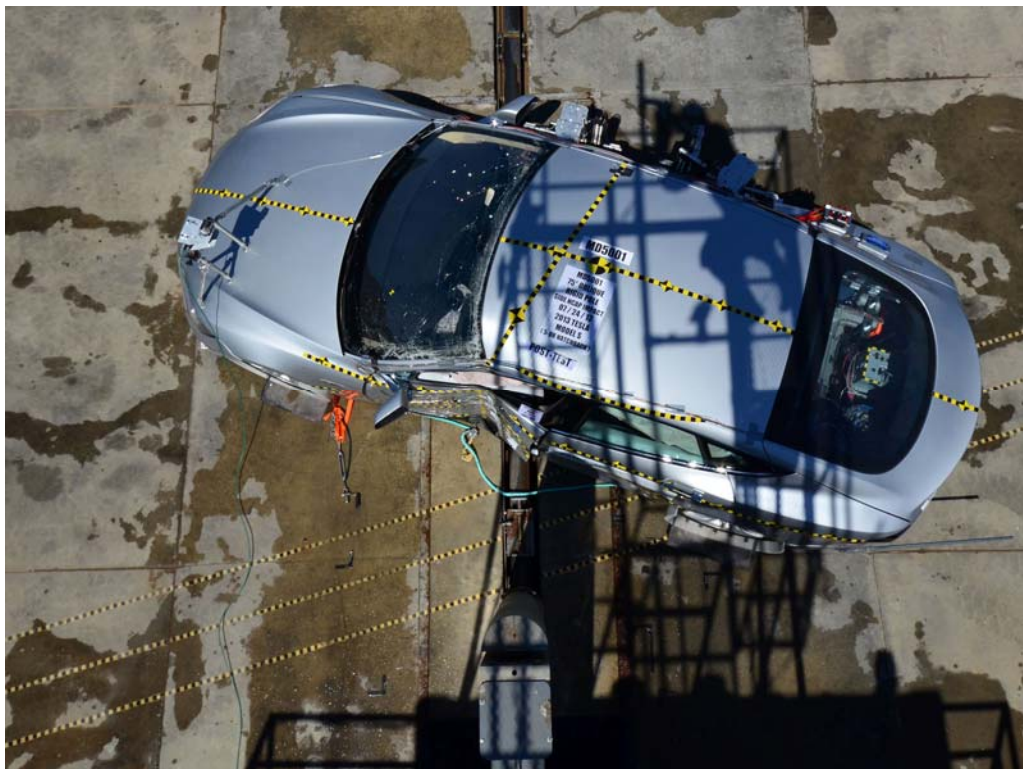


FIGURE 16. Post-Test Overhead View of Test Area



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

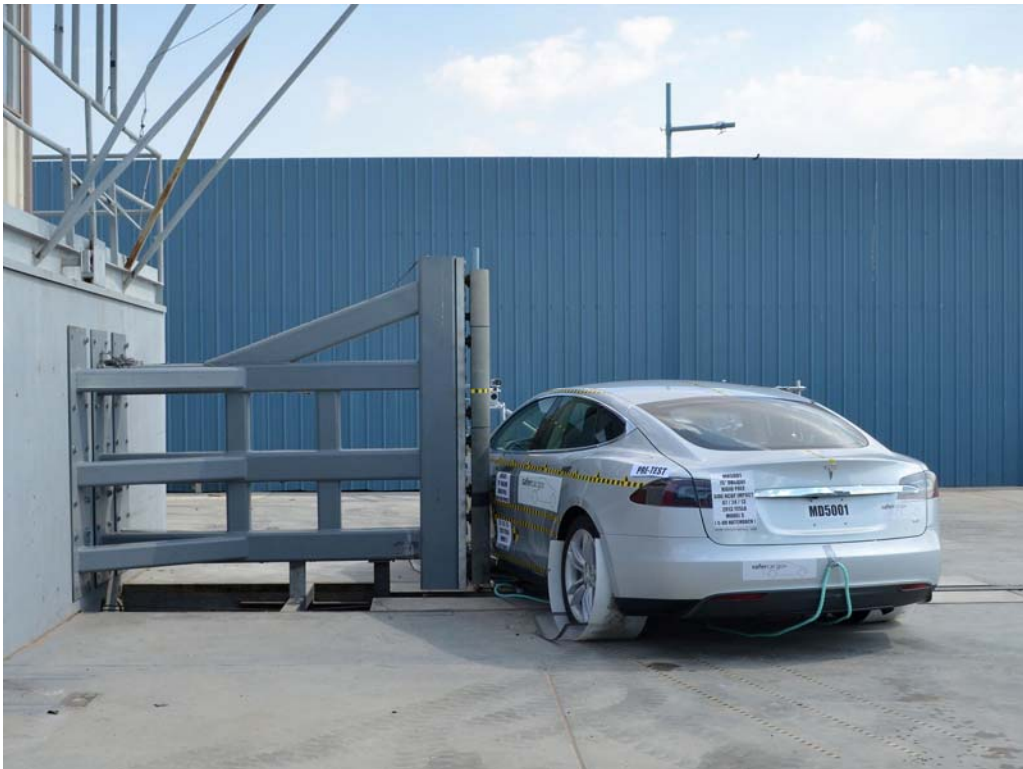


FIGURE 18. Pre-Test Right Side View of Pole
Positioned Against Side of Vehicle



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

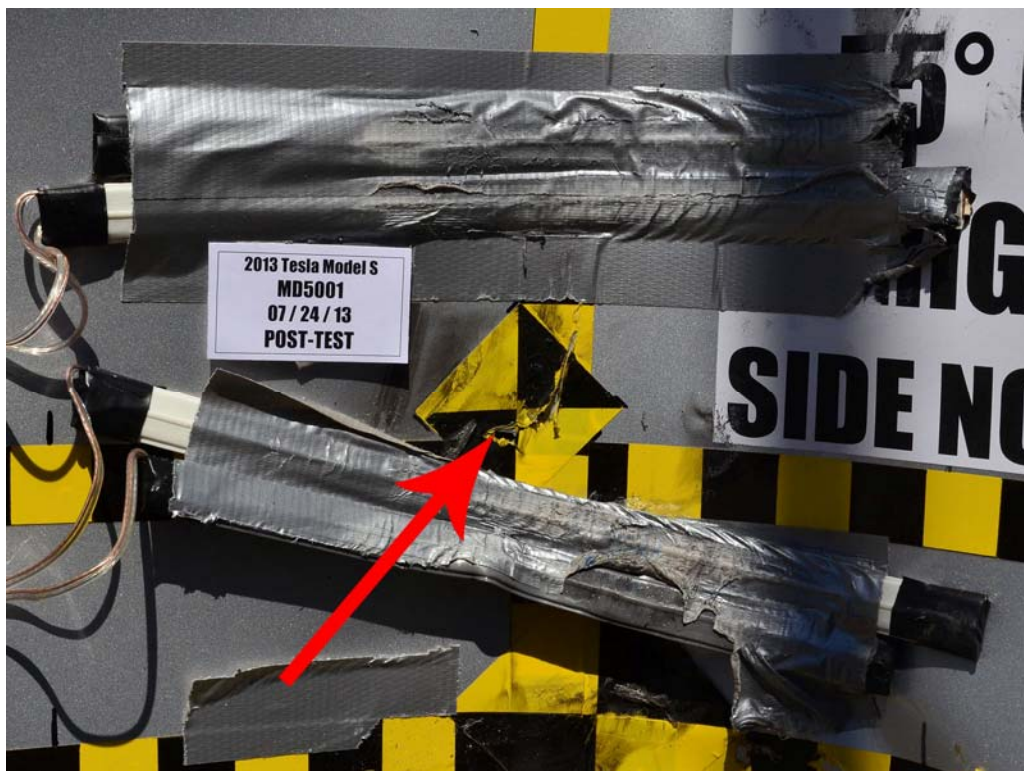


FIGURE 20. Post-Test Close-Up View of Impact Point Target
Showing Impact Location



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



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



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



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



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



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



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



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



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



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



FIGURE 31. Pre-Test View of Dummy's Head Showing Dummy's Head Is Level



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



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

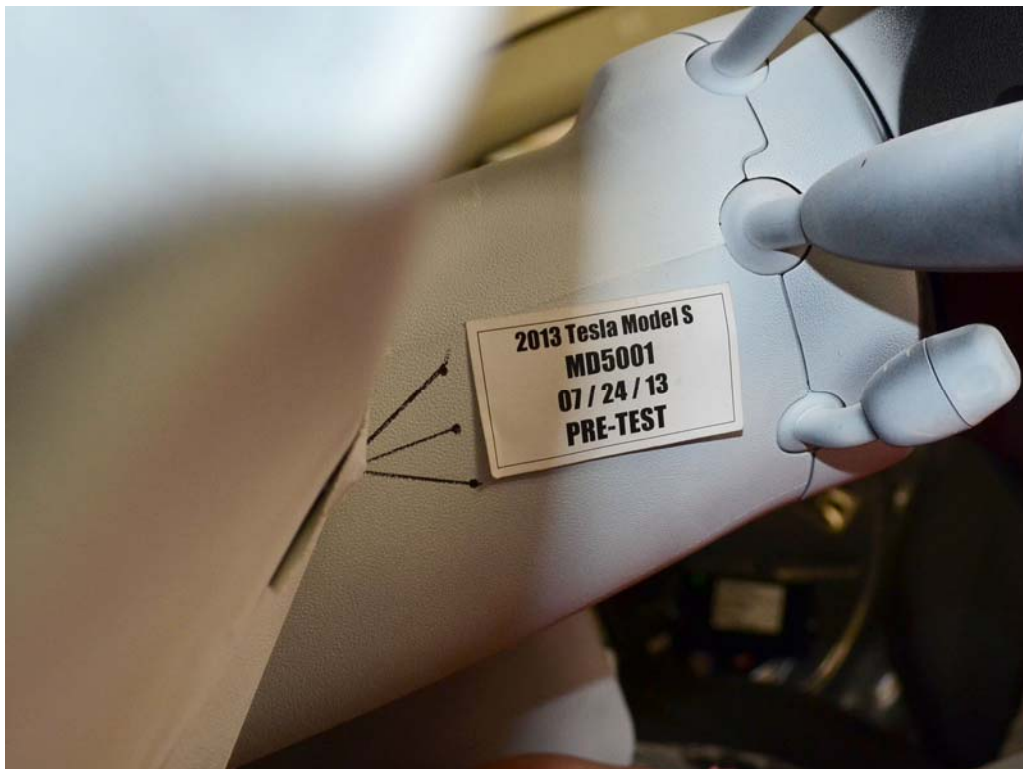


FIGURE 34. Pre-Test Left Side View of Steering Wheel



FIGURE 35. Pre-Test View of Disengaged Parking Brake

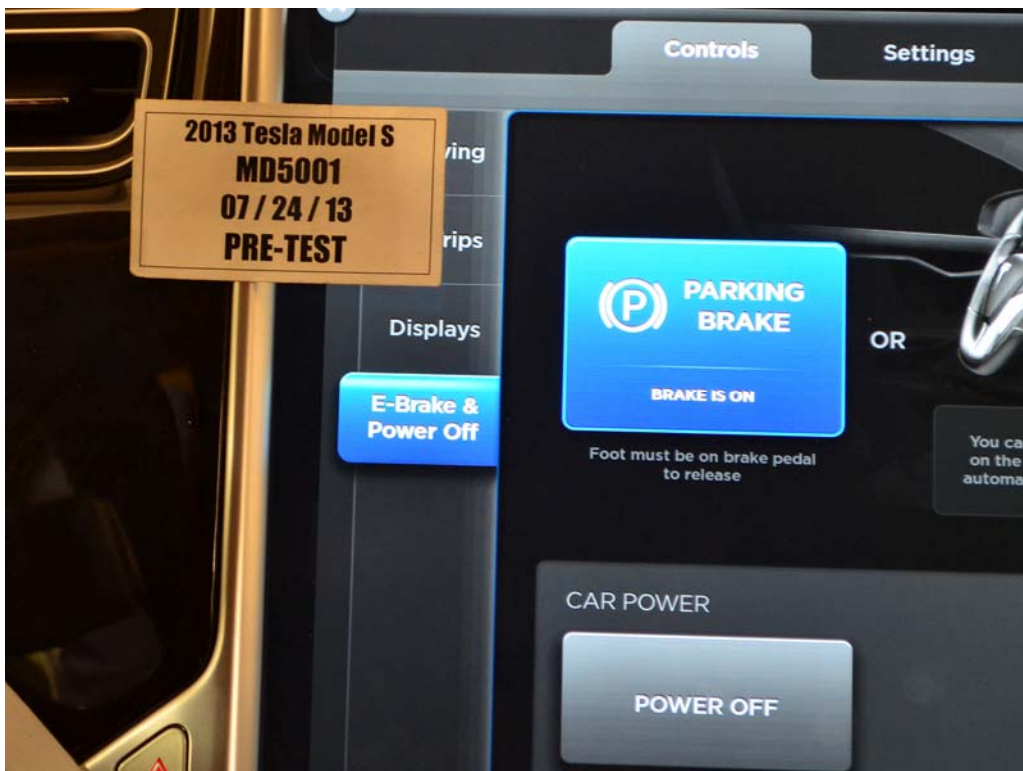


FIGURE 36. Pre-Test View of Parking Brake



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

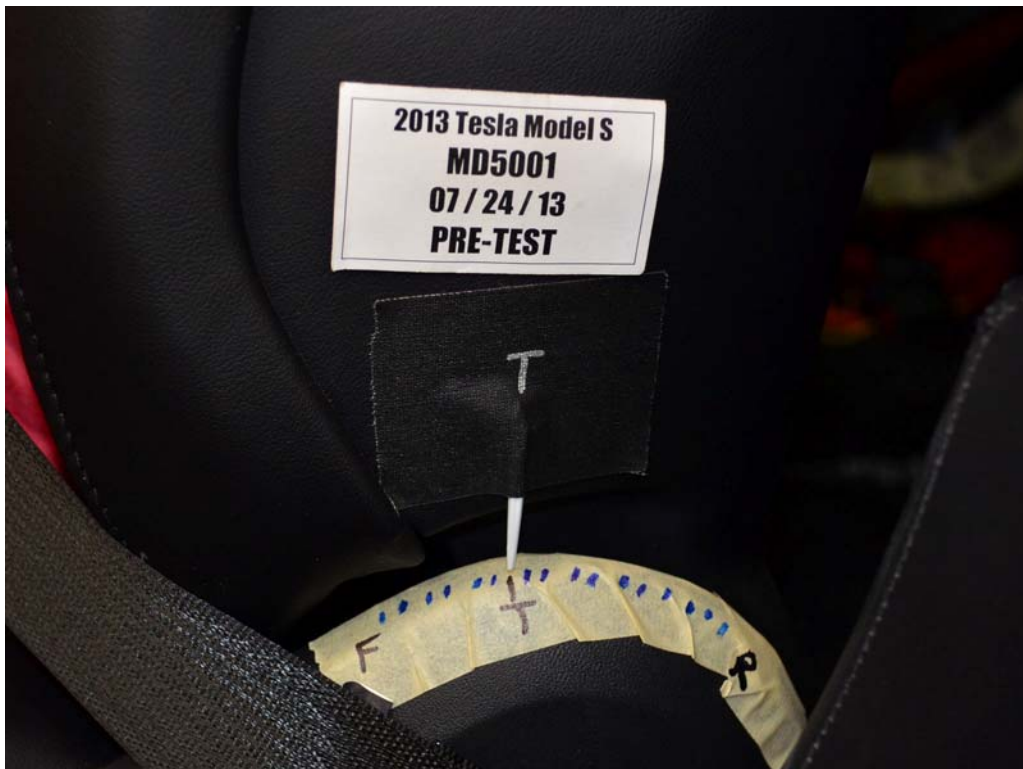


FIGURE 38. Pre-Test Close-Up Left Side View of Driver Seat Back

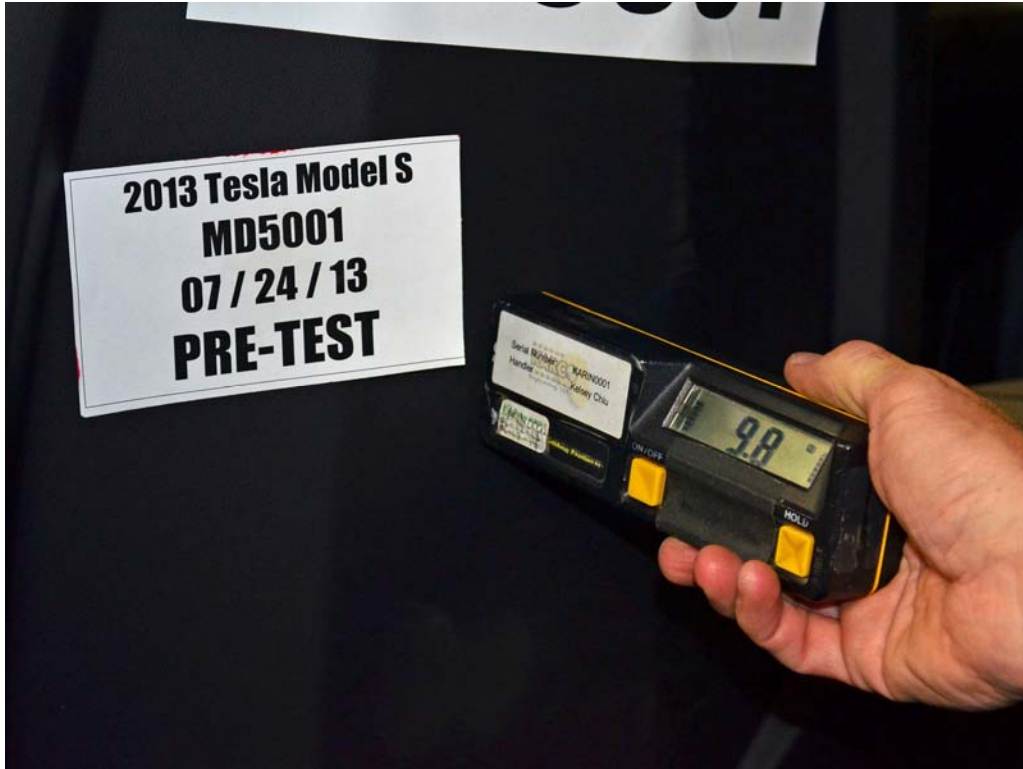


FIGURE 39. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 40. Pre-Test Dummy and Door Clearance View



FIGURE 41. Post-Test Dummy and Door Clearance View



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



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

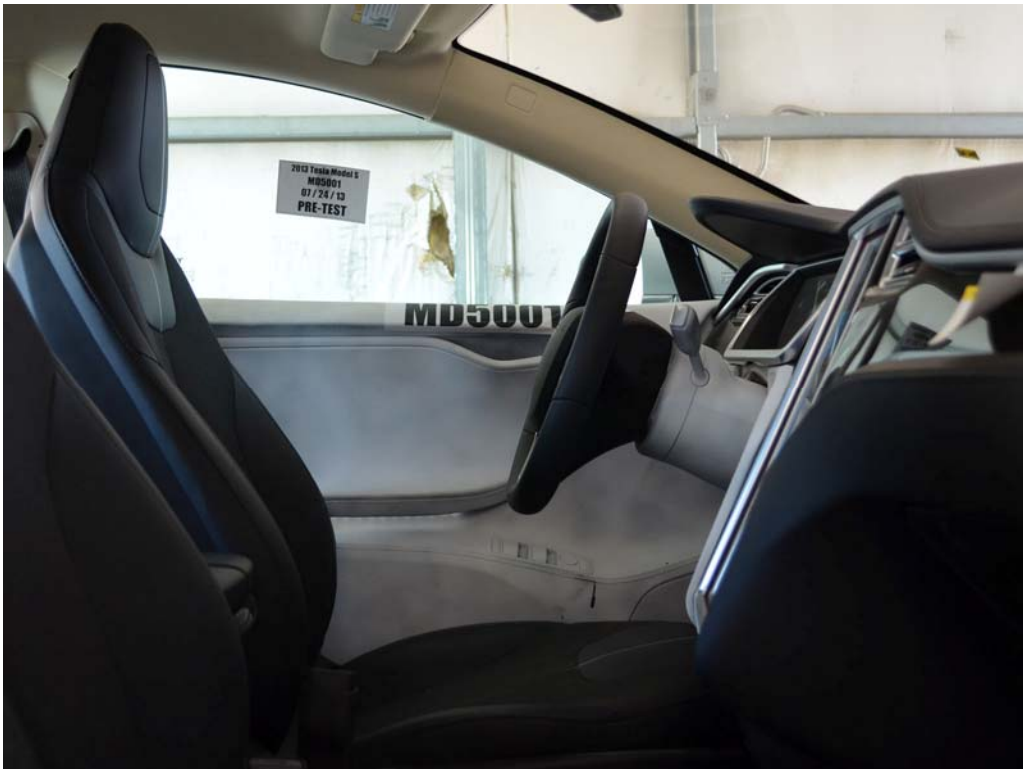


FIGURE 44. Pre-Test Inner Door Panel View



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



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

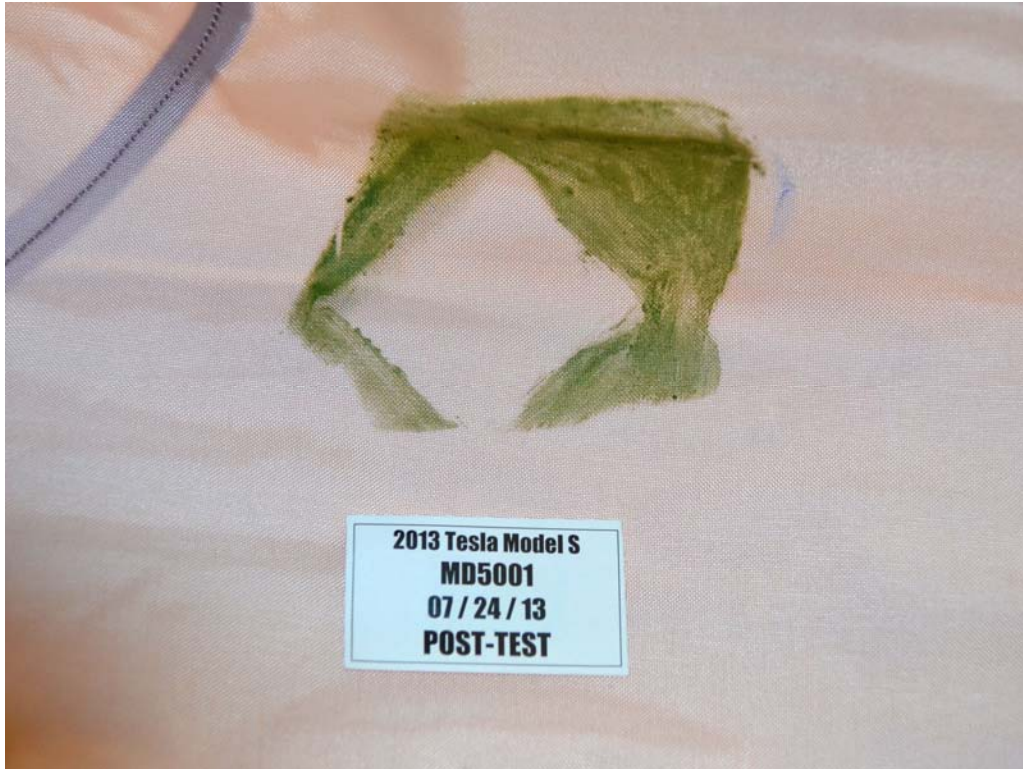


FIGURE 47. Post-Test Dummy Close-Up Head Contact With Side Airbag View



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



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



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

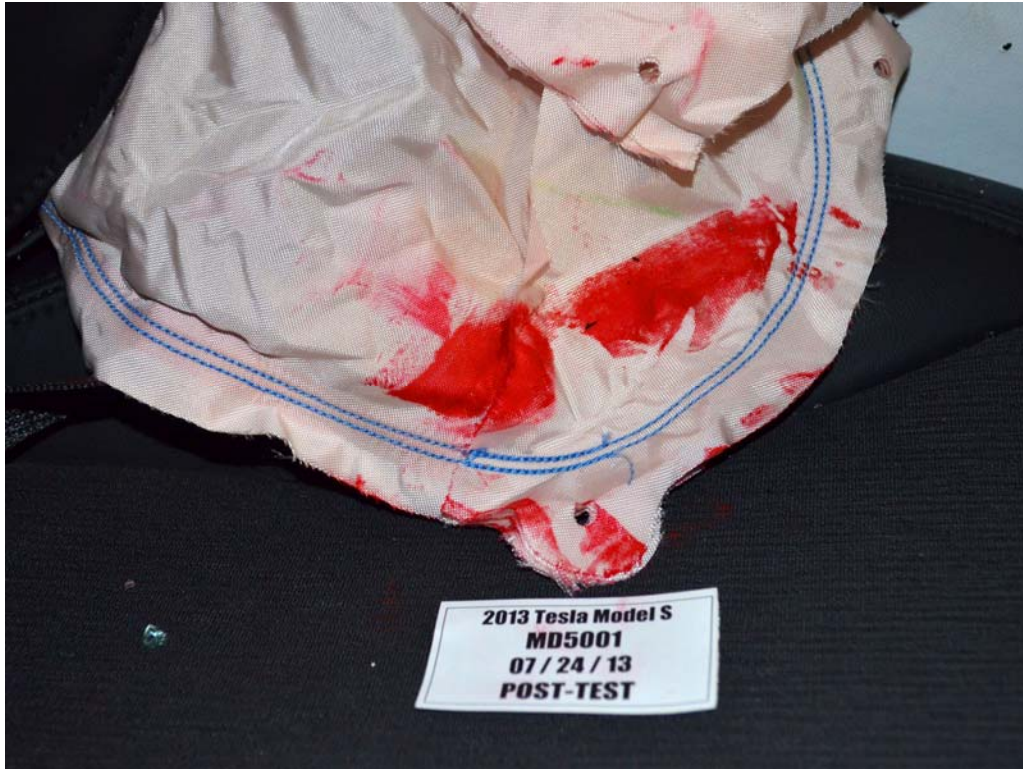


FIGURE 51. Post-Test Dummy Close-Up Pelvis Contact With Side Airbag View



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

Photograph Not Applicable

Vehicle Not Equipped
with Liquid Fuel System

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

Photograph Not Applicable

Vehicle Not Equipped
with Liquid Fuel System

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



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

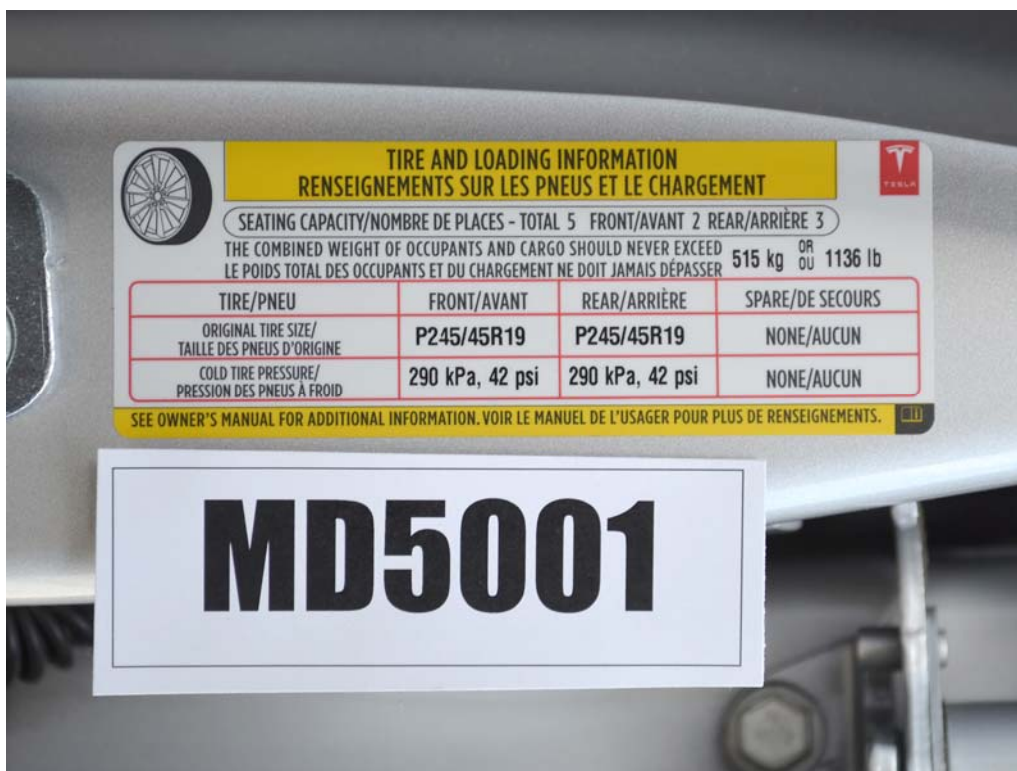


FIGURE 56. Close-Up View of Vehicle's Tire Information Placard or Label



FIGURE 57. Pre-Test Pole Barrier Front View



FIGURE 58. Post-Test Pole Barrier Front View



FIGURE 59. Pre-Test Pole Barrier Side View



FIGURE 60. Post-Test Pole Barrier Side View

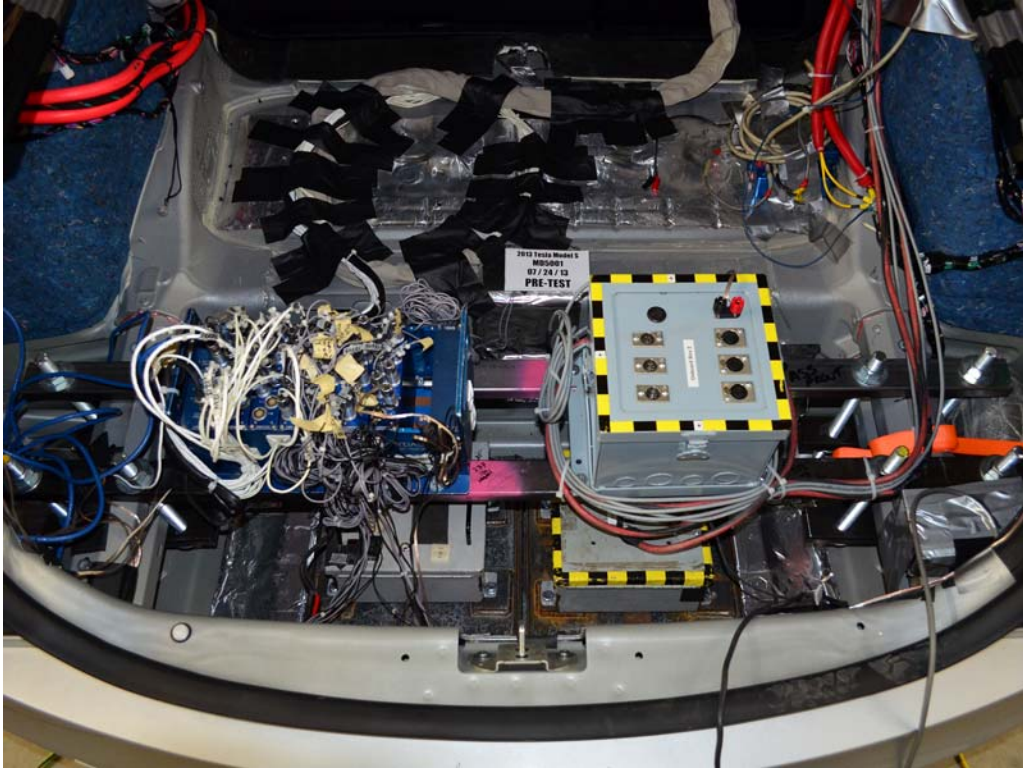


FIGURE 61. Pre-Test Ballast View



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

Photograph Not Required

FMVSS No. 305
Performed Instead

FIGURE 63. FMVSS No. 301 Static Rollover 0 Degrees

Photograph Not Required

FMVSS No. 305
Performed Instead

FIGURE 64. FMVSS No. 301 Static Rollover 90 Degrees

Photograph Not Required

FMVSS No. 305
Performed Instead

FIGURE 65. FMVSS No. 301 Static Rollover 180 Degrees

Photograph Not Required

FMVSS No. 305
Performed Instead

FIGURE 66. FMVSS No. 301 Static Rollover 270 Degrees

Photograph Not Required

FMVSS No. 305 Performed Instead

FIGURE 67. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 68. Impact Event

TESLA		MODEL S VEHICLE IDENTIFICATION NUMBER: 5YJSA1AG7DFP11290	EPA DOT Fuel Economy and Environment
DATE OF MANUFACTURE: 06/2013 STANDARD EQUIPMENT Items below are included at NO EXTRA COST in the standard vehicle price. Technical Features • Three phase, four pole AC induction motor with copper rotor, variable frequency drive • Drive inverter with regenerative braking system • Microprocessor controlled, lithium-ion battery • Single speed gearbox • 10 kW on-board charger • 10 kW optional Mobile Connector • 120 volt, 240 volt and J1772 adapters Safety Features • Eight airbags including driver and passenger head, knee and pelvis, plus front and second row side curtain airbags • Three point driver and front passenger safety belts with retractor pretensioners and secondary lap anchor pretensioners and load limiters • Three point second row safety belts for all three seats • Anti-Lock disc brakes (ABS) with ventilated rotors and electronic parking brake • Traction Control • Stability Control • Second row LATCH attachments for child seat installations • Rear door child safety locks • Tire pressure monitoring system • Anti-theft alarm system Exterior Features • Aluminum body with high strength steel reinforcements • UV and infrared blocking safety glass windshield • Solar absorbing, laminated safety glass rear window with defroster • Rain sensing, adjustable speed windshield wipers • Flush mounted door handles • Frameless, tempered safety glass front windows • Keyless entry Interior Features • 17" capacitive touchscreen with media, communication, passenger cabin and vehicle controls • Bluetooth wireless technology • Cruise Control • 200 watt, 7 speaker stereo system with AM/FM/HD radio. Supports mp3, AAC and mp4 music formats and flash memory storage for up to 500 songs • Three spoke, multi-function steering wheel with tactile controls • Power lift and telescope steering column • Power windows featuring one-touch up and down with resistance reversing • Automatic climate control with dual zone temperature settings, air distribution controls and recirculation • 60/40 split second row seats		Standard Vehicle Price 60 kWh Battery Silver Paint Body Color Roof 19" Wheels with all season tires Textile Piano Black Interior Décor Accents Standard Suspension Single Charger Destination and Regulatory Doc Fee	\$57,400 INCLUDED \$750 INCLUDED INCLUDED INCLUDED INCLUDED INCLUDED \$1,170
DELIVERY INFORMATION DELIVERED TO: TESLA MOTORS, INC. Washington, DC, US TRANSPORTATION METHOD: TRUCK		TOTAL VEHICLE PRICE	\$69,320
			Fuel Economy Large cars range from 14 to 35 MPGe. The best vehicle rates 121 MPGe. 95 MPGe combined city/hwy Driving Range Charge Time: 10 hours (240V) 208 miles You save \$8,350 in fuel costs over 5 years compared to the average new vehicle. Annual fuel Cost \$650 Fuel Economy & Greenhouse Gas Rating This vehicle emits 6 grams CO ₂ per mile. The best vehicle emits 6 grams per mile (tailpipe only). Producing and distributing fuel also causes greenhouse gases (see fueleconomy.gov). fueleconomy.gov Calculate personalized estimates and compare vehicles.
			PARTS CONTENT INFORMATION FOR THIS VEHICLE: US/CANADIAN PARTS CONTENT: 55% NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION OR OTHER NON-PARTS CONTENT. FOR THIS VEHICLE: FINAL ASSEMBLY POINT: FREMONT, CA COUNTRY OF ORIGIN: MOTOR ASSEMBLY: USA GEARBOX/TRANSMISSION: USA
			ADDITIONAL ASSEMBLY INFORMATION FOR THIS VEHICLE: BATTERY FINAL ASSEMBLY POINT: FREMONT, CA, USA ON-BOARD CHARGER FINAL ASSEMBLY POINT: FREMONT, CA, USA
			GOVERNMENT SAFETY RATINGS This vehicle has not been rated by the government for frontal crash, side crash or rollover risk. Source: National Highway Traffic Safety Administration (NHTSA). www.safercar.gov or 1-888-327-4236

FIGURE 69. Monroney Label

Photograph Not Applicable

Owner's Manual Does Not Include Head Restraint Use And Adjustment Information

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

APPENDIX B
DUMMY RESPONSE DATA

TABLE OF DATA PLOTS

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

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

www.NHTSA.dot.gov

Additional Driver Dummy Instrumentation Data

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

Vehicle Instrumentation Data

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

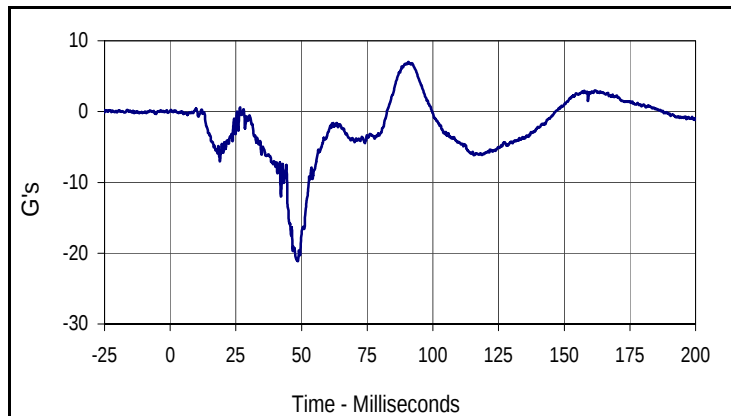
Left B-Pillar Sill Acceleration
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration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

Pole Instrumentation Data

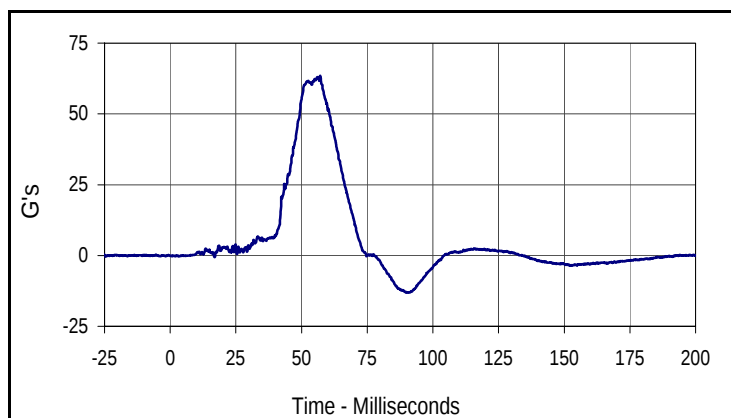
Load Cell Pole Barrier #1 Force (Y)
Load Cell Pole Barrier #2 Force (Y)
Load Cell Pole Barrier #3 Force (Y)
Load Cell Pole Barrier #4 Force (Y)
Load Cell Pole Barrier #5 Force (Y)
Load Cell Pole Barrier #6 Force (Y)
Load Cell Pole Barrier #7 Force (Y)
Load Cell Pole Barrier #8 Force (Y)

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

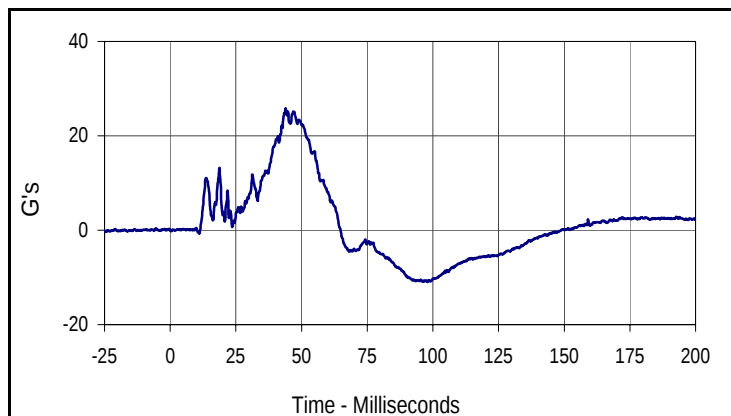
Test Date: 7/24/13
 NHTSA No.: MD5001



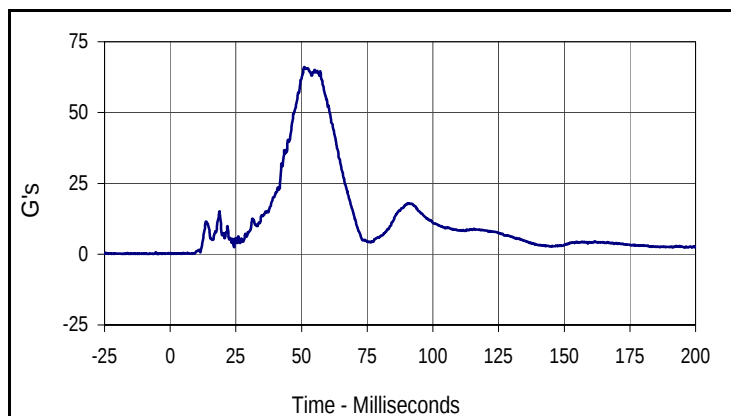
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
7.0	90.7	-21.2	48.6



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
63.5	57.1	-13.1	90.6



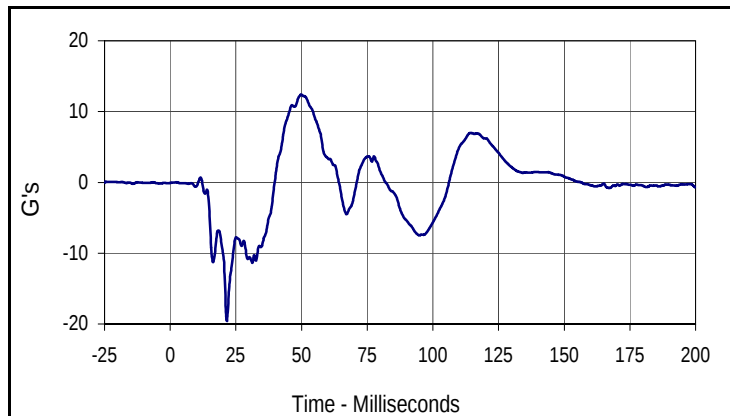
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
25.7	44.0	-11.0	97.9



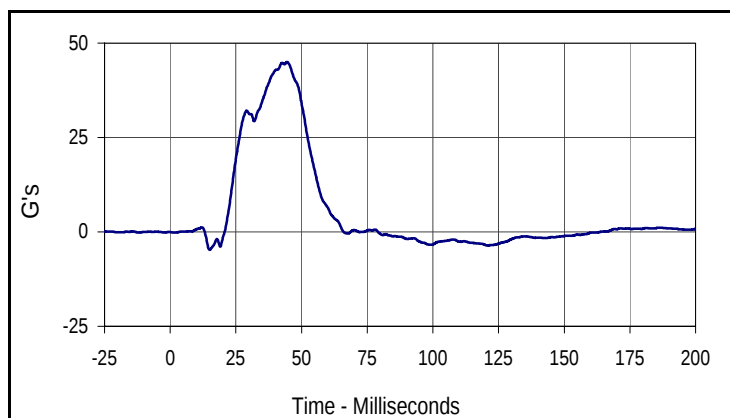
Curve Description			
Driver Head Acceleration Primary Res.			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
66.1	51.1	0.1	1.3

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

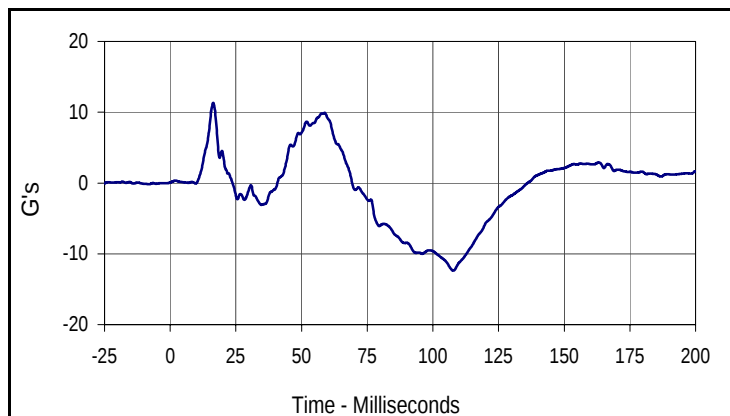
Test Date: 7/24/13
 NHTSA No.: MD5001



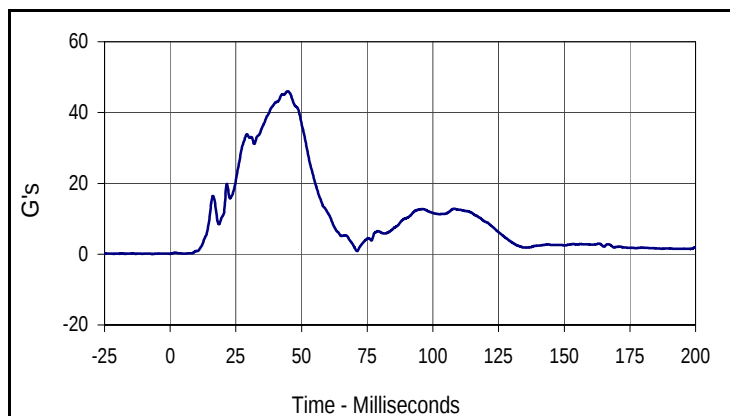
Curve Description			
Driver Lower Spine T12 Acceleration X			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
12.4	49.9	-19.6	21.6



Curve Description			
Driver Lower Spine T12 Acceleration Y			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
45.0	44.4	-4.7	15.0



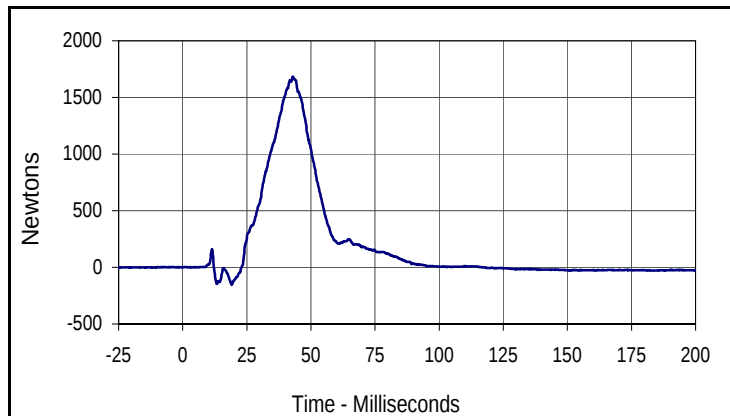
Curve Description			
Driver Lower Spine T12 Acceleration Z			
Plot No.	Type	SAE Class	Units
007	FIL	180	G's
Max	Time	Min	Time
11.3	16.4	-12.4	107.8



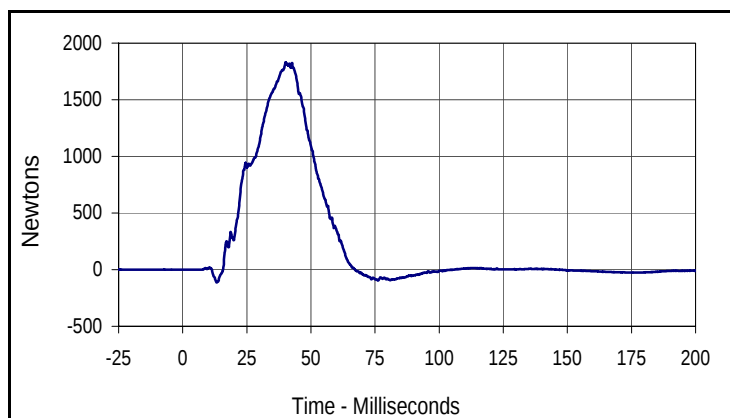
Curve Description			
Driver Lower Spine T12 Acceleration Res.			
Plot No.	Type	SAE Class	Units
008	RES	180	G's
Max	Time	Min	Time
46.0	44.6	0.1	0.0

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback
 Test Program: 32 km/h (20 mph) Side Impact NCAP 75° Rigid Pole Test

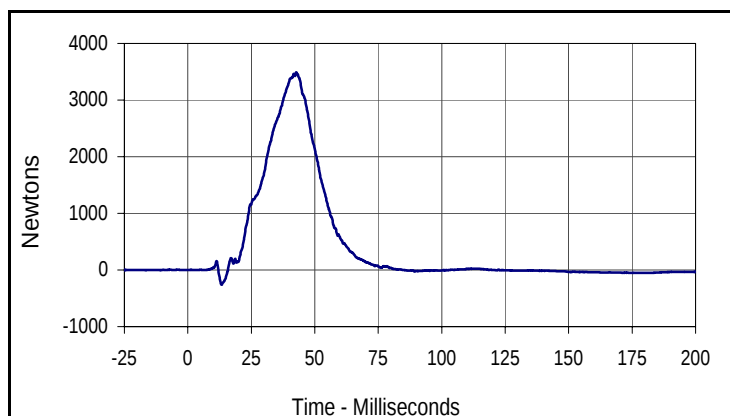
Test Date: 7/24/13
 NHTSA No.: MD5001



Curve Description			
Driver Iliac Wing Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
009	FIL	600	Newtons
Max	Time	Min	Time
1683.2	42.9	-155.0	19.1



Curve Description			
Driver Acetabulum Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Newtons
Max	Time	Min	Time
1830.8	40.2	-112.8	13.2



Curve Description			
Driver Total Pelvic Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
011	SUM	600	Newtons
Max	Time	Min	Time
3492.4	42.7	-258.1	13.3

APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

APPENDIX C
PRE-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID IIs External Measurements
 ATD Serial No.: 299

Test Date: 7/2/13
 Test I.D.: N/A



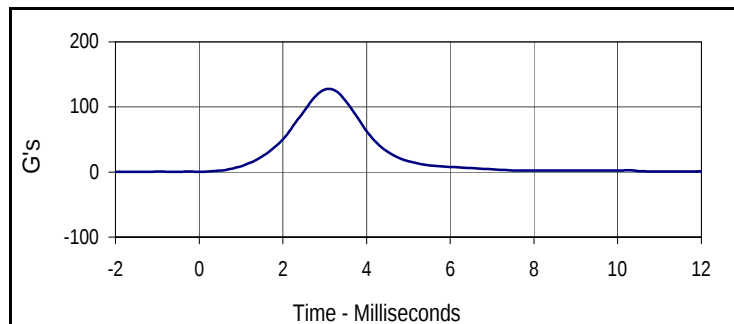
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
A	Sitting Height	mm	772 - 788	780	Pass
B	Shoulder Pivot Height	mm	437 - 453	445	Pass
C	H-Point Height	mm	79 - 89	85	Pass
D	H-Point from Seatback	mm	141 - 151	145	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F	Thigh Clearance	mm	119 - 135	125	Pass
G	Head Breadth	mm	140 - 148	145	Pass
H	Head Back from Backline	mm	40 - 46	44	Pass
I	Head Depth	mm	178 - 188	184	Pass
J	Head Circumference	mm	541 - 551	545	Pass
K	Buttock to Knee Length	mm	514 - 540	527	Pass
L	Popliteal Height	mm	343 - 369	352	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	401	Pass
N	Buttock Popliteal Length	mm	416 - 442	432	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	202	Pass
P	Foot Length	mm	216 - 232	221	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	315	Pass
R	Arm Length	mm	249 - 259	252	Pass
S	Knee Joint to Seatback	mm	477 - 493	481	Pass
V	Shoulder Width	mm	341 - 357	352	Pass
W	Foot Width	mm	78 - 94	86	Pass
Y	Chest Circumference with Jacket	mm	851 - 881	872	Pass
Z	Waist Circumference	mm	760 - 791	774	Pass
Overall Test Results					Pass

Test Program: SID IIs Head Drop Test
 ATD Serial No.: 299

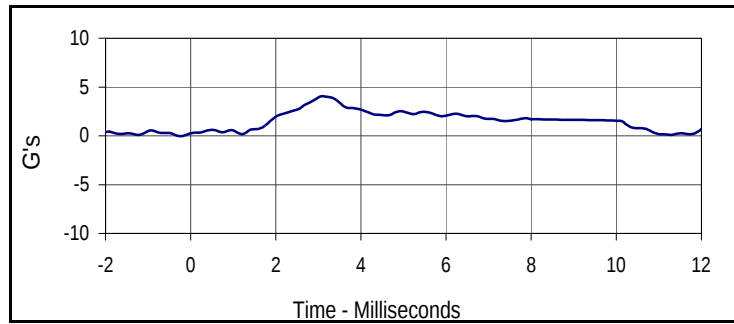
Test Date: 7/2/13
 Test I.D.: 299HD060



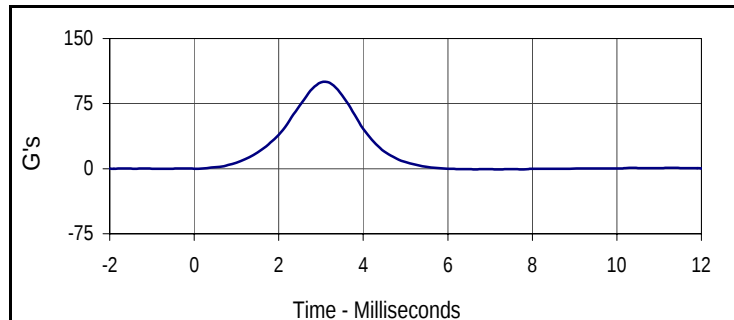
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	255	Pass
Temperature During Soak	Max	18.9 to 25.6	21.5	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	35.3	Pass
	Min		29.5	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.4	Pass
Peak Head Resultant Acceleration	G's	115 to 137	127.9	Pass
Peak Head X Acceleration	G's	<15	4.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	3.3	Pass
Overall Test Results				Pass



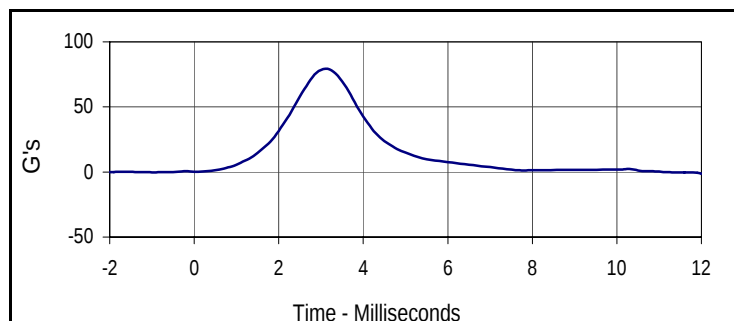
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
127.9	3.1	0.2	-1.3



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
4.1	3.1	0.0	-0.2



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
100.3	3.1	-0.9	7.2



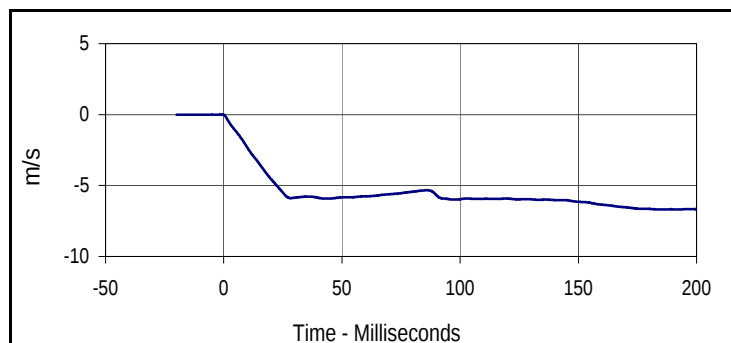
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
79.2	3.1	-1.2	12.0

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 299

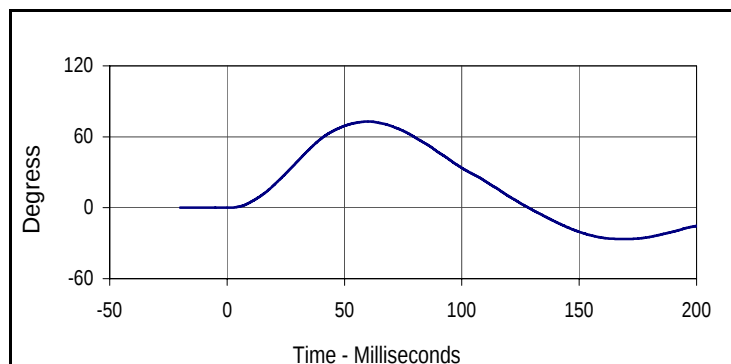
Test Date: 7/2/13
 Test I.D.: 299NB060



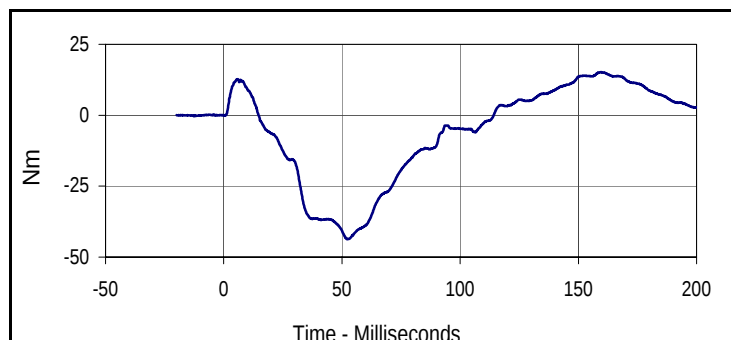
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	320	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	35.3	Pass
	Min		29.5	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.4	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.62	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.33	Pass
	15 msec	-3.30 to -4.10	-3.45	Pass
	20 msec	-4.40 to -5.40	-4.55	Pass
	25 msec	-5.40 to -6.10	-5.50	Pass
	25-100 msec	-5.50 to -6.20	-5.99	Pass
D-Plane Rotation	Max	71 to 81	73.0	Pass
	Time	50 to 70	60.2	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-43.7	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	114.2	Pass
Overall Test Results			Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.8	-6.7	184.8



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
73.0	60.2	-26.4	170.1



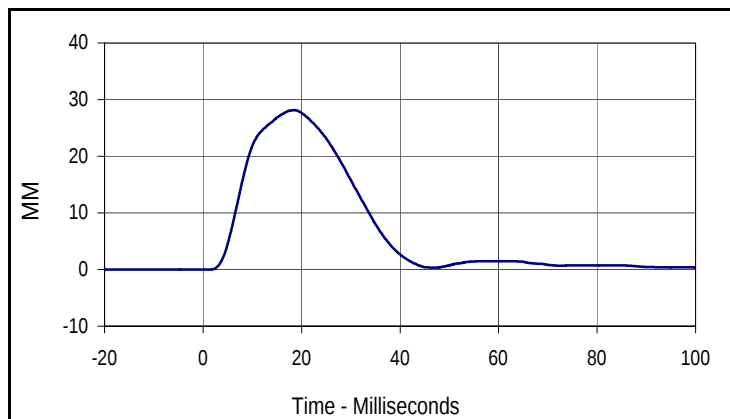
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
15.2	159.6	-43.7	52.2

Test Program: SID IIs Shoulder Impact Test
 ATD Serial No.: 299

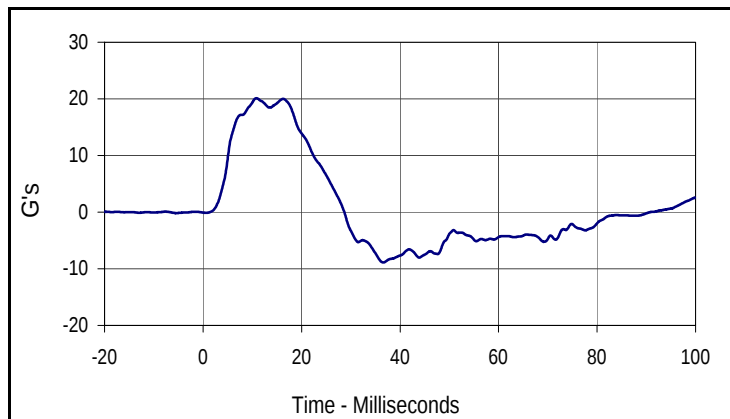
Test Date: 7/2/13
 Test I.D.: 299SH060



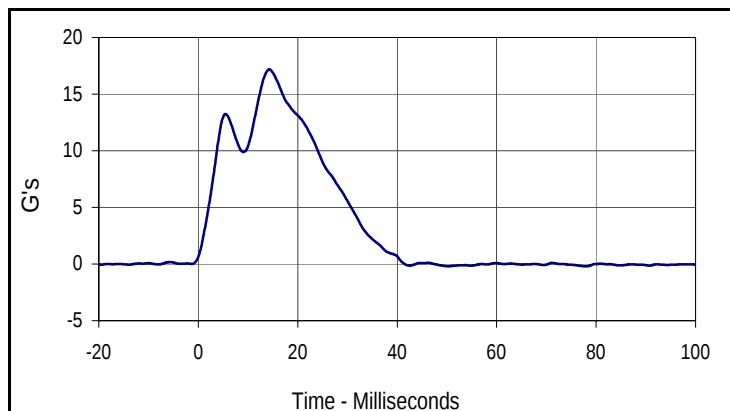
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	395	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.5	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	35.3	Pass
	Min	%		29.5	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.5	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.29	Pass
Peak Shoulder Deflection		mm	28 to 37	28.1	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	20.1	Pass
Peak Impactor Acceleration		G's	13 to 18	17.2	Pass
Overall Test Results				Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
28.1	18.7	0.0	-20.0



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
20.1	10.8	-8.9	36.6



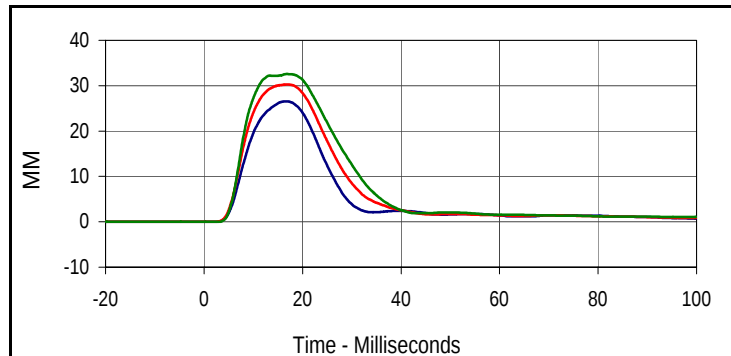
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
17.2	14.3	-0.2	78.0

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 299

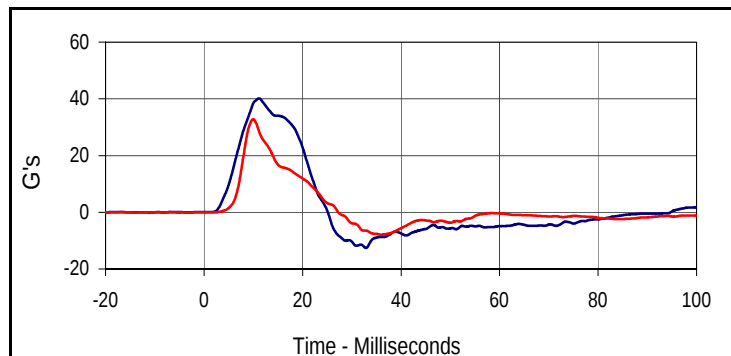
Test Date: 7/2/13
 Test I.D.: 299TWA060



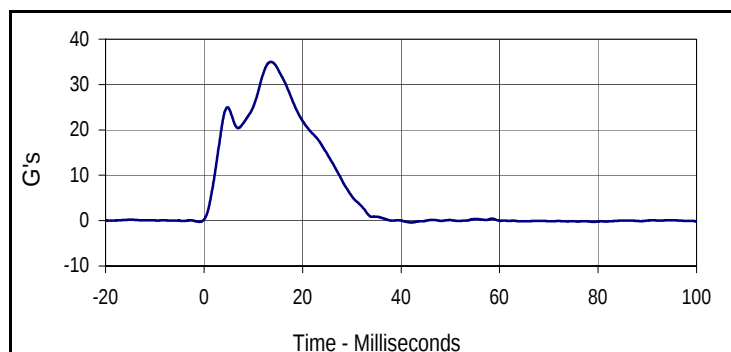
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	445	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	35.3	Pass
	Min		29.5	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.65	Pass
Peak Shoulder Deflection	mm	31 to 40	33.9	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	26.6	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	30.3	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	32.6	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	40.1	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	32.8	Pass
Peak Impactor Acceleration	G's	30 to 36	35.0	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
26.6	16.6	0.0	-20.0
Middle Thorax Deflection			
Max	Time	Min	Time
30.3	16.9	0.0	0.0
Lower Thorax Deflection			
Max	Time	Min	Time
32.6	16.8	0.0	-0.7



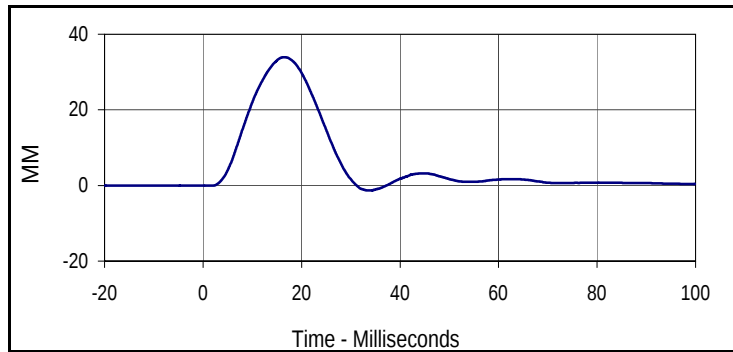
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
40.1	11.1	-12.6	32.9
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
32.8	10.0	-7.9	36.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
35.0	13.6	-0.4	0.0

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 299

Test Date: 7/2/13
 Test I.D.: 299TWA060



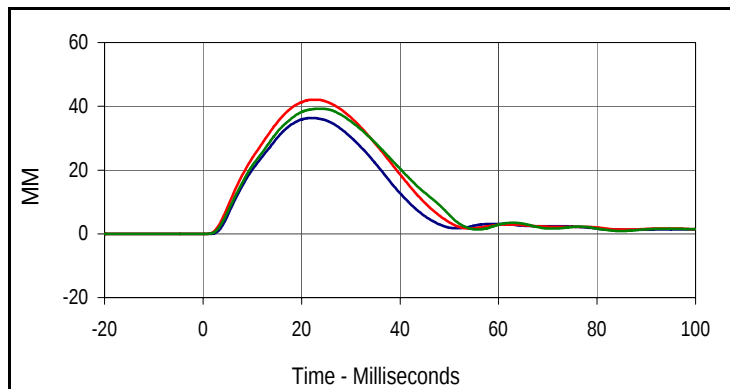
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
33.9	16.4	-1.3	33.6

Test Program: SID IIs Thorax without Arm Impact Test
 ATD Serial No.: 299

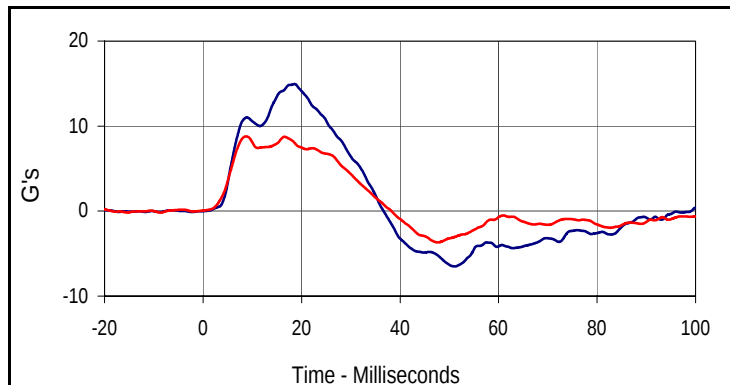
Test Date: 7/2/13
 Test I.D.: 299TWOA060



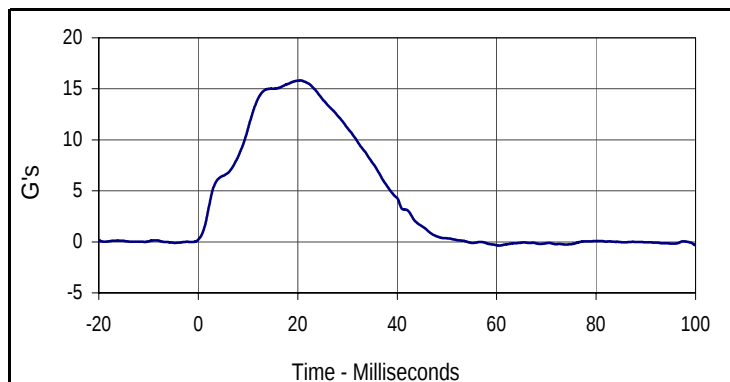
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	500	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.5	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	35.3	Pass
	Min	%		29.5	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.5	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.36	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	36.3	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	42.1	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	39.3	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	14.9	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	8.8	Pass
Peak Impactor Acceleration		G's	14 to 18	15.8	Pass
Overall Test Results				Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
36.3	22.2	0.0	-2.6
Middle Thorax Deflection			
Max	Time	Min	Time
42.1	22.7	0.0	-1.2
Lower Thorax Deflection			
Max	Time	Min	Time
39.3	23.6	0.0	-0.8



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.9	18.6	-6.5	51.0
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
8.8	8.7	-3.7	47.6



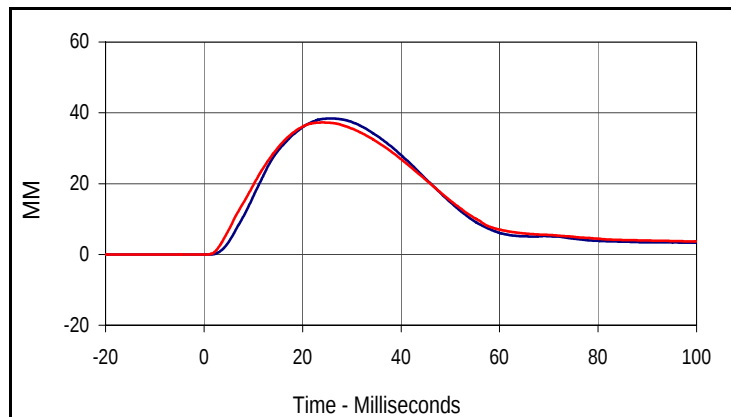
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
15.8	20.5	-0.3	60.7

Test Program: SID IIs Abdomen Impact Test
 ATD Serial No.: 299

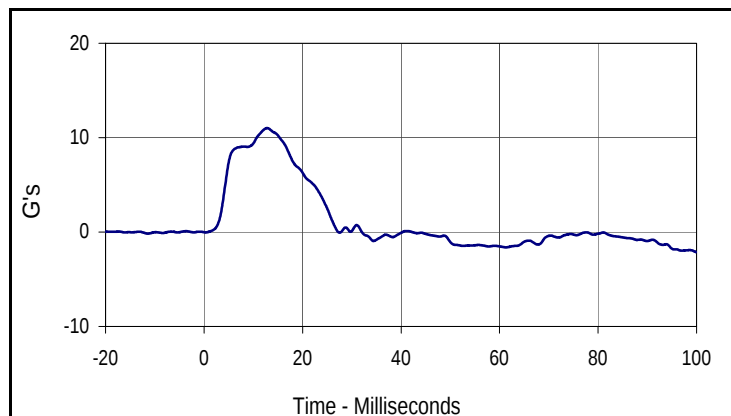
Test Date: 7/2/13
 Test I.D.: 299ABD060



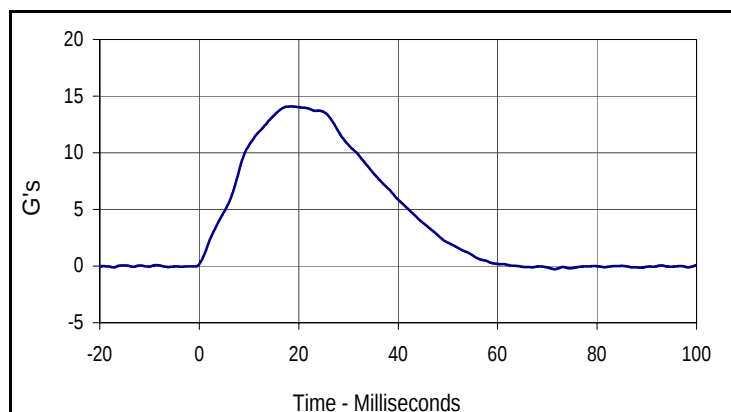
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	560	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	35.3	Pass
	Min		29.5	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.29	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	38.4	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	37.3	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	11.0	Pass
Peak Impactor Acceleration	G's	12 to 16	14.1	Pass
Overall Test Results			Pass	



Curve Description			
Upper Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
38.4	26.0	0.0	-1.6
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
37.3	24.1	0.0	-9.9

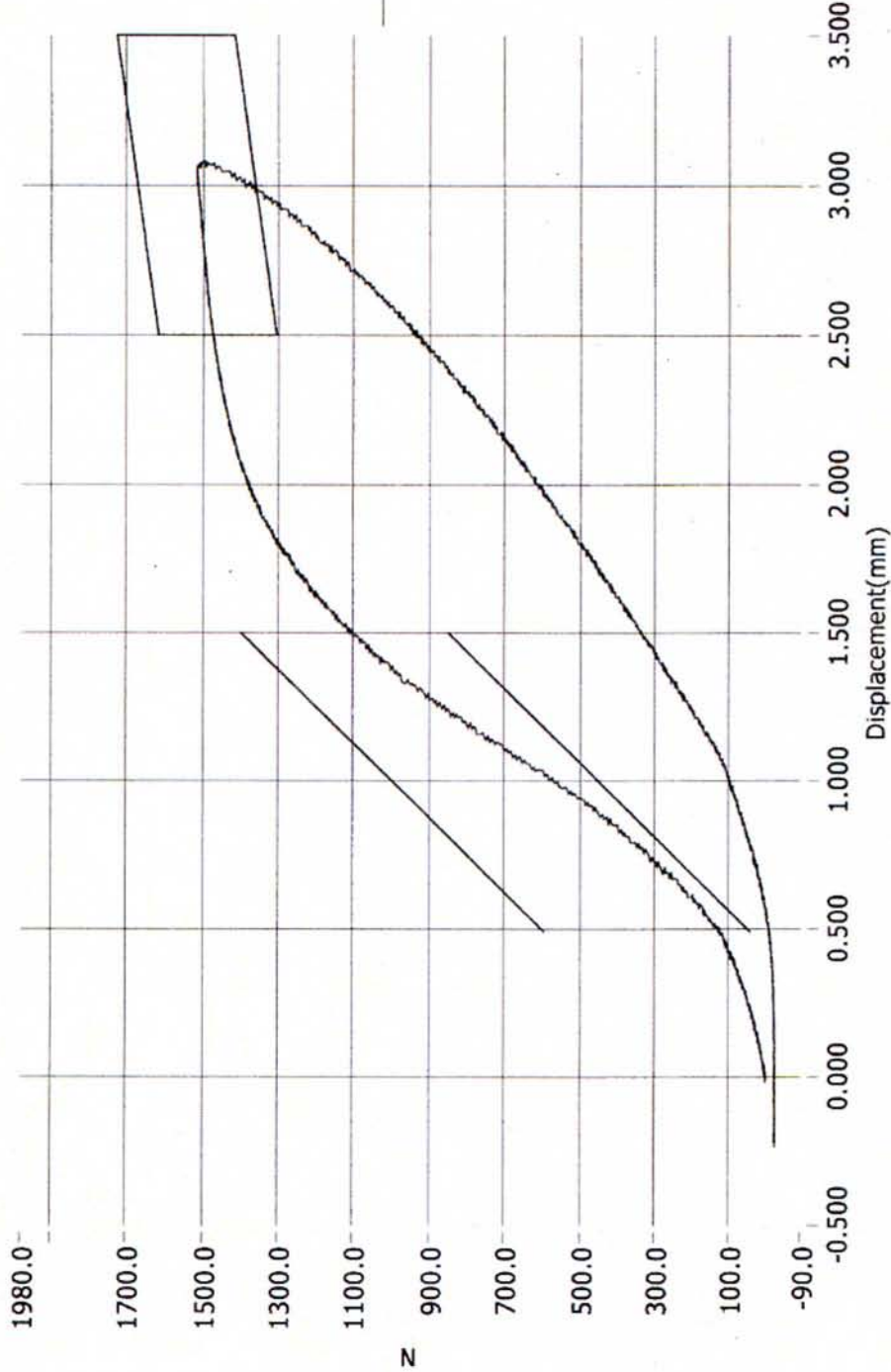


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
11.0	12.8	-2.1	99.9



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.1	18.6	-0.3	71.5

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	48923	12/5/2011	9:08 PM
Cert ID	ATD Serial Number	ATD Type	SIDIIs
	N/A	SIDIIs	

MD5001 PRE TEST

Current Date : 12/5/2011

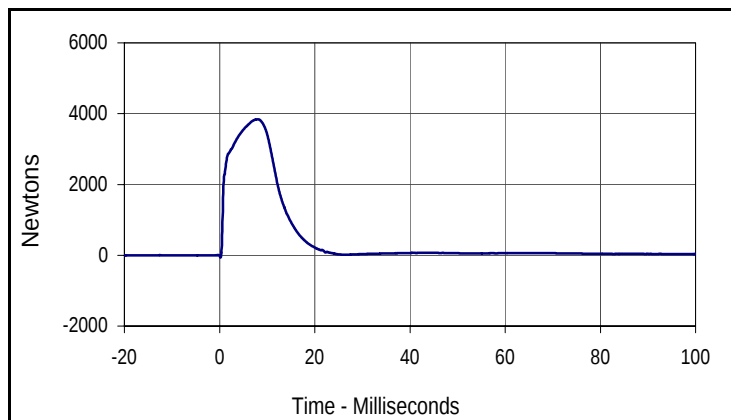
Current Time : 21:09:30

Test Program: SID IIs Pelvis Acetabulum Impact Test
 ATD Serial No.: 299

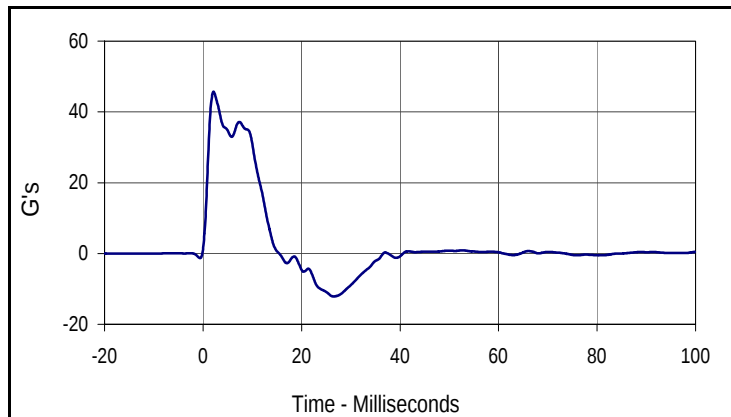
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 Test I.D.: 299ACET060



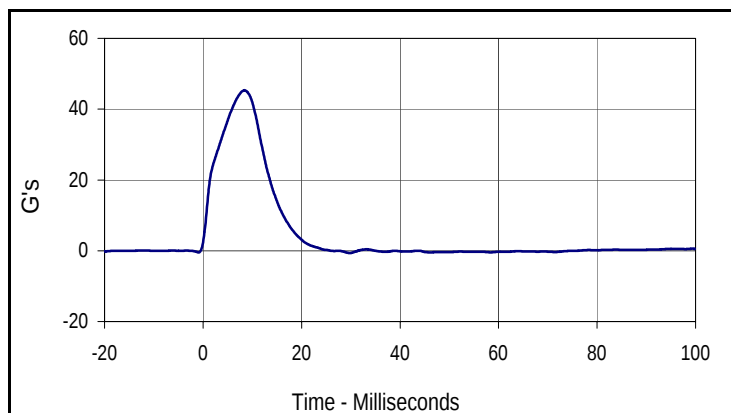
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	635	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.8	Pass
Humidity During Soak	Max	10.0 to 70.0	35.3	Pass
	Min		29.5	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.62	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	3843.9	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	37.2	Pass
Peak Impactor Acceleration	G's	38 to 47	45.3	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3843.9	8.0	-61.2	0.2



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
45.7	2.1	-12.2	26.5



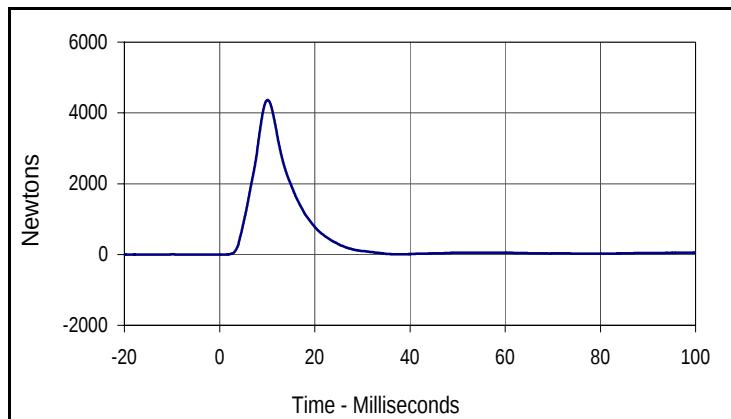
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
45.3	8.4	-0.7	29.8

Test Program: SID IIs Pelvis Iliac Calibration
 ATD Serial No.: 299

Test Date: 7/2/13
 Test I.D.: 299PL060



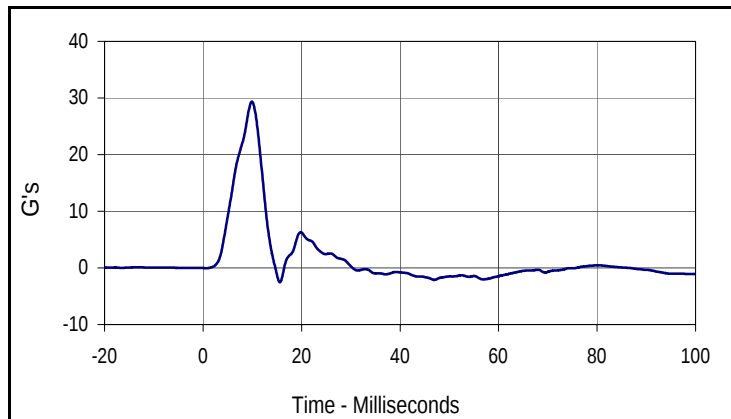
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	700	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.5	Pass
	Min	°C		20.8	Pass
Humidity During Soak	Max	%	10.0 to 70.0	35.3	Pass
	Min	%		29.5	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.5	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.36	Pass
Peak Iliac Force		Newtons	4100 to 5100	4365.8	Pass
Peak Pelvis Y Acceleration		G's	28 to 39	29.4	Pass
Peak Impactor Acceleration		G's	36 to 45	39.6	Pass
Overall Test Results				Pass	



Curve Description

Pelvis Iliac Force

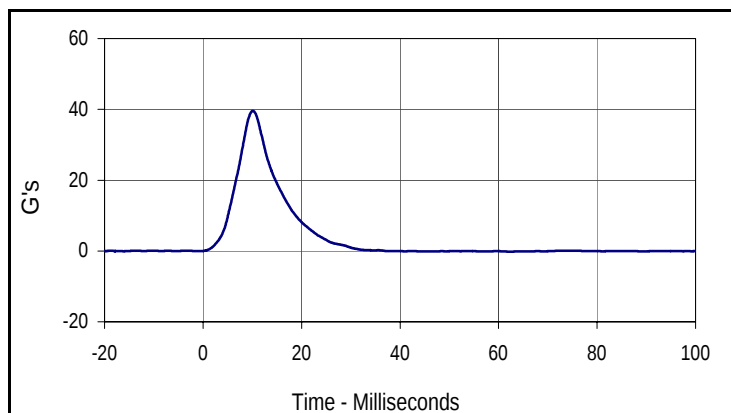
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4365.8	10.1	-2.3	-7.5



Curve Description

Pelvis Y Acceleration

Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
29.4	9.9	-2.5	15.6



Curve Description

Impactor Acceleration

Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
39.6	10.1	-0.2	62.5

APPENDIX C
POST-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA

Test Program: SID IIs External Measurements
 ATD Serial No.: 299

Test Date: 7/24/13
 Test I.D.: N/A



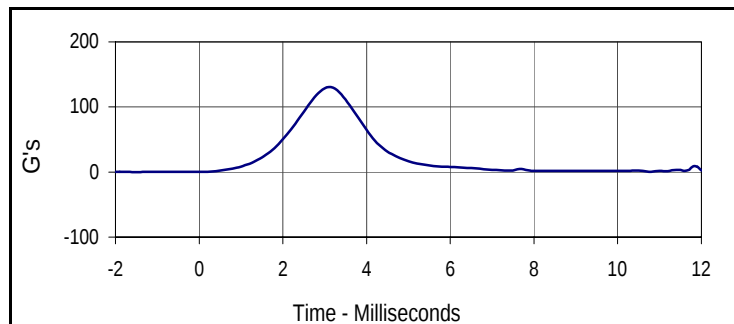
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity		%	10 to 70	30	Pass
A	Sitting Height	mm	772 - 788	780	Pass
B	Shoulder Pivot Height	mm	437 - 453	445	Pass
C	H-Point Height	mm	79 - 89	85	Pass
D	H-Point from Seatback	mm	141 - 151	145	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F	Thigh Clearance	mm	119 - 135	125	Pass
G	Head Breadth	mm	140 - 148	145	Pass
H	Head Back from Backline	mm	40 - 46	44	Pass
I	Head Depth	mm	178 - 188	184	Pass
J	Head Circumference	mm	541 - 551	545	Pass
K	Buttock to Knee Length	mm	514 - 540	527	Pass
L	Popliteal Height	mm	343 - 369	352	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	401	Pass
N	Buttock Popliteal Length	mm	416 - 442	432	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	202	Pass
P	Foot Length	mm	216 - 232	221	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	315	Pass
R	Arm Length	mm	249 - 259	252	Pass
S	Knee Joint to Seatback	mm	477 - 493	481	Pass
V	Shoulder Width	mm	341 - 357	352	Pass
W	Foot Width	mm	78 - 94	86	Pass
Y	Chest Circumference with Jacket	mm	851 - 881	872	Pass
Z	Waist Circumference	mm	760 - 791	774	Pass
Overall Test Results					Pass

Test Program: SID IIs Head Drop Test
 ATD Serial No.: 299

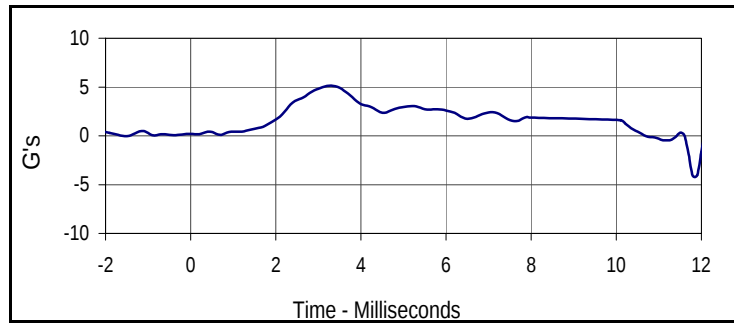
Test Date: 7/24/13
 Test I.D.: 299HD061



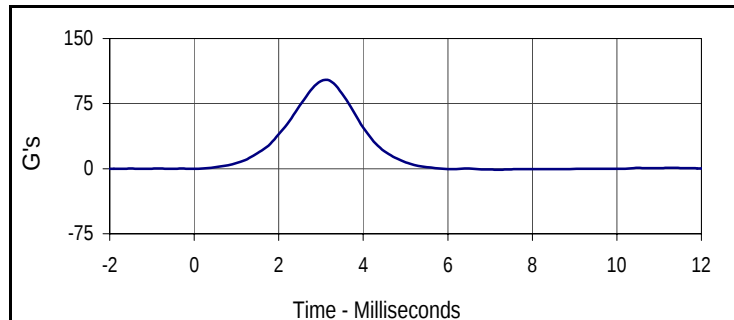
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	250	Pass
Temperature During Soak	Max	18.9 to 25.6	21.5	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	37.4	Pass
	Min		30.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.4	Pass
Peak Head Resultant Acceleration	G's	115 to 137	130.4	Pass
Peak Head X Acceleration	G's	<15	5.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	6.6	Pass
Overall Test Results				Pass



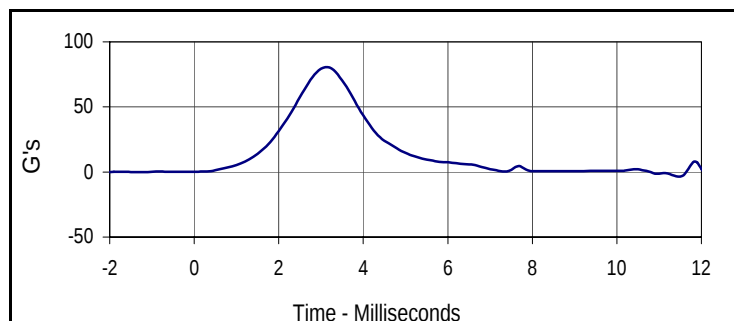
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
130.4	3.1	0.1	-1.6



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
5.1	3.3	0.0	-1.5



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
102.3	3.1	-1.2	7.2



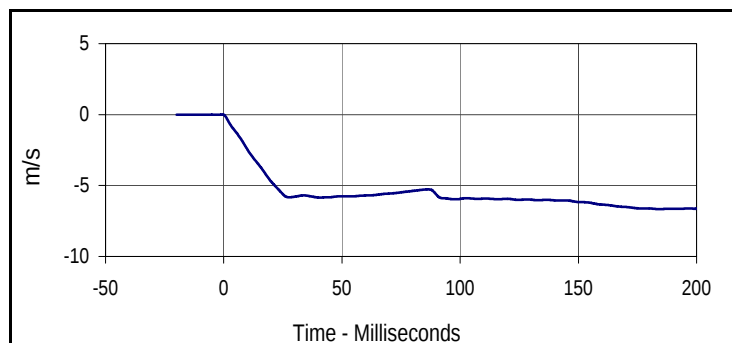
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
80.7	3.1	-3.4	11.5

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 299

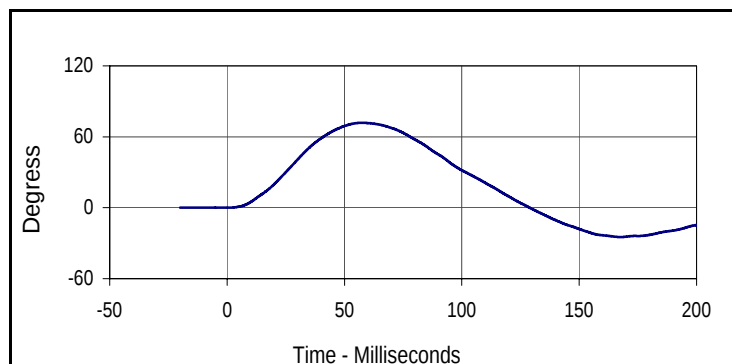
Test Date: 7/24/13
 Test I.D.: 299NB061



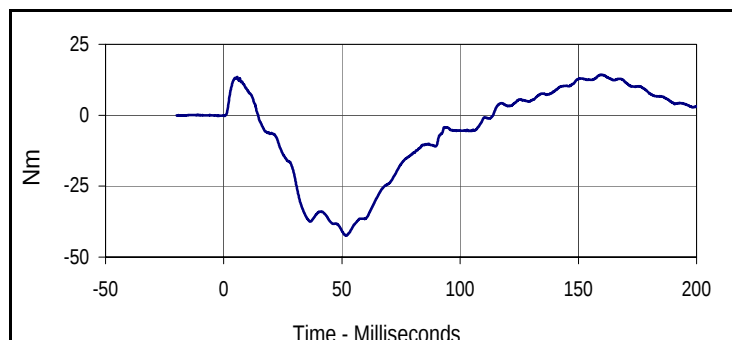
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	315	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	37.4	Pass
	Min		30.3	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.4	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.60	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.46	Pass
	15 msec	-3.30 to -4.10	-3.57	Pass
	20 msec	-4.40 to -5.40	-4.71	Pass
	25 msec	-5.40 to -6.10	-5.61	Pass
	25-100 msec	-5.50 to -6.20	-5.97	Pass
D-Plane Rotation	Max	71 to 81	71.8	Pass
	Time	50 to 70	57.5	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-42.5	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	114.0	Pass
Overall Test Results			Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.7	-6.7	184.3



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
71.8	57.5	-24.8	167.5



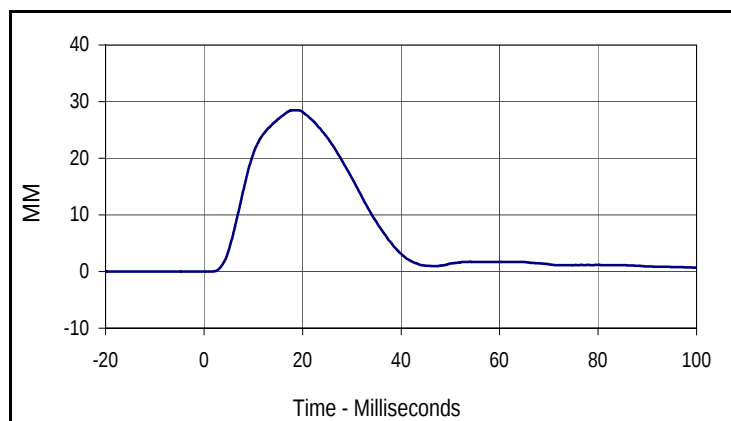
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
14.3	159.5	-42.5	51.8

Test Program: SID IIs Shoulder Impact Test
 ATD Serial No.: 299

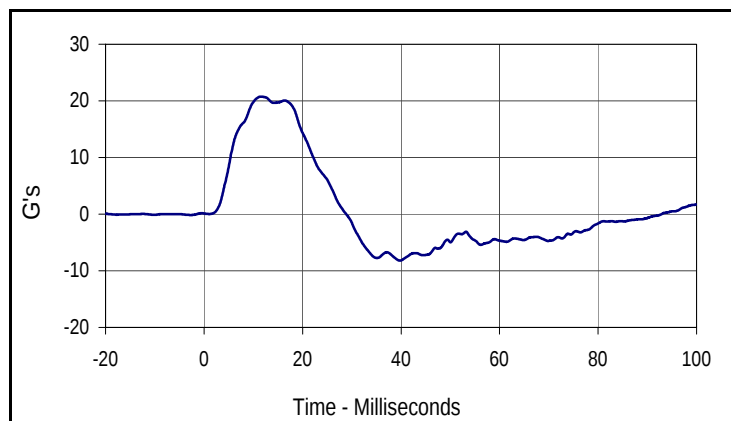
Test Date: 7/24/13
 Test I.D.: 299SH061



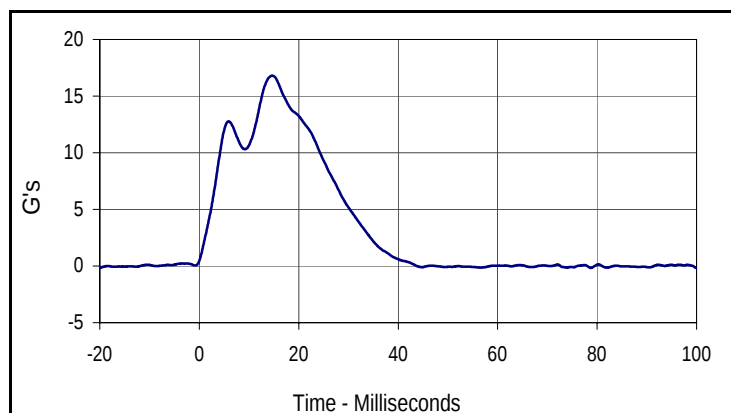
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	390	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.5	Pass
	Min	°C		20.9	Pass
Humidity During Soak	Max	%	10.0 to 70.0	37.4	Pass
	Min	%		30.3	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.5	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.28	Pass
Peak Shoulder Deflection		mm	28 to 37	28.5	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	20.7	Pass
Peak Impactor Acceleration		G's	13 to 18	16.8	Pass
Overall Test Results				Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
28.5	18.8	0.0	-15.2



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
20.7	11.5	-8.2	39.8



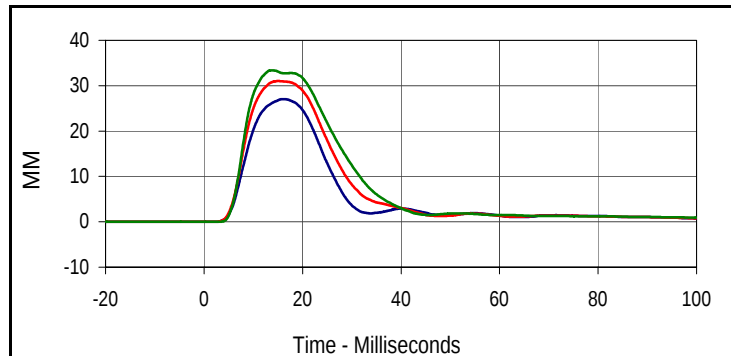
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.8	14.7	-0.2	78.7

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 299

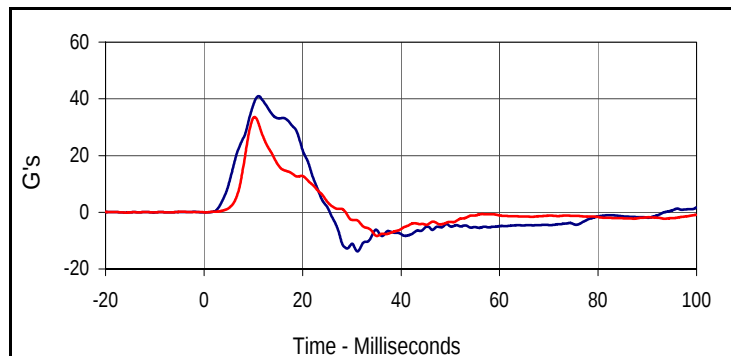
Test Date: 7/24/13
 Test I.D.: 299TWA061



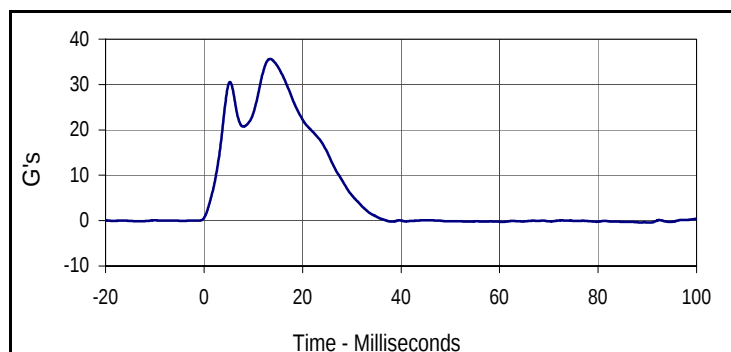
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	440	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	37.4	Pass
	Min		30.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.62	Pass
Peak Shoulder Deflection	mm	31 to 40	35.7	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	27.0	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	31.0	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	33.4	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	41.0	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	33.5	Pass
Peak Impactor Acceleration	G's	30 to 36	35.6	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
27.0	16.2	0.0	-4.2
Middle Thorax Deflection			
Max	Time	Min	Time
31.0	15.1	0.0	-5.8
Lower Thorax Deflection			
Max	Time	Min	Time
33.4	13.8	0.0	-4.8



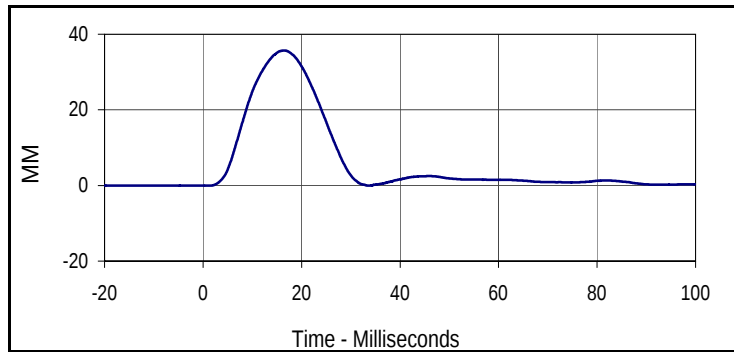
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
41.0	11.1	-13.7	31.2
Lower Spine Y Acceleration			
Max	Time	Min	Time
33.5	10.3	-8.4	35.1



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
35.6	13.4	-0.4	90.7

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 299

Test Date: 7/24/13
 Test I.D.: 299TWA061



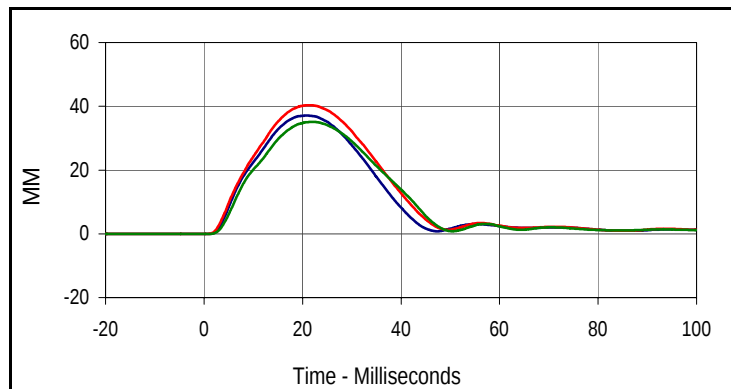
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
35.7	16.4	0.0	33.6

Test Program: SID IIs Thorax without Arm Impact Test
 ATD Serial No.: 299

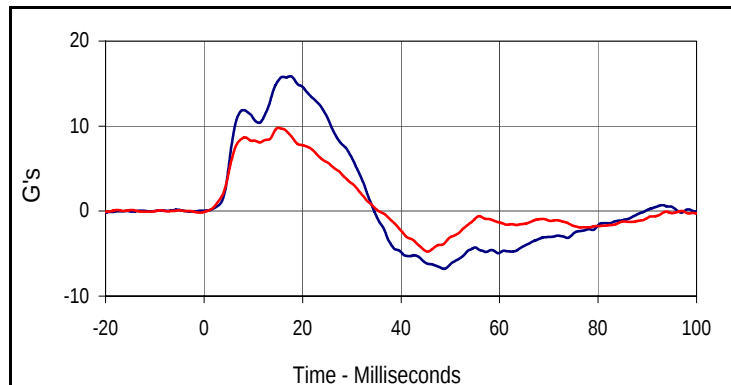
Test Date: 7/24/13
 Test I.D.: 299TWOA061



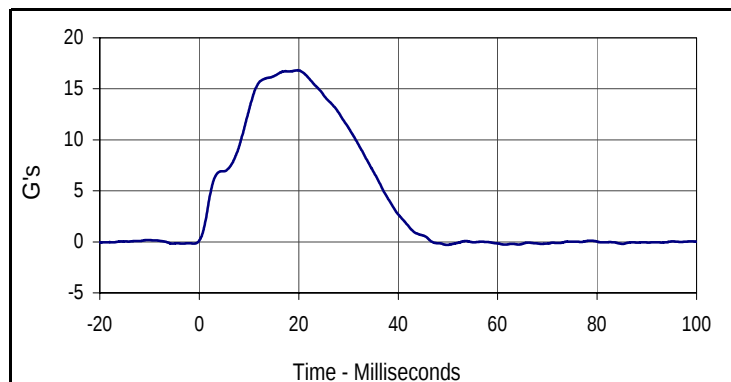
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	495	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.5	Pass
	Min	°C		20.9	Pass
Humidity During Soak	Max	%	10.0 to 70.0	37.4	Pass
	Min	%		30.3	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.5	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.29	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	37.1	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	40.3	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	35.1	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	15.9	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	9.8	Pass
Peak Impactor Acceleration		G's	14 to 18	16.8	Pass
Overall Test Results				Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
37.1	20.8	0.0	-6.9
Middle Thorax Deflection			
Max	Time	Min	Time
40.3	21.4	0.0	-5.3
Lower Thorax Deflection			
Max	Time	Min	Time
35.1	22.2	0.0	-3.9



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.9	17.5	-6.8	48.7
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.8	15.1	-4.8	45.4



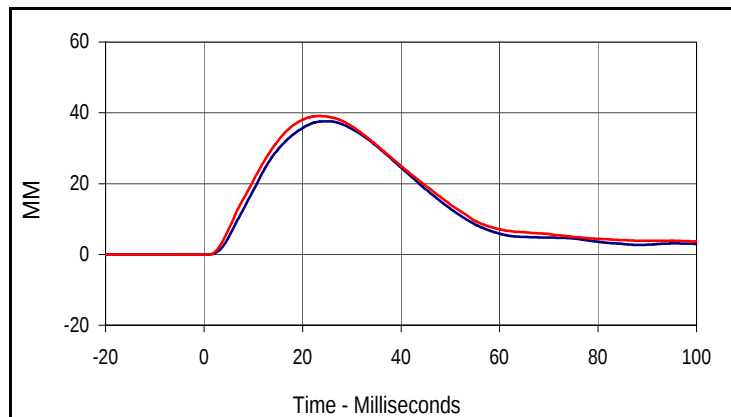
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
16.8	19.8	-0.3	49.9

Test Program: SID IIs Abdomen Impact Test
 ATD Serial No.: 299

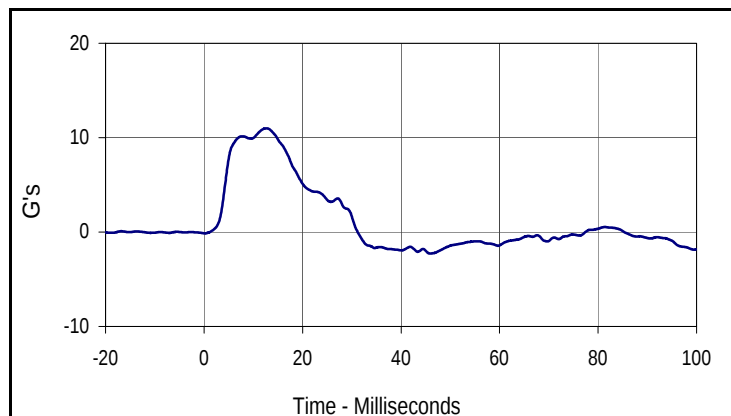
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 Test I.D.: 299ABD061



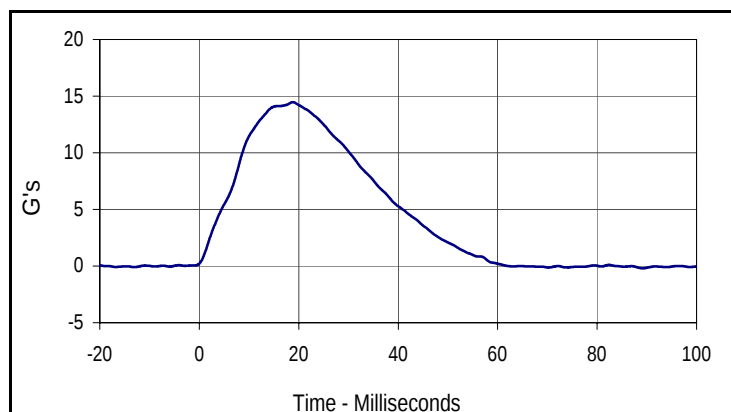
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	555	Pass
Temperature During Soak	Max °C	20.6 to 22.2	21.5	Pass
	Min °C		20.9	Pass
Humidity During Soak	Max %	10.0 to 70.0	37.4	Pass
	Min %		30.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.31	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	37.6	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	39.1	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	11.0	Pass
Peak Impactor Acceleration	G's	12 to 16	14.5	Pass
Overall Test Results			Pass	



Curve Description			
Upper Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
37.6	24.6	0.0	-7.9
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
39.1	23.4	0.0	-1.9

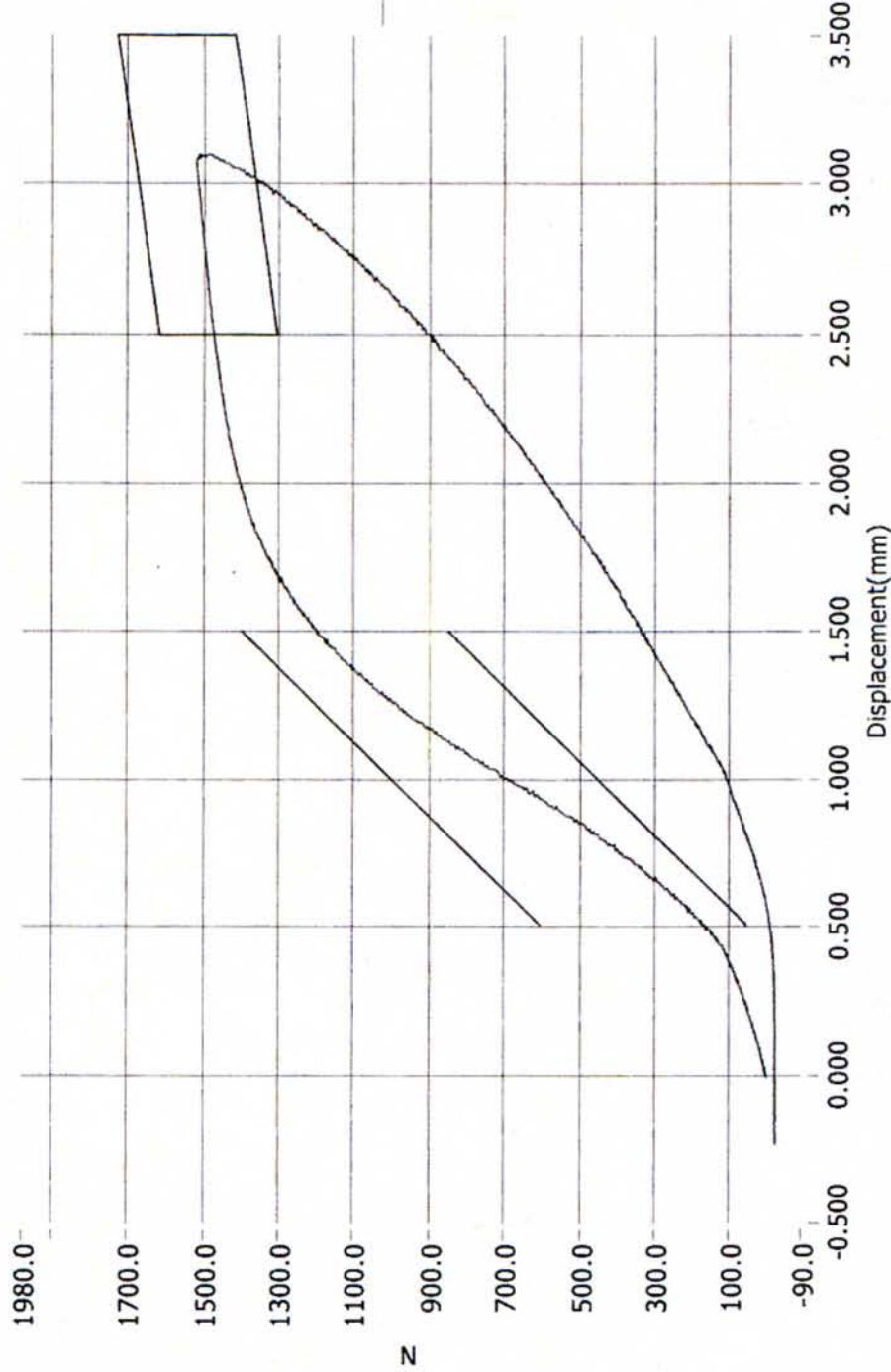


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
11.0	12.6	-2.3	45.9



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
14.5	18.8	-0.2	89.2

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	49031	12/7/2011	1:48 AM
Cert ID	ATD Serial Number	ATD Type	SIDIIs
	N/A		

MD5001 POST TEST

Current Date : 12/7/2011

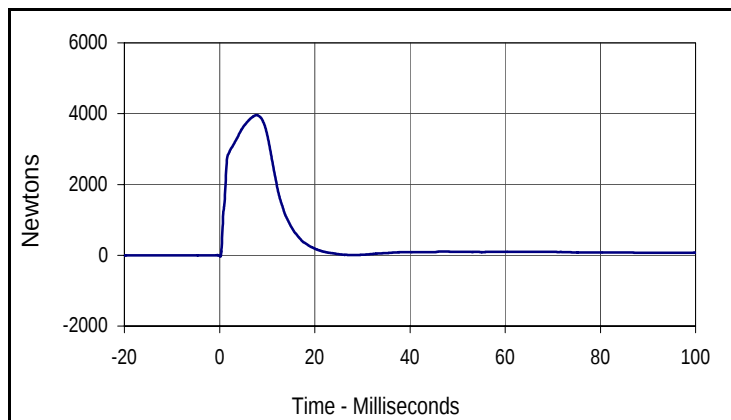
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Test Program: SID IIs Pelvis Acetabulum Impact Test
 ATD Serial No.: 299

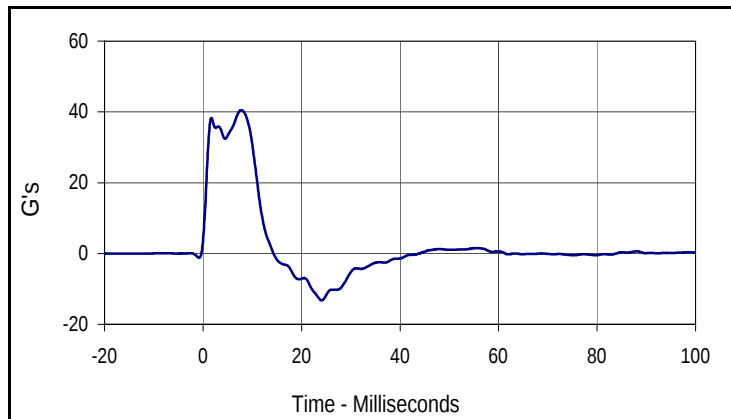
Test Date: 7/24/13
 Test I.D.: 299ACET061



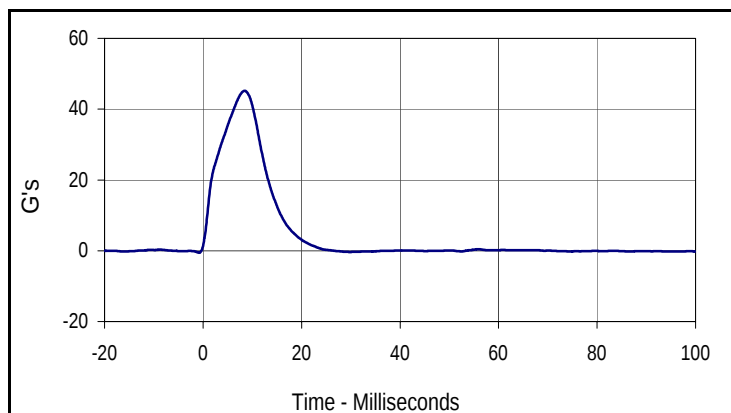
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	630	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	37.4	Pass
	Min		30.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.71	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	3958.2	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	40.5	Pass
Peak Impactor Acceleration	G's	38 to 47	45.2	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3958.2	7.8	-41.5	0.2



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
40.5	7.8	-13.3	24.1



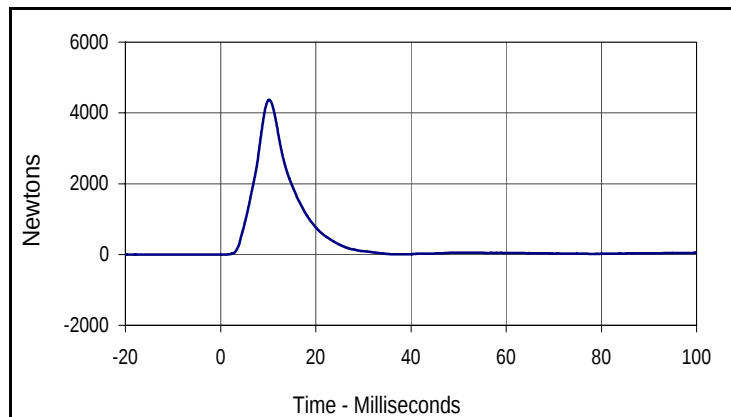
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
45.2	8.4	-0.5	-0.8

Test Program: SID IIs Pelvis Iliac Calibration
 ATD Serial No.: 299

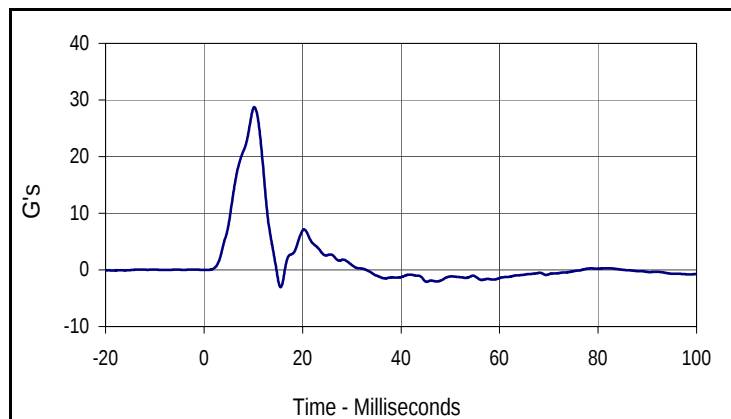
Test Date: 7/24/13
 Test I.D.: 299PL061



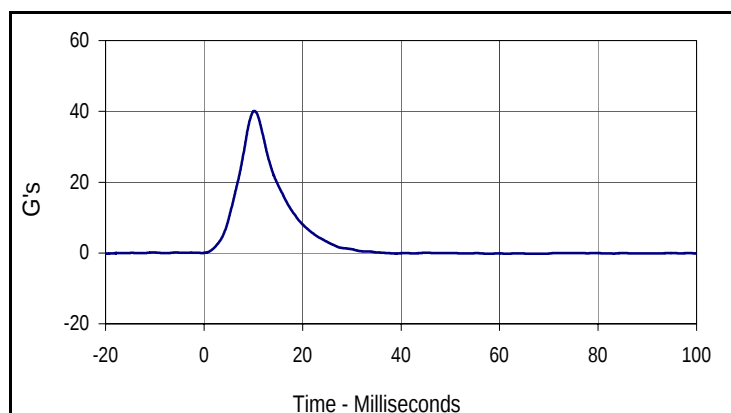
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	695	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		20.9	Pass
Humidity During Soak	Max	10.0 to 70.0	37.4	Pass
	Min		30.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.5	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.33	Pass
Peak Iliac Force	Newtons	4100 to 5100	4370.4	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	28.7	Pass
Peak Impactor Acceleration	G's	36 to 45	40.1	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4370.4	10.2	-3.0	-16.8



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
28.7	10.2	-3.1	15.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
40.1	10.2	-0.2	61.7

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 299		
				Serial Number	Manufacturer	Calibration
Head Accelerometers			X	P51926	Endevco	4/30/13
			Y	P51929	Endevco	4/30/13
			Z	P51934	Endevco	4/30/13
Displacement Potentiometers	Shoulder		Y	1074	FTSS	5/2/13
	Thoracic Rib	Upper	Y	1143	FTSS	5/2/13
		Middle	Y	1160	FTSS	5/2/13
		Lower	Y	1213	FTSS	5/2/13
	Abdominal Rib	Upper	Y	1218	FTSS	5/2/13
		Lower	Y	1234	FTSS	5/2/13
Lower Spine Accelerometers (T12)			X	P63999	Endevco	4/30/13
			Y	P58872	Endevco	4/30/13
			Z	P58795	Endevco	5/1/13
Acetabulum Load Cell			Y	272	Denton	4/19/13
Iliac Wing Load Cell			Y	284	Denton	4/19/13
Pelvis Plug (Struck Side)				48924	FTSS	12/5/11
Pelvis Plug (Non-Struck Side)				48946	FTSS	12/6/11

TABLE 2 – Vehicle Instrumentation

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	Keva202x	ICSensor	7/2/13
Vehicle Center of Gravity	Y	Keva202y	ICSensor	7/2/13
Vehicle Center of Gravity	Z	Keva202z	ICSensor	7/1/13
Left Floor Sill	Y	13503	Endevco	6/17/13
A-Pillar Sill	Y	13663	Endevco	7/1/13
A-Pillar Low	Y	13707	Endevco	6/18/13
A-Pillar Mid	Y	12891	Endevco	7/1/13
B-Pillar Sill	Y	13481	Endevco	6/17/13
B-Pillar Low	Y	13659	Endevco	6/26/13
B-Pillar Mid	Y	13651	Endevco	6/18/13
Driver Seat	Y	13486	Endevco	6/26/13
Engine Top	X	13316	Endevco	6/25/13
Engine Top	Y	13331	Endevco	6/26/13
Firewall	Y	13748	Endevco	4/17/13
Right Roof	Y	13646	Endevco	6/18/13
Right Floor Sill	Y	13490	Endevco	4/17/13
Rear Floorpan	X	13717	Endevco	6/17/13
Rear Floorpan	Y	12881	Endevco	6/17/13

TABLE 3 – Pole Instrumentation

	Serial Number	Manufacturer	Calibration Date
Load Cell 1	131822A	Interface	9/17/12
Load Cell 2	132304A	Interface	9/17/12
Load Cell 3	19477	Interface	9/18/12
Load Cell 4	19325	Interface	9/18/12
Load Cell 5	131827A	Interface	9/18/12
Load Cell 6	132302A	Interface	9/18/12
Load Cell 7	19267	Interface	9/19/12
Load Cell 8	19321	Interface	9/19/12