

REPORT NUMBER: SINCAP-KAR-15-020

**NEW CAR ASSESSMENT PROGRAM (NCAP)
MOVING DEFORMABLE BARRIER SIDE IMPACT TEST**

**BAYERISCHE MOTOREN WERKE AG
2015 BMW X3 XDRIVE28I 5-DOOR MPV**

NHTSA No: M20154106

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



DECEMBER 22, 2014

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. SINCAP-KAR-15-020	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Final Report of New Car Assessment Program Side Impact MDB Testing of a 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106		5. Report Date December 22, 2014
		6. Performing Organization Code KAR
7. Authors Mr. Balbino A. Beltran, Project Engineer, KARCO Mr. Frank Richardson, Program Manager, KARCO		8. Performing Organization Report No. TR-P34003-10-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, Dec. 10 - 22, 2014
		14. Sponsoring Agency Code NVS-111
15. Supplementary Notes		

16. Abstract

A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2015 BMW X3 xDrive28i 5-door MPV in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on December 10, 2014.

The impact velocity of the Moving Deformable Barrier was 61.82 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 21.1° C. The target vehicle's maximum post-test static crush was 230 mm located at level 3. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	44.1
Maximum Thoracic Rib Deflection	mm	44	22
Total Abdominal Force	N	2500	880
Pubic Symphysis Force	N	6000	986

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC ₃₆)		1000	162.3
Resultant Lower Spine Acceleration	g	82	42
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	3153
Maximum Thoracic Rib Deflection	mm	38*	24
Maximum Abdominal Rib Deflection	mm	45*	16

The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches. The opposite side doors did not open during the side impact event.

* Proposed IARV

17. Key Words New Car Assessment Program (NCAP) Side Impact Moving Deformable Barrier (MDB) ES-2re 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., 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 159	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	MDB Accelerometer Locations	17
8	Post-Test Observations	18
9	MDB Summary of Results	21
10	Test Vehicle Profile Measurements	22
11	Test Vehicle Exterior Crush Measurements	23
12	MDB Exterior Static Crush Measurements	26
13	Vehicle and MDB Damage Profile Distances	27
14	FMVSS No. 301 Static Rollover Results	28
15	Dummy/Vehicle Temperature and Humidity Stabilization	29
<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 moving deformable barrier side impact test is part of the MY2015 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 2015 BMW X3 xDrive28i 5-door MPV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated September 2013.

SECTION 2

SUMMARY OF TEST RESULTS

A 2015 BMW X3 xDrive28i 5-door MPV was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.82 km/h (38.43 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by KARCO Engineering, LLC. in Adelanto, California, on December 10, 2014. Pre- and post-test photographs of the test vehicle, the MDB and the dummies (ES-2re and SID-IIs) are included in Appendix A of this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated September 2013. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummy was instrumented in the following manner:

DRIVER ATD (ES-2re)

Primary and redundant head CG tri-axial accelerometers

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen forward, middle, and rear y-axis load cells

Lower spine (12) tri-axial accelerometers

Pubic symphysis y-axis load cell

PASSENGER ATD (SID-IIs)

Primary and redundant head CG tri-axial accelerometers

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen upper rib and lower rib y-axis displacement potentiometers

Lower spine (12) tri-axial accelerometers

Acetabulum and iliac wing y-axis load cells

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 of this report contains the test equipment and instrumentation calibration data.

Dummy injury readings were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	44.1
Maximum Thoracic Rib Deflection	mm	44	22
Combined Abdominal Force	N	2500	880
Pubic Symphysis Force	N	6000	986

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC ₃₆)		1000	162.3
Lower Spine (T12) Resultant Acceleration	g	82	42
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3153
Maximum Thoracic Rib Deflection	mm	38*	24
Maximum Abdominal Rib Deflection	mm	45*	16

*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)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other	No		No	

GENERAL COMMENTS

The two doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. The doors on the non-struck side remained closed and latched. There was no ATD value that exceeded its limits.

SECTION 3

OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

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: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	M20154106
Model Year	2015
Make	BMW
Model	X3 xDrive28i
Body Style	5-Door MPV
VIN	5UXWX9C55FOD52941
Body Color	Deep Sea Blue Metallic
Odometer Reading (km / mi)	55 / 34
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4
Engine Placement	Longitudinal
Transmission Type	Steptronic Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	No
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	Yes
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	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	Bayerische Motoren Werke AG
Date of Manufacture	Oct-14
Vehicle Type	MPV

GVWR (kg)	2304
GAWR Front (kg)	1089
GAWR Rear (kg)	1279

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	2	3		5
Capacity Weight (VCW) (kg)				410.0
DSC x 68.04 (kg)				340.2
Cargo Weight (RCLW) (kg)				69.8

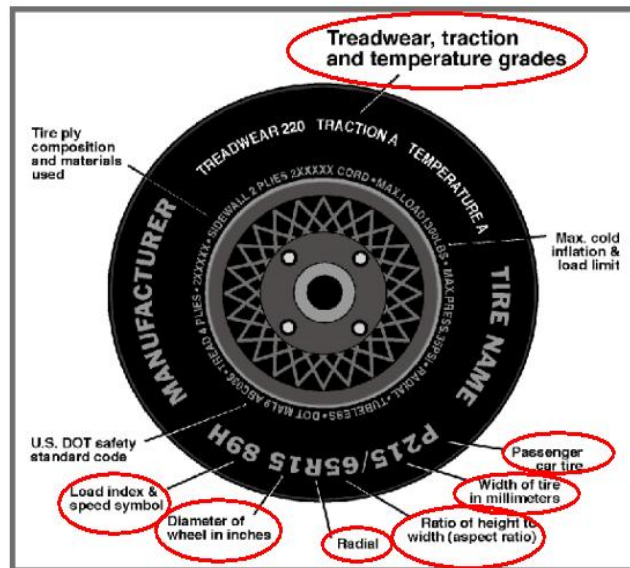
VEHICLE SEAT TYPE

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

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	220	240
Recommended Tire Size	P245/50R18	P245/50R18
Tire Size on Vehicle	P245/50R18	P245/50R18
Tire Manufacturer	Pirelli	Pirelli
Tire Model	Cinturato P4	Cinturato P4
Treadware	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	2 Rayon	2 Rayon
Tire Plies Body	2 Rayon, 2 Steel, 1 Polyamide	2 Rayon, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	100V	100V
Tire Material	Rayon, Steel, Polyamide	Rayon, Steel, Polyamide
DOT Safety Code Left	93 V2 N371 0714	93 V2 N371 0714
DOT Safety Code Right	93 V2 N371 0714	93 V2 N371 0714

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

TIRE PRESSURES

	Units	LF	RF	LR	RR
As Delivered	kPa	240	240	240	240
Tire Placard	kPa	220	220	240	240
Owner's Manual	kPa	220	220	240	240
As Tested	kPa	220	220	240	240

MDB TIRE SPECIFICATIONS

	Units	Requirement	LF	RF	LR	RR
Tire Size		P205/75R15	P205/75R15	P205/75R15	P205/75R15	P205/75R15
Tire Pressure	kPa	200 ± 21	200	200	200	200

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	459.0	476.5		499.0	558.5		494.0	568.0	
Right	kg	452.5	457.5		462.0	512.5		459.5	517.0	
Ratio	%	49.4%	50.6%	100.0%	47.3%	52.7%	100.0%	46.8%	53.2%	100.0%
Total	kg	911.5	934.0	1845.5	961.0	1071.0	2032.0	953.5	1085.0	2038.5

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1845.5	A
Actual Weight of 2 P572 ATDs Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	69.8	C
Calculated Vehicle Target Wt (TVTW)	kg	2040.3	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	Fully Loaded	As Tested	Meets Requirement***
LF	mm	832	833	Yes
RF	mm	837	838	Yes
LR	mm	820	822	Yes
RR	mm	830	825	Yes
Vehicle CG (Aft of Front Axle)	mm	1423	1482	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	11	33	

***The "As Tested" vehicle attitude measurements must be equal to or within ±10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well. Indicate "Yes" or "No" for "Meets Requirement"

DATA SHEET NO. 1 ... (CONTINUED)

GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW

Component Description	Weight (kg)
Trunk Trim	16.0
Ballast / Equipment Added	67.5

Test Height Adjustable Setting (If Applicable)	
--	--

DATA SHEET NO. 2

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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

SEAT POSITIONING

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, 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 rearmost, lowest, mid-angle position.

SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	12.1	0.0	6.0
Front Passenger Seat	12.2	0.0	6.1
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	664	Max	716	724	734
			Mid	686	694	704
			Min	656	664	674
Front Passenger Seat	6.1	622	Max	665	673	682
			Mid	639	648	657
			Min	613	622	631
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: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

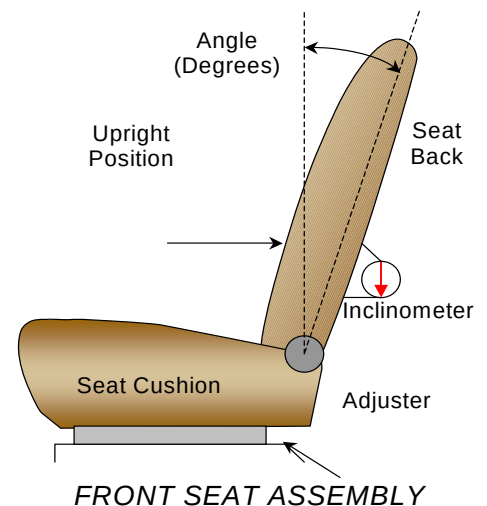
SEAT FORE/AFT POSITION

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	248		124	
Front Passenger Seat	250		125	
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

*Detent zero (0) is the forward most detent

SEAT BACK ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The right front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck side rear seat back. Seat back angle is measured at the seat back.



SEAT BACK POSITION

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/Seated Dummy	66.4		24.2	
Front Passenger Seat	70.9		24.2	
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

*Detent zero (0) is the forward most detent

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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

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
Rear Seat	Fixed	Fixed

HEAD RESTRAINT ADJUSTMENT

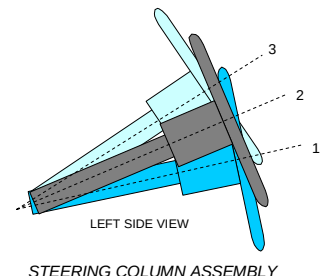
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

	Total No. of Positions	Placed in Position
Driver Seat	5	Full Up
Rear Seat	5	Full Down

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	22.5	84
Geometric Center - Position 2	23.9	114
Uppermost - Position 3	25.4	144
Telescoping Steering Wheel Travel		60
Test Position	23.9	114



DATA SHEET NO. 2 ... (CONTINUED)

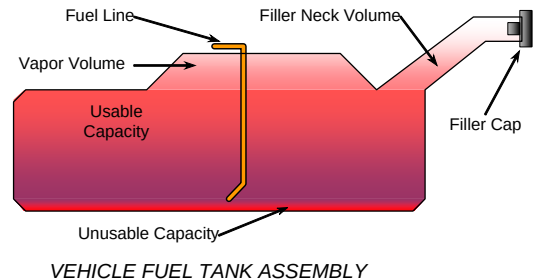
SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

FUEL PUMP

The vehicle is equipped with an electric fuel pump.

The fuel pump operates for 5 seconds after the ignition is switched to the "ON" position. After pressure has been built up the pump switches to sleep mode until the engine is started or the pressure decreases.



FUEL TANK CAPACITY

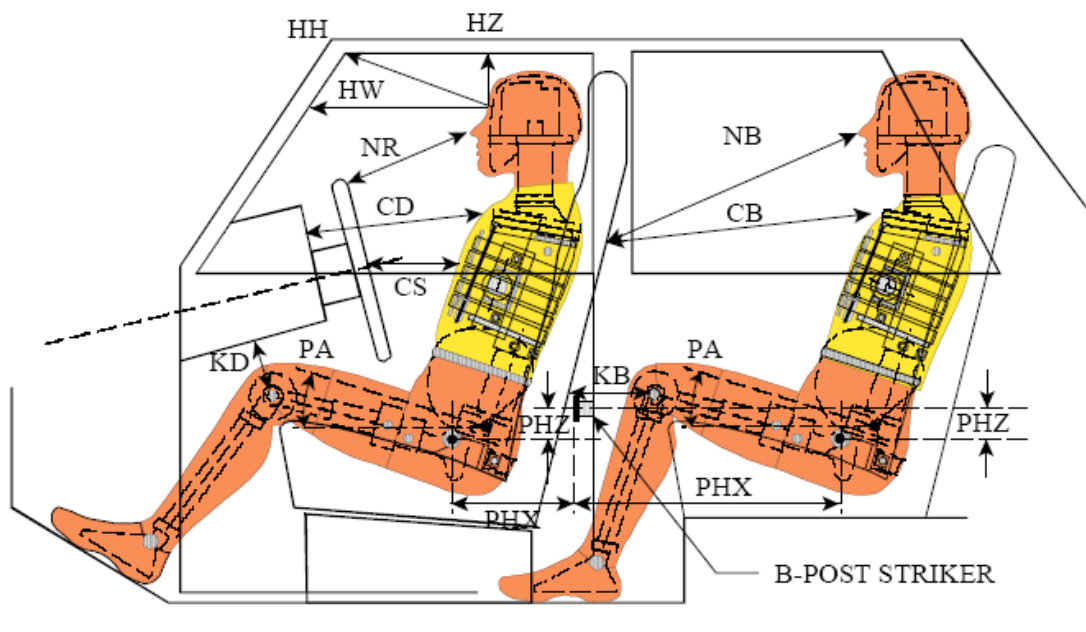
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	66.99
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	62.30
Actual amount of Solvent Used in Test	62.30
1/3 of Usable Capacity	22.33

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: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



LEFT SIDE VIEW

NOTE: 2-DOOR VEHICLE SHOWN.
 REAR DUMMY PHX & PHZ
 MEASUREMENTS FOR A 4-DOOR
 VEHICLE WOULD USE THE C-POST
 STRIKER AS A REFERENCE POINT

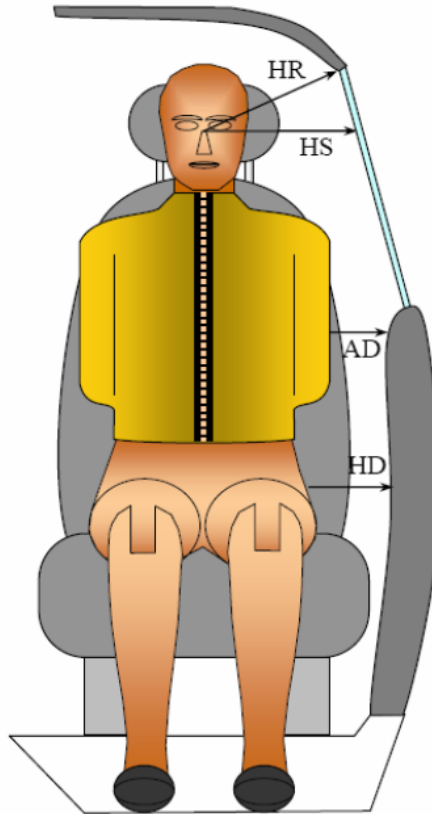
DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	458			
HW		Head to Windshield	713			
HZ	HZ	Head to Roof	193		305	
NR	NB	Nose to Rim/Seat Back	483		533	
CD	CB	Chest to Dash/Seat Back	595		523	
CS		Chest to Steering Wheel	331			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	185	39.4	273	22.6
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	145	36.7	149	2.1
PAX°	PAX°	Pelvic Tilt Angle X		17.4		22.4
	PAY°	Pelvic Tilt Angle Y		0.0		0.3
PHX	PHX	Hip Point to Striker (x-axis)	133		152	
PHZ	PHZ	Hip Point to Striker (z-axis)	191		223	

DATA SHEET NO. 4

DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



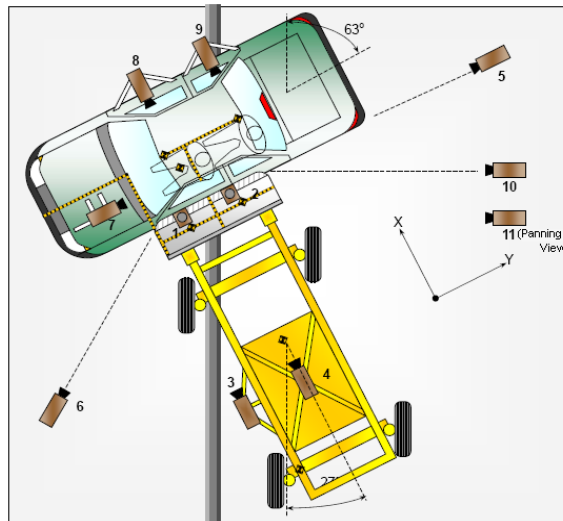
DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	220	304
HS	Head to Side Window	mm	343	390
AD	Arm to Door	mm	88	160
HD	H-Point to Door	mm	161	195

DATA SHEET NO. 5

CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



CAMERA LOCATIONS AND DATA

No.	View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Overhead Overall	1220	2287	-5486	14	1000
2	Overhead Close-Up	609	2287	-5102	35	1000
3	Left Impact Point (MDB)	-2134	0	-1143	25	1000
4	Side Overall (MDB)	-3912	838	-1829	12.5	1000
5	Rear	-64	2485	-1348	85	1000
6	Left Front	-2266	-3564	-1475	24	1000
7	Driver Front (On-Board)	527	-606	-854	24	1000
8	Driver Side (On-Board)	1723	920	-490	12	1000
9	Passenger Side (On-Board)	1741	1676	-500	12	1000
10	Real Time Overall				Zoom	30
11	Real Time Inrun				Zoom	30

Reference: Impact Point Projected to Ground; +X = To Front of MDB, +Y = To Right of MDB, +Z = Down

*All measurements accurate to ± 6 mm

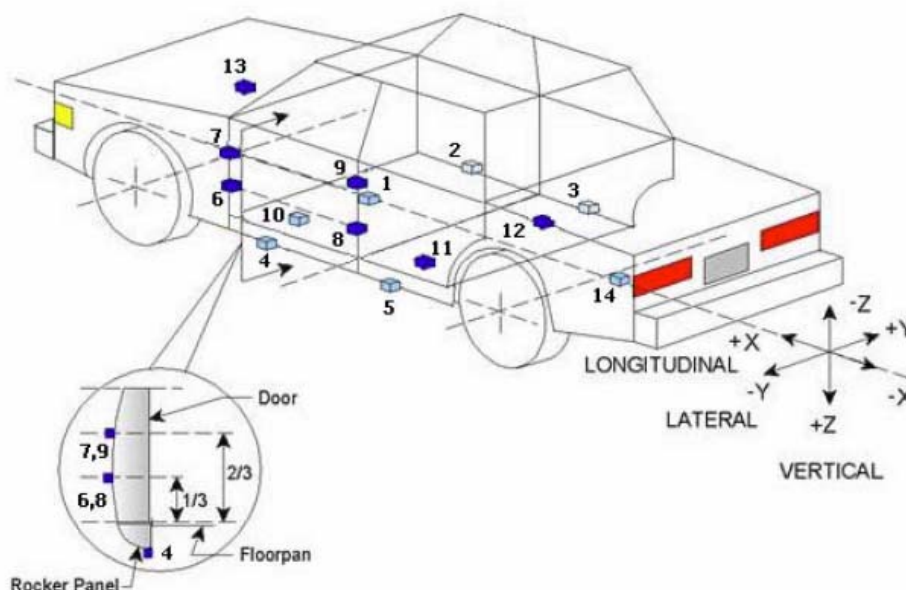
INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	22
MDB Accelerometers	5
Total	59

DATA SHEET NO. 6

TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

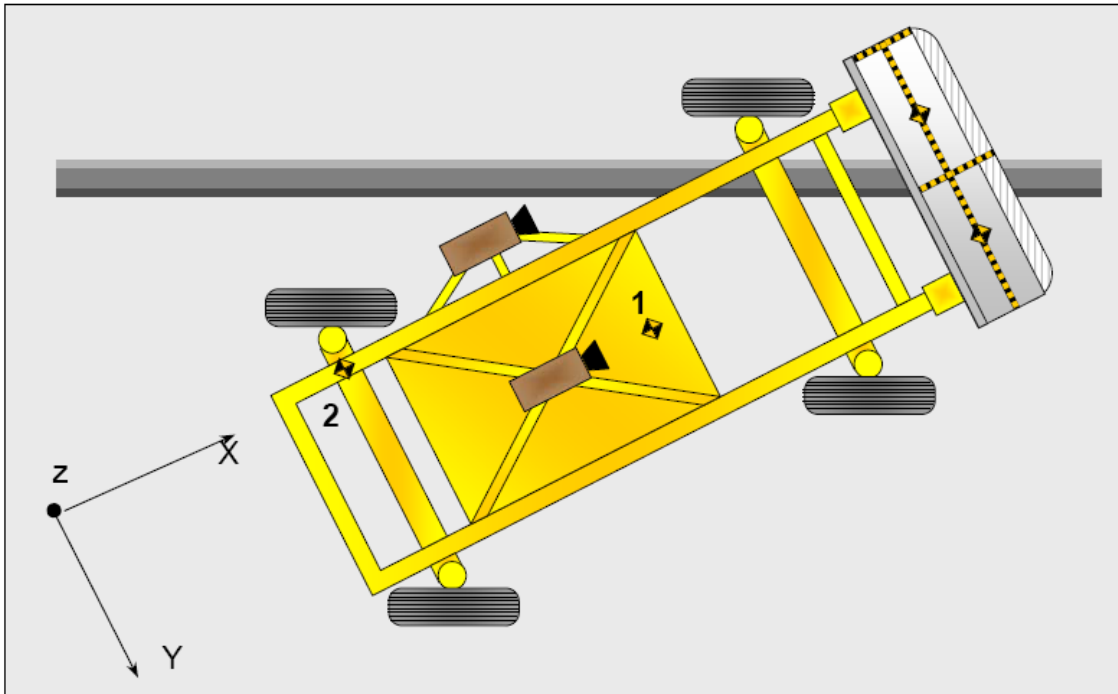
Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2055	90	-450
2	Right Sill at Front Seat	2708	725	-395
3	Right Sill at Rear Seat	1820	730	-410
4	Left Sill at Front Door	2530	-730	-235
5	Left Sill at Rear Door	1765	-735	-230
6	A-Pillar Lower	3149	-830	-660
7	A-Pillar Middle	3149	-830	-875
8	B-Pillar Lower	2075	-740	-595
9	B-Pillar Middle	2075	-740	-920
10	Front Seat Track	2380	-585	-425
11	Rear Seat Structure			
12	Right Rear Occupant Compartment	2068	445	-310
13	Engine Block	3905	-70	-875
14	Rear Floorpan Above Axle	1115	55	-660

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

DATA SHEET NO. 7

MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



MDB ACCELEROMETER LOCATIONS

Loc. No.	Accelerometer Location	Measurement		
		X	Y	Z
1	MDB CG	-1195	0	-430
2	MDB Rear	-2642	-593	-608

Reference: X – Face of MDB (+ forward)
Y – MDB centerline (+ to right)
Z – Ground plane (+ down)

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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

TEST DUMMY INFORMATION AND CONTACT POINTS

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	None	None
Top of Head	Curtain Airbag	Curtain Airbag
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Curtain Airbag, Headrest	Curtain Airbag, Center Seat Back
Left Shoulder	B-Pillar	Door Panel
Upper Torso	Seat, Torso Airbag	Door Panel, Seat
Lower Torso	Seat, Torso Airbag	Door Panel, Seat
Left Hip	Seat, Torso Airbag, Door Panel	Door Panel, Seat
Left Knee	Door Panel	Door Panel, Right Knee

POST-TEST DOOR PERFORMANCE

Description	Struck Side		Non-Struck Side		Rear Hatch/Other
	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

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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

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	None
Side Window Damage	Left Rear Broken
Other Notable Effects	None

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

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	Yes	No	No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso)	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
Vehicle Wheel Base	mm		2811
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		465
Actual Impact Point (Aft of Front Axle)	mm		465
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	0
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	7

DATA SHEET NO. 9**MDB SUMMARY OF RESULTS**

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

MDB SPECIFICATIONS

Measurement Description	Length (mm)
Overall Width of Framework Carriage	1251
Overall Length including Honeycomb Face	4023
Wheel Base of Framework Carriage	2595
CG location aft of Front Axle	1118

MDB WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	401.8	298.0	699.8
Right	kg	376.9	291.6	668.5
Ratio	%	56.9%	43.1%	100.0%
Totals	kg	778.7	589.6	1368.3

SPEED AND IMPACT DATA

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	61.1 to 62.7	61.82
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.84
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.9
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.1

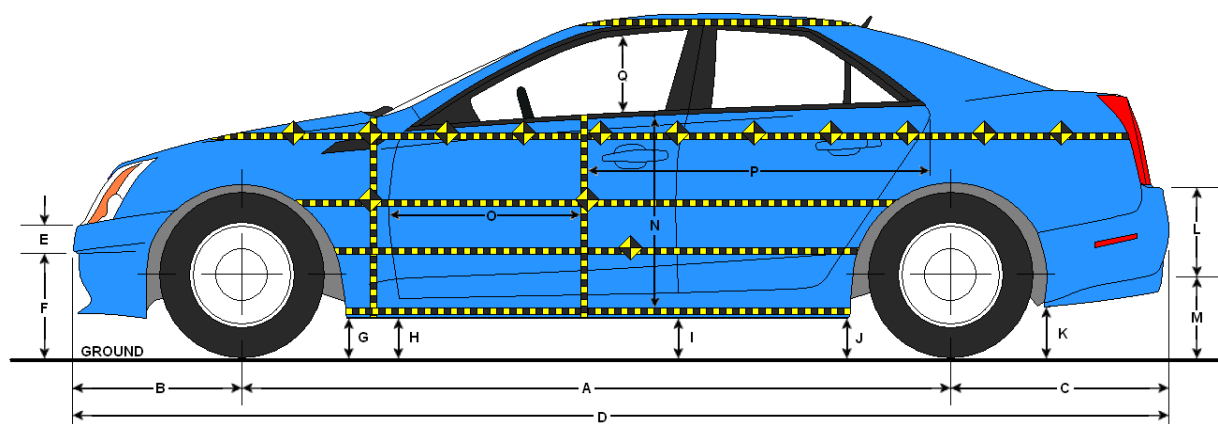
MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	219
B	Top of Bumper	533	800	Left	97
C	Mid Level	686	800	Left	131
D	Top of Stack	813	800	Left	185

DATA SHEET NO. 10

TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



LEFT SIDE VIEW

VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

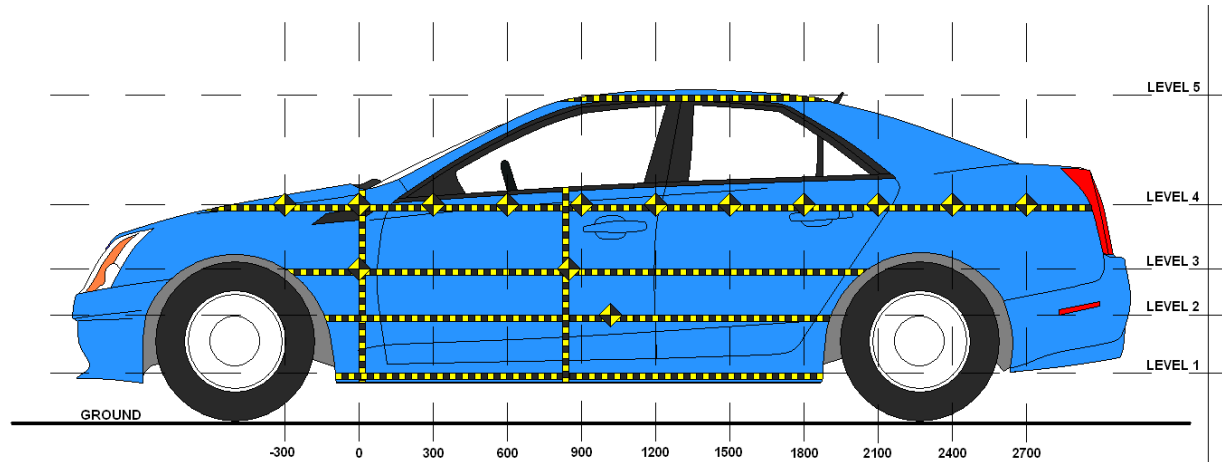
Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2811	2806	-5
B	Front Axle to FSOV	844	841	-3
C	Rear Axle to RSOV	989	995	6
D	Total Length at Centerline	4644	4641	-3
E	Front Bumper Thickness	138	138	0
F	Front Bumper Bottom to Ground	451	479	28
G	Sill Height at Front Wheel Well	260	279	19
H	Sill Height at Front Door Leading Edge	283	313	30
I	Sill Height at B-Pillar	287	319	32
J1	Sill Height at Rear Wheel Well	267	286	19
J2	Pinch Weld Height at Rear Wheel Well	231	235	4
K	Sill Height Aft of Rear Wheel Well	296	311	15
L	Rear Bumper Thickness	175	175	0
M	Rear Bumper Bottom to Ground	436	450	14
N	Sill Height to Bottom of Front Window Sill	736	664	-72
O	Front Door Leading Edge to Impact CL	689	664	-25
P	Rear Door Trailing Edge to Impact CL	1421	1381	-40
Q	Front Window Opening	492	504	12
R	Right Side Length	3364	3366	2
S	Left Side Length	3362	3349	-13
T	Vehicle Width at B-Pillar	1850	1737	-113

All measurements in mm with tolerance of ± 3 mm

DATA SHEET NO. 11

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



LEFT SIDE VIEW

MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	358	131	1200
2	Occupant H-Point	676	218	1800
3	Mid-Door	711	230	1800
4	Window Sill	1048	83	1650
5	Window Top	1615	14	900

DATA SHEET NO. 11 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106

Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14

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															
-750															
-600															
-450															
-300				694					701					7	
-150		566	570	682			582	588	690			16	18	8	
0	609	583	584	671		619	623	632	677		10	40	48	6	
150	604	594	594	664		622	688	677	673		18	94	83	9	
300	597	594	593	665		680	725	717	689		83	131	124	24	
450	590	590	589	667		687	728	735	691		97	138	146	24	
600	584	587	585	663		694	749	763	686		110	162	178	23	
750	580	584	582	662		698	768	775	685		118	184	193	23	
900	579	582	580	654	887	703	771	775	686	901	124	189	195	32	14
1050	576	582	580	652	886	706	740	744	686	898	130	158	164	34	12
1200	574	584	582	646	887	705	724	723	692	900	131	140	141	46	13
1350	580	587	584	645	891	699	740	730	711	902	119	153	146	66	11
1500	582	592	588	642	893	700	764	773	717	905	118	172	185	75	12
1650	586	596	593	641	896	702	812	814	724	906	116	216	221	83	10
1800	592	589	589	638	897	687	807	819	714	907	95	218	230	76	10
1950		572	574	638	899		683	701	684	907		111	127	46	8
2100			561	615	900			595	617	910			34	2	10
2250				644	905				609	914				-35	9
2400				654	910				684	919				30	9
2550				667	923				684	931				17	8
2700				682	946				690	952				8	6
2850															

DATA SHEET NO. 11 ... (CONTINUED)

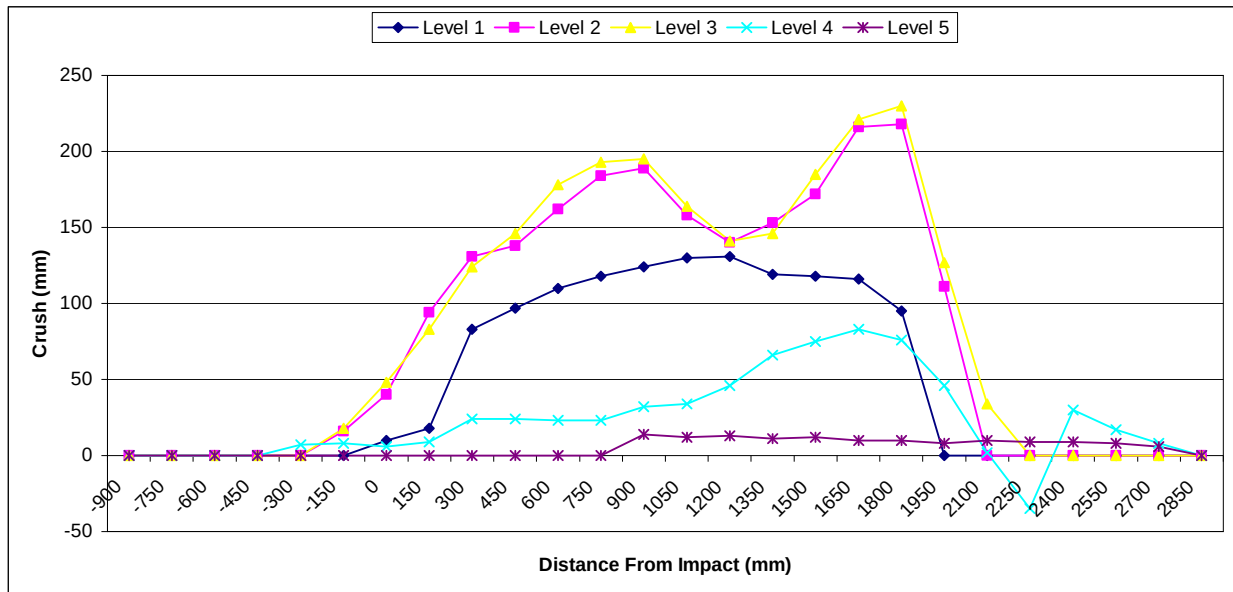
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV

NHTSA No. M20154106

Test Program: NCAP MDB Side Impact Test

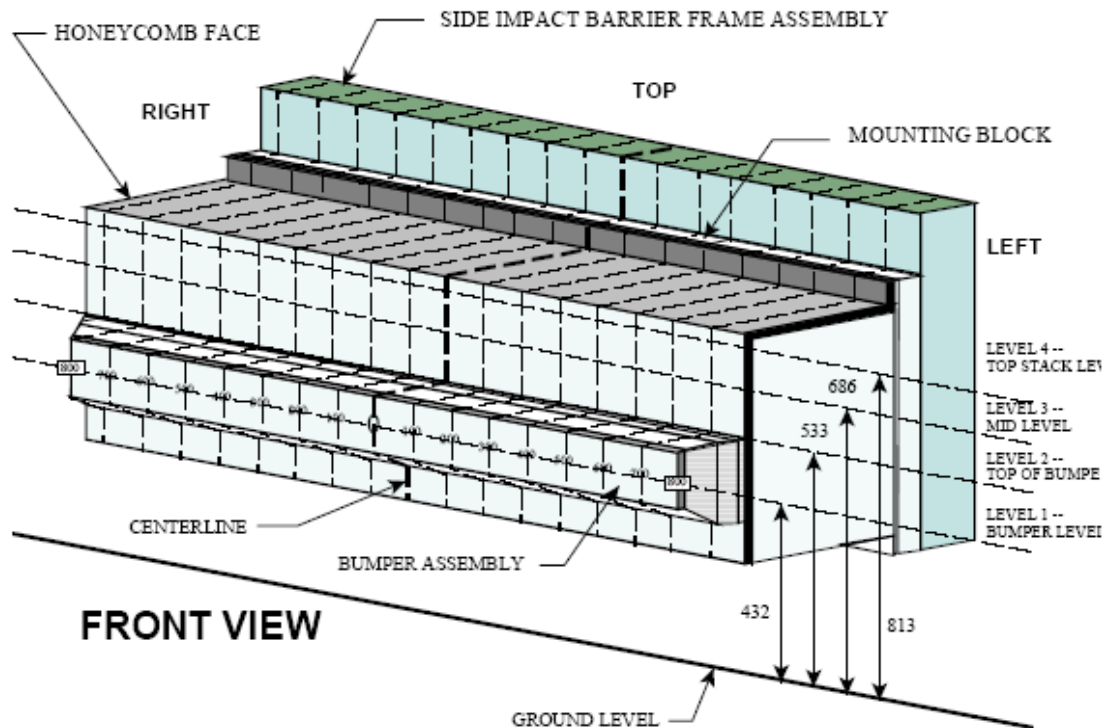
Test Date: 12/10/14



DATA SHEET NO. 12

MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



NOTE: Dimensions are shown in millimeters, mm

DEFORMABLE BARRIER STATIC CRUSH

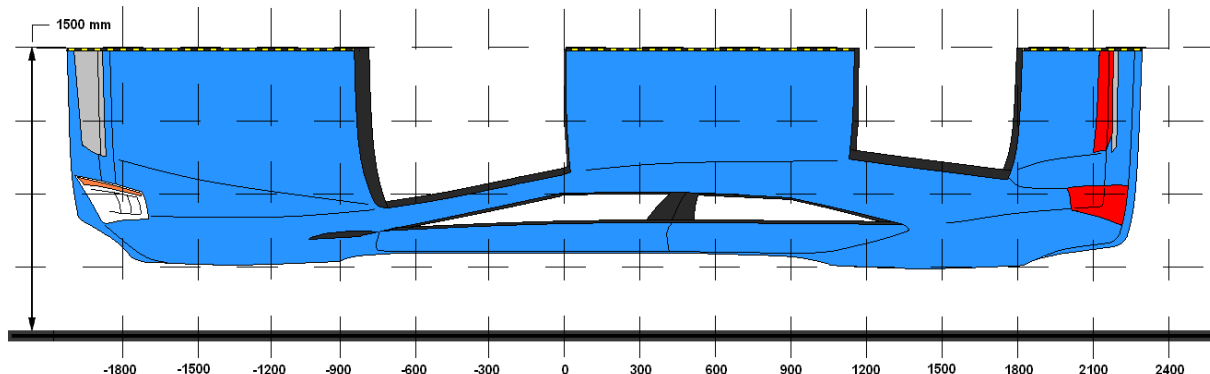
Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	219	202	209	201	199	192	197	199	204	184	189	191	179	185	174	184	188
2	87	80	76	72	76	77	71	66	62	62	67	73	73	77	80	82	97
3	33	42	62	77	83	105	89	71	46	33	27	32	47	61	77	92	131
4	51	50	57	77	103	125	92	57	37	33	42	52	62	67	92	137	185

All dimensions in millimeters.

DATA SHEET NO. 13

VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14



VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2700	4	682	690	8
2	2100	3	561	595	34
3	1500	3	588	773	185
4	900	3	580	775	195
5	300	2	594	725	131
6	-300	4	694	701	7

MDB DAMAGE PROFILE DISTANCES

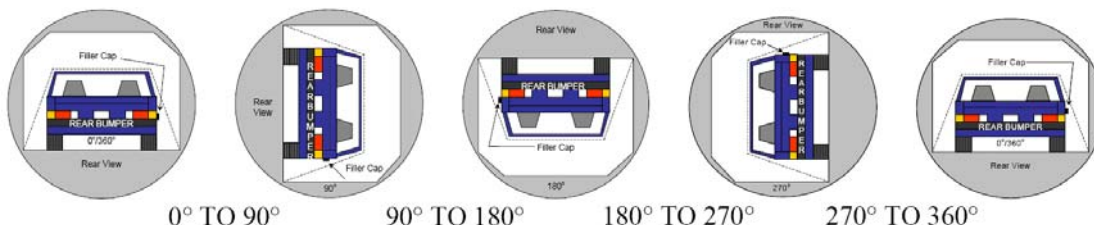
DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	188
2	500	Left	1	185
3	200	Left	1	189
4	200	Right	1	197
5	500	Right	1	201
6	800	Right	1	219

DATA SHEET NO. 14

FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV NHTSA No. M20154106
 Test Program: NCAP MDB Side Impact Test Test Date: 12/10/14
 Temperature at Time of Impact: 21.1 C Test Time: 12:56 PM

- A. From impact until vehicle motion ceases: 0 oz.
 (Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.
 (Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.
 (Maximum allowable = 1 oz./minute)
- D. Spillage Details: There was no Stoddard solvent spillage.



SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	84	300	384
90° To 180°	81	300	381
180° To 270°	79	300	379
270° To 360°	83	300	383

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

DATA SHEET NO. 15

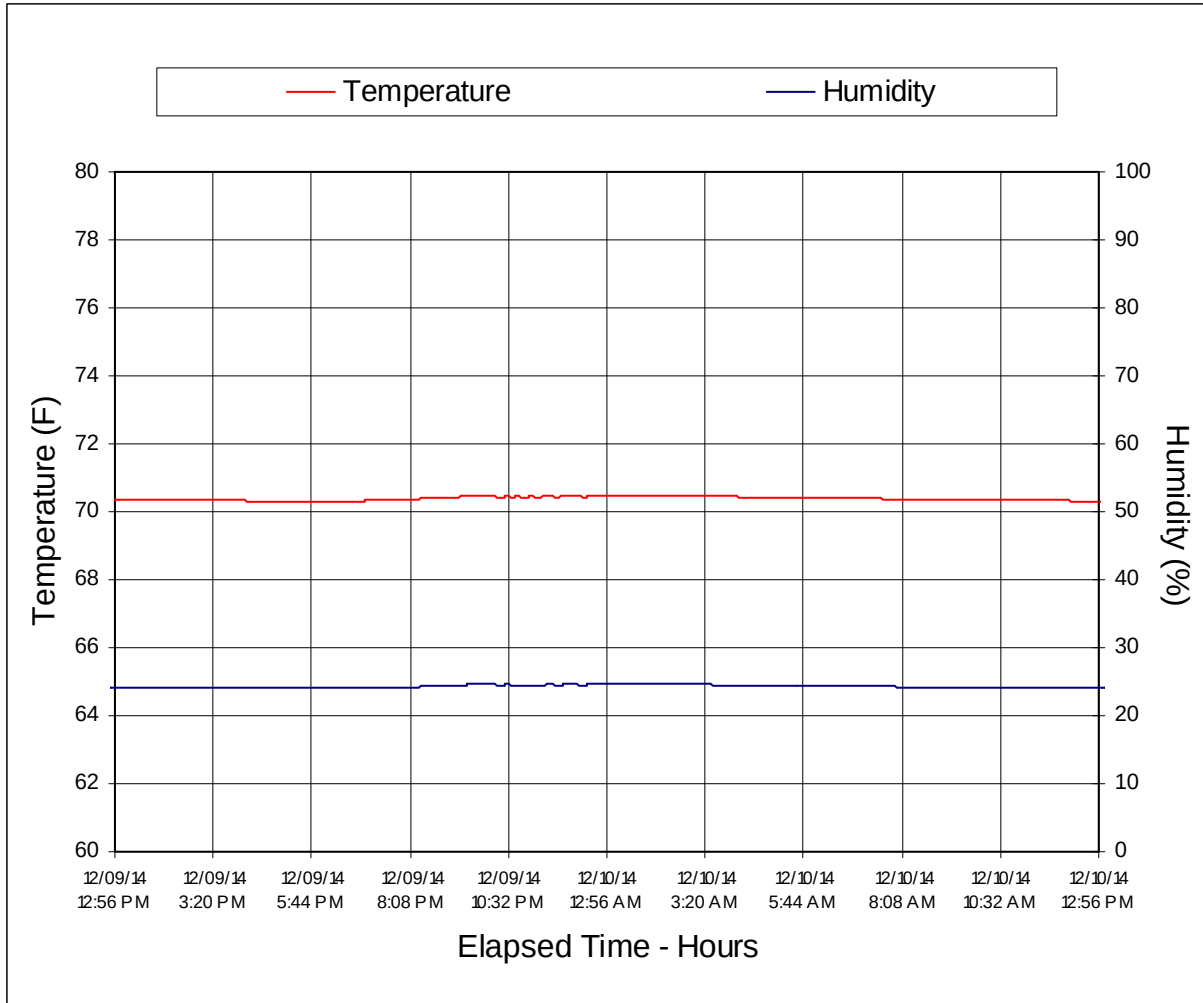
DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV

NHTSA No. M20154106

Test Program: NCAP MDB Side Impact Test

Test Date: 12/10/14



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 MDB Positioned Against Side of Test Vehicle	A-9
18	Pre-Test Right Side View of MDB Positioned Against Side of Test 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	A-10
21	Pre-Test Left Front Door Latch Close-Up	A-11
22	Post-Test Left Front Door Latch Close-Up	A-11
23	Pre-Test Left Rear Door Latch Close-Up	A-12
24	Post-Test Left Rear Door Latch Close-Up	A-12
25	Pre-Test Front Close-Up View of Driver Dummy	A-13
26	Post-Test Front Close-Up View of Driver Dummy	A-13
27	Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking	A-14
28	Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-14
29	Post-Test Left Side View of Driver Dummy Shoulder and Door Top View	A-15
30	Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning	A-15
31	Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint	A-16
32	Pre-Test Overhead View of Driver Seat Pan Prior to Dummy Positioning	A-16
33	Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan	A-17
34	Pre-Test Placement of Driver Dummy's Feet	A-17
35	Pre-Test View of Belt Anchorage for Driver Dummy	A-18

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
36	Pre-Test Left Side View of Steering Wheel	A-18
37	View of Disengaged Parking Brake	A-19
38	Pre-Test View of Parking Brake	A-19
39	Pre-Test Close-Up Left Side View of Driver Seat Track	A-20
40	Pre-Test Close-Up Left Side View of Driver Seat Back	A-20
41	Pre-Test Close-Up View of Driver Seat Back or Head Restraint	A-21
42	Pre-Test Driver Dummy and Door Clearance View	A-21
43	Post-Test Driver Dummy and Door Clearance View	A-22
44	Pre-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment	A-22
45	Post-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment	A-23
46	Pre-Test Driver Inner Door Panel View	A-23
47	Post-Test Driver Inner Door Panel View Showing Driver Dummy Contact Locations	A-24
48	Post-Test Driver Dummy Close-Up Head Contact with Vehicle Interior View	A-24
49	Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View	A-25
50	Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View	A-25
51	Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View	A-26
52	Post-Test Driver Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-26
53	Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View	A-27
54	Post-Test Driver Dummy Close-Up Knee Contact View	A-27
55	Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking	A-28
56	Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-28
57	Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View	A-29
58	Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning	A-29
59	Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint	A-30
60	Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning	A-30
61	Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan	A-31
62	Pre-Test View of Rear Passenger Dummy's Neck Showing Position of Adjustable Neck Bracket	A-31
63	Pre-Test View of Rear Passenger Dummy's Head Showing Dummy's Head is Level	A-32
64	Pre-Test Placement of Rear Passenger Dummy's Feet	A-32
65	Pre-Test View of Belt Anchorage for Rear Passenger Dummy	A-33
66	Pre-Test Close-Up Left Side View of Rear Passenger Seat Track	A-33
67	Pre-Test Close-Up Left Side View of Rear Passenger Seat Back	A-34
68	Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint	A-34
69	Pre-Test Rear Passenger Dummy and Door Clearance View	A-35
70	Post-Test Rear Passenger Dummy and Door Clearance View	A-35

TABLE OF PHOTOGRAPHS ... (CONTINUED)

Figure		Page
71	Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-36
72	Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment	A-36
73	Pre-Test Rear Passenger Inner Door Panel View	A-37
74	Post-Test Rear Passenger Inner Door Panel View Showing Rear Passenger Dummy Contact Locations	A-37
75	Post-Test Rear Passenger Dummy Close-Up Head Contact with Vehicle Interior View	A-38
76	Post-Test Rear Passenger Dummy Close-Up Head Contact with Side Airbag View	A-38
77	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Vehicle Interior View	A-39
78	Post-Test Rear Passenger Dummy Close-Up Torso Contact with Side Airbag View	A-39
79	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Vehicle Interior View	A-40
80	Post-Test Rear Passenger Dummy Close-Up Pelvis Contact with Side Airbag View	A-40
81	Post-Test Rear Passenger Dummy Close-Up Knee Contact View	A-41
82	Pre-Test View of Fuel Filler Cap or Fuel Filler Neck	A-41
83	Post-Test View of Fuel Filler Cap or Fuel Filler Neck	A-42
84	Pre-Test Front View of MDB Impactor Face	A-42
85	Post-Test Front View of MDB Impactor Face	A-43
86	Pre-Test Top View of MDB Impactor Face	A-43
87	Post-Test Top View of MDB Impactor Face	A-44
88	Pre-Test Left Side View of MDB Impactor Face	A-44
89	Post-Test Left Side View of MDB Impactor Face	A-45
90	Pre-Test Right Side View of MDB Impactor Face	A-45
91	Post-Test Right Side View of MDB Impactor Face	A-46
92	Close-Up View of Vehicle's Certification Label	A-46
93	Close-Up View of Vehicle's Tire Information Placard or Label	A-47
94	Pre-Test Ballast View	A-47
95	Post-Test Primary and Redundant Speed Trap Read-Out	A-48
96	FMVSS No. 301 Static Rollover 0 Degrees	A-48
97	FMVSS No. 301 Static Rollover 90 Degrees	A-49
98	FMVSS No. 301 Static Rollover 180 Degrees	A-49
99	FMVSS No. 301 Static Rollover 270 Degrees	A-50
100	FMVSS No. 301 Static Rollover 360 Degrees	A-50
101	Impact Event	A-51
102	Monroney Label	A-51
103	Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-52
104	Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual	A-52



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 MDB Positioned
Against Side of Test Vehicle



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



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



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



FIGURE 21. Pre-Test Left Front Door Latch Close-Up



FIGURE 22. Post-Test Left Front Door Latch Close-Up



FIGURE 23. Pre-Test Left Rear Door Latch Close-Up



FIGURE 24. Post-Test Left Rear Door Latch Close-Up



FIGURE 25. Pre-Test Front Close-Up View of Driver Dummy



FIGURE 26. Post-Test Front Close-Up View of Driver Dummy



FIGURE 27. Pre-Test Left Side View of Driver Dummy
Showing Belt and Chalking



FIGURE 28. Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View



FIGURE 29. Post-Test Left Side View of Driver Dummy Shoulder and Door Top View



FIGURE 30. Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning



FIGURE 31. Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 32. Pre-Test Overhead View of Driver Seat Pan Prior to Dummy Positioning



FIGURE 33. Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan



FIGURE 34. Pre-Test Placement of Driver Dummy's Feet



FIGURE 35. Pre-Test View of Belt Anchorage for Driver Dummy



FIGURE 36. Pre-Test Left Side View of Steering Wheel



FIGURE 37. View of Disengaged Parking Brake



FIGURE 38. Pre-Test View of Parking Brake



FIGURE 39. Pre-Test Close-Up Left Side View of Driver Seat Track



FIGURE 40. Pre-Test Close-Up Left Side View of Driver Seat Back



FIGURE 41. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 42. Pre-Test Driver Dummy and Door Clearance View



FIGURE 43. Post-Test Driver Dummy and Door Clearance View



FIGURE 44. Pre-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment



FIGURE 45. Post-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment



FIGURE 46. Pre-Test Driver Inner Door Panel View



FIGURE 47. Post-Test Driver Inner Door Panel View
Showing Driver Dummy Contact Locations



FIGURE 48. Post-Test Driver Dummy Close-Up Head Contact
with Vehicle Interior View

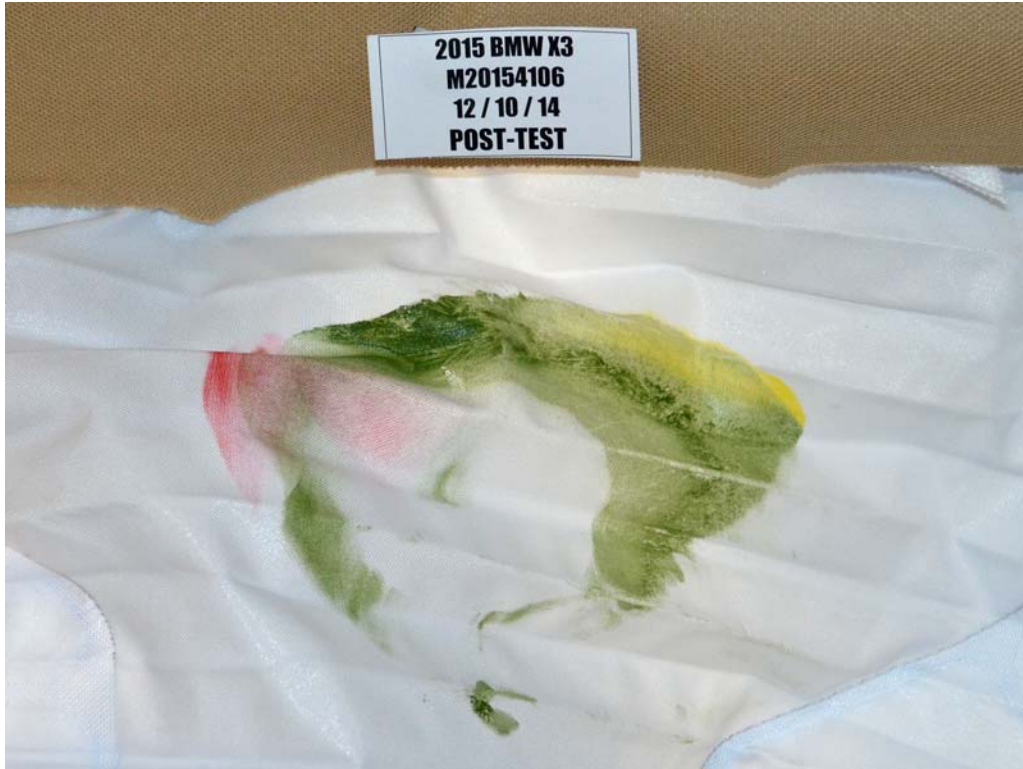


FIGURE 49. Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View



FIGURE 50. Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View



FIGURE 51. Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View



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



FIGURE 53. Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View

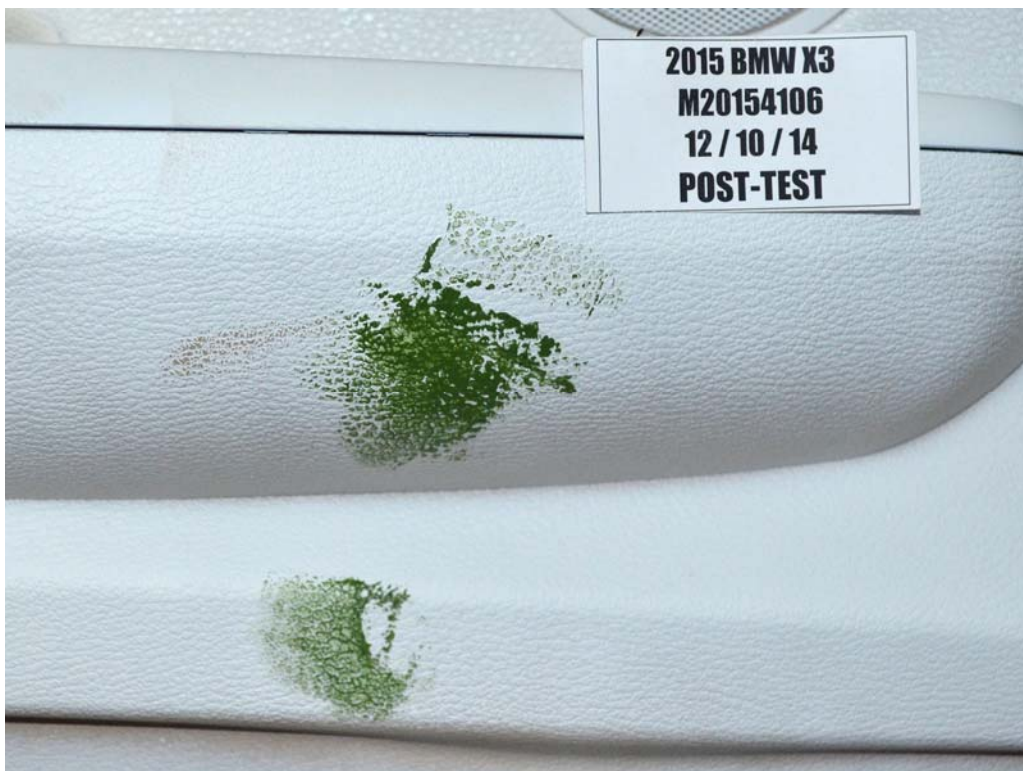


FIGURE 54. Post-Test Driver Dummy Close-Up Knee Contact View



FIGURE 55. Pre-Test Left Side View of Rear Passenger Dummy
Showing Belt and Chalking



FIGURE 56. Pre-Test Left Side View of Rear Passenger Dummy
Shoulder and Door Top View



FIGURE 57. Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



FIGURE 58. Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



FIGURE 59. Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 60. Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



FIGURE 61. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

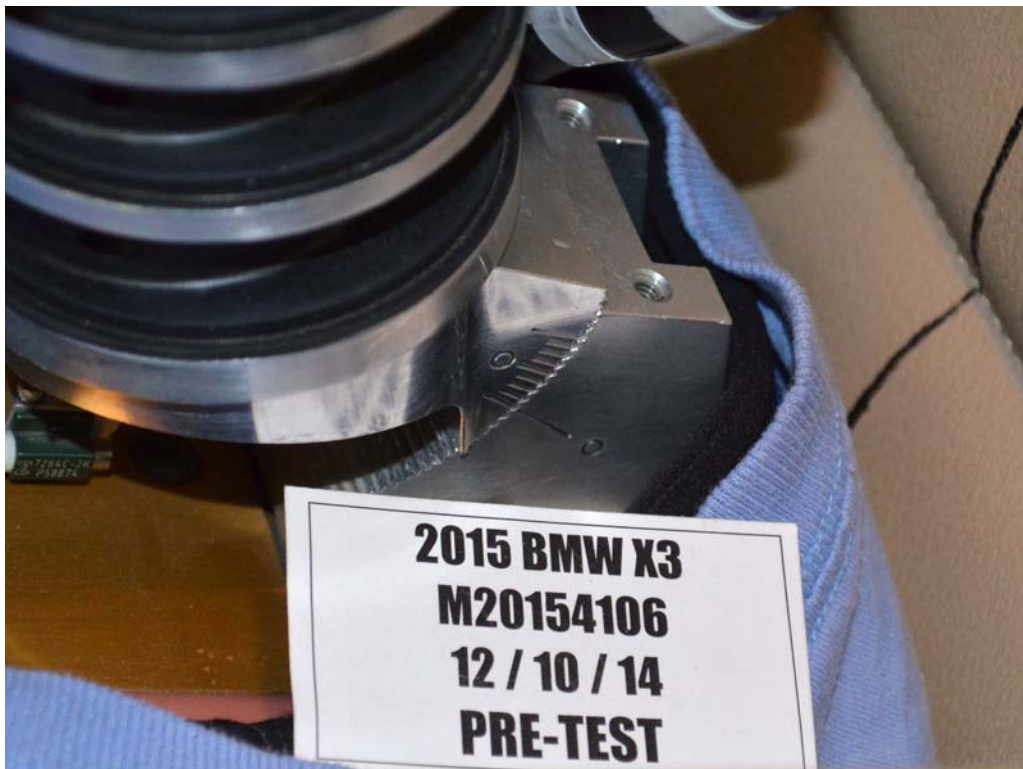


FIGURE 62. Pre-Test View of Rear Passenger Dummy's Neck
Showing Position of Adjustable Neck Bracket



FIGURE 63. Pre-Test View of Rear Passenger Dummy's Head
Showing Dummy's Head is Level



FIGURE 64. Pre-Test Placement of Rear Passenger Dummy's Feet



FIGURE 65. Pre-Test View of Belt Anchorage for Rear Passenger Dummy

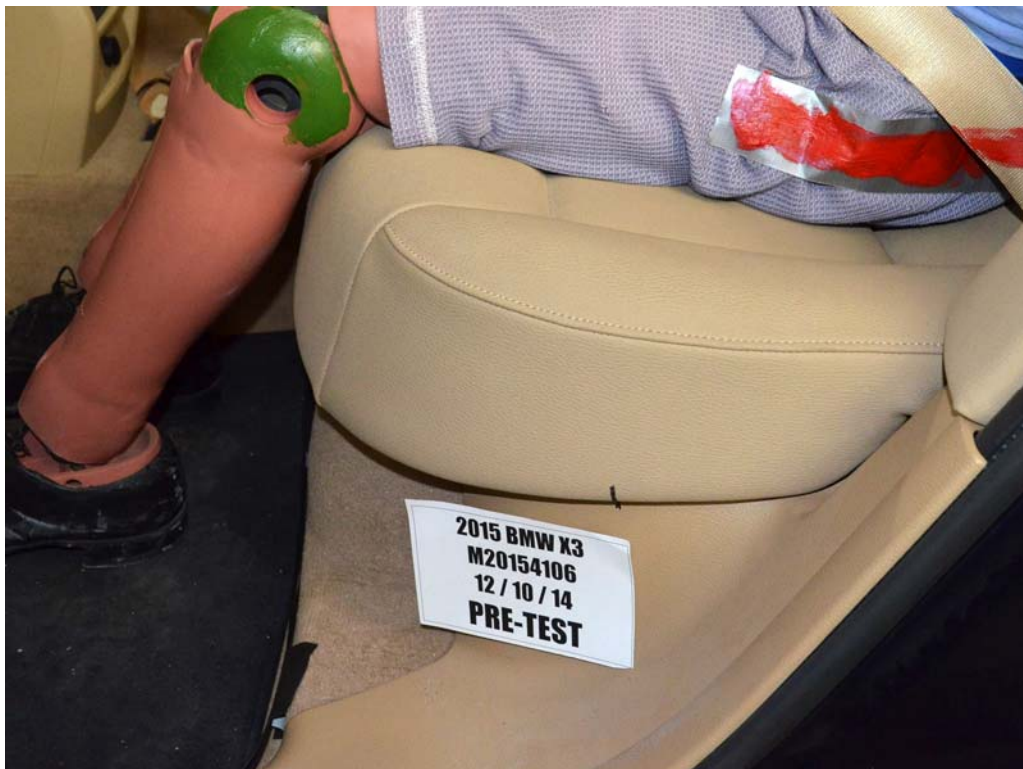


FIGURE 66. Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



FIGURE 67. Pre-Test Close-Up Left Side View of Rear Passenger Seat Back



FIGURE 68. Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



FIGURE 69. Pre-Test Rear Passenger Dummy and Door Clearance View



FIGURE 70. Post-Test Rear Passenger Dummy and Door Clearance View



FIGURE 71. Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



FIGURE 72. Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



FIGURE 73. Pre-Test Rear Passenger Inner Door Panel View



FIGURE 74. Post-Test Rear Passenger Inner Door Panel View
Showing Rear Passenger Dummy Contact Locations



FIGURE 75. Post-Test Rear Passenger Dummy Close-Up
Head Contact with Vehicle Interior View



FIGURE 76. Post-Test Rear Passenger Dummy Close-Up
Head Contact with Side Airbag View

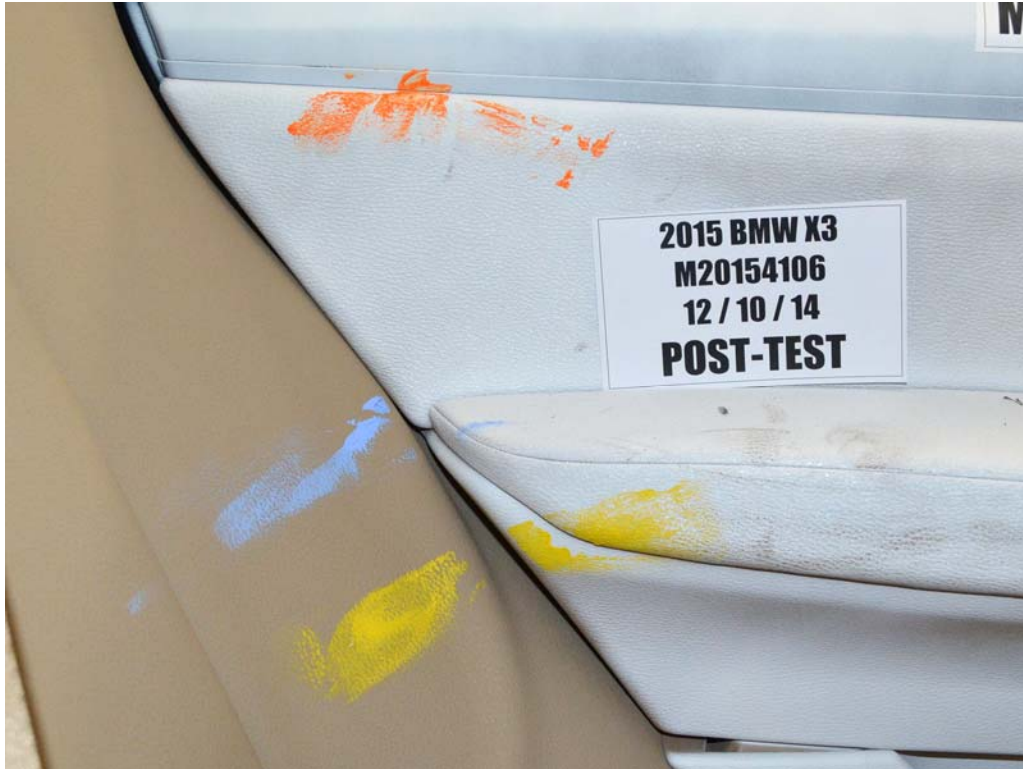


FIGURE 77. Post-Test Rear Passenger Dummy Close-Up
Torso Contact with Vehicle Interior View

Photograph Not Applicable

Vehicle Not Equipped with
Rear Passenger Side Airbag

FIGURE 78. Post-Test Rear Passenger Dummy Close-Up
Torso Contact with Side Airbag View



FIGURE 79. Post-Test Rear Passenger Dummy Close-Up
Pelvis Contact with Vehicle Interior View

Photograph Not Applicable

Vehicle Not Equipped with
Rear Passenger Side Airbag

FIGURE 80. Post-Test Rear Passenger Dummy Close-Up
Pelvis Contact with Side Airbag View



FIGURE 81. Post-Test Rear Passenger Dummy Close-Up Knee Contact View



FIGURE 82. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 83. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 84. Pre-Test Front View of MDB Impactor Face



FIGURE 85. Post-Test Front View of MDB Impactor Face

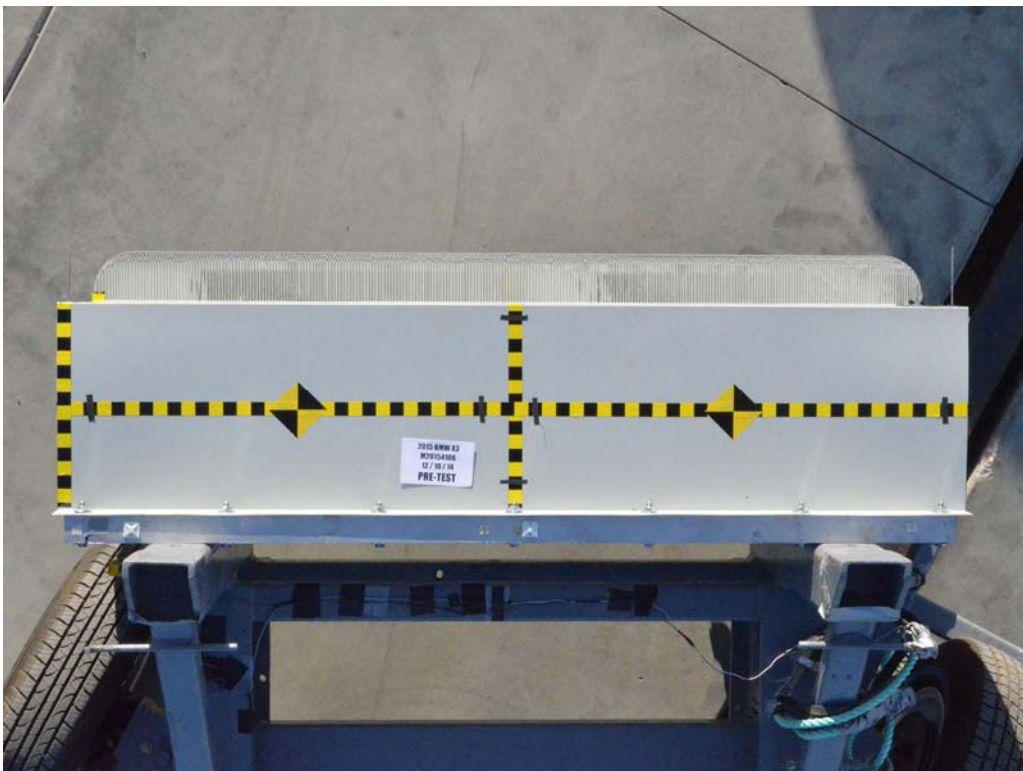


FIGURE 86. Pre-Test Top View of MDB Impactor Face



FIGURE 87. Post-Test Top View of MDB Impactor Face



FIGURE 88. Pre-Test Left Side View of MDB Impactor Face



FIGURE 89. Post-Test Left Side View of MDB Impactor Face



FIGURE 90. Pre-Test Right Side View of MDB Impactor Face



FIGURE 91. Post-Test Right Side View of MDB Impactor Face



FIGURE 92. Close-Up View of Vehicle's Certification Label



FIGURE 93. Close-Up View of Vehicle's Tire Information Placard or Label

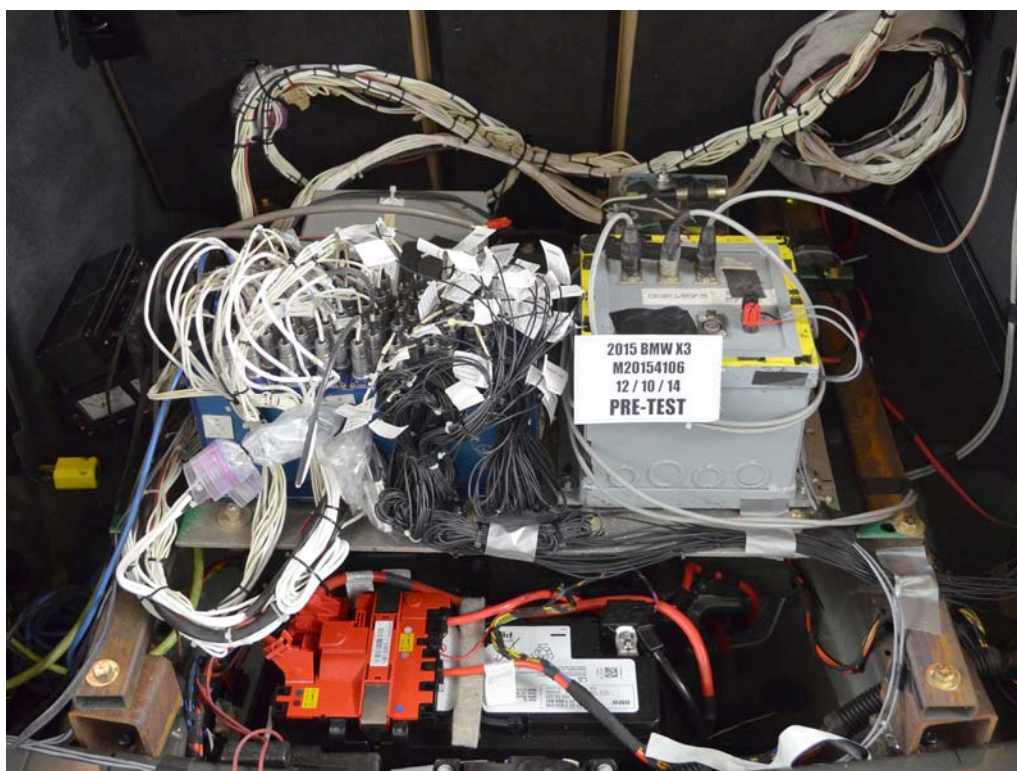


FIGURE 94. Pre-Test Ballast View



FIGURE 95. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees



FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

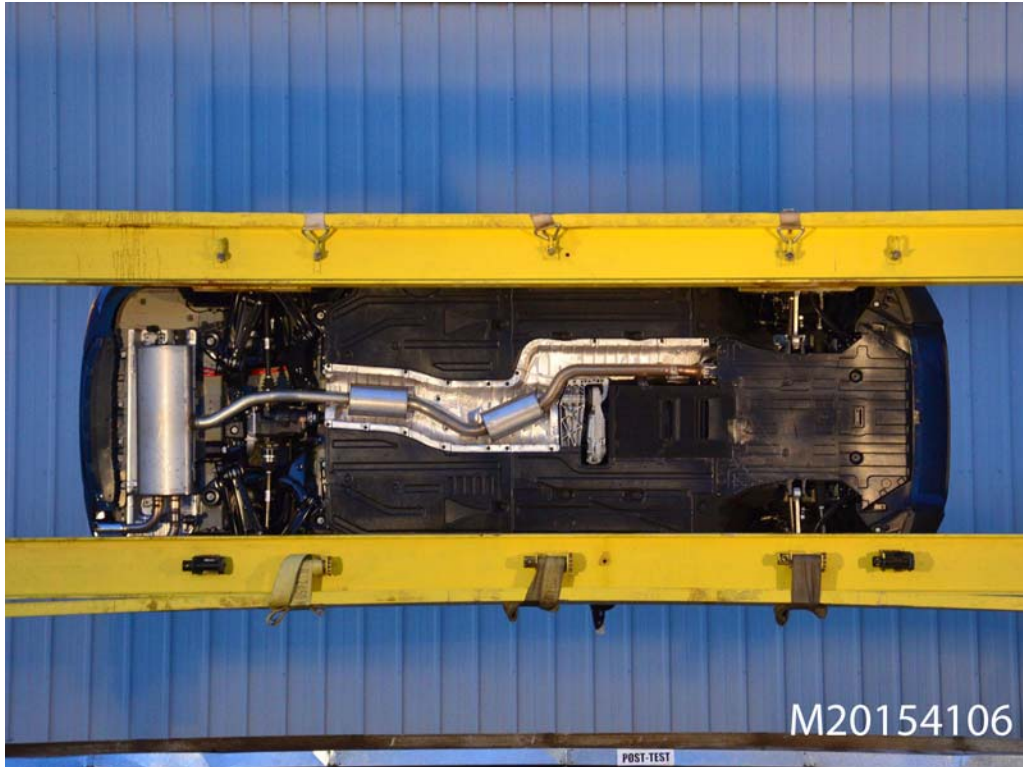


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees



FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 101. Impact Event

The Ultimate Driving Machine®

2015 BMW X3 xDrive28i

Manufacturer's Suggested Retail Price	
Options and Additional Charges:	\$ 40,500.00
Deep Sea Blue Metallic	\$ 500.00
Driver Assistance Package	\$ 950.00
Automatic Start/Stop function	Included
Automatic steering wheel	Included
Auto theft alarm system	Included
Power tailgate	Included
Universal garage-door opener	Included
Road rails in Satin Aluminum	Included
Auto-dimming mirrors	Included
Auto-dimming rearview mirror	Included
Power front seats	Included
Split fold-down rear seat	Included
Storage package	Included
Frontline Light High Gloss Wood	Included
Black high-gloss trim panel	Included
Ambiance lighting	Included
LED Fog Lights	Included
BMW Assist vCall	Included
BMW TeleServices	Included
Hands-free Bluetooth and USB	Included
Destination Charge	\$ 950.00
Total Suggested Retail Price	\$ 42,950.00

Standard Features

Performance and efficiency

- 2.0 liter, 18-cylinder, inline 4-cylinder BMW TwinPower Turbo engine with high-pressure direct injection, Valvetronic and Double VANOS
- Active noise control
- Driving Dynamics Control with DSC (DSC) mode
- 8-speed STEPTRONIC automatic transmission with Sport and Manual

Handling, ride and braking

- Drive all-wheel drive system
- Dynamic Stability Control (DSC), including Brake Drying, Brake Slip-to, Slip-off Assistant and Brake Fade Compensation
- 18" Disc Brakes (FWD)
- Active noise control

Exterior

- LED headlights
- Power glass
- 18" Aluminum alloy wheels

Interior seating

- 8-cylinder front seats with driver's seat and mirror memory
- 40/20/40 split folding rear seat
- Automatic climate control
- Rain-sensing windshield wipers with Automatic Headlight Control

Instrumentation and controls

- 8-speaker leather-upholstered multi-function sport steering wheel
- USB audio connection and hands-free Bluetooth including Audio Streaming
- Drive system with on-board computer, Controller and 8 programmable memory buttons
- Dynamic Drive Control
- Tire Pressure Monitor

Audio system

- AM/FM/CD/MP3 player audio system with 10 speakers

Safety and security

- Front Protection System (EPS), front and rear
- Driver's and passenger's front airbag (optional second row)
- Side-impact protection system
- BMW Active xCall with a 10-year subscription

Warranty

- 4-year/50,000-mile New Vehicle BMW Limited Warranty
- 12-year/100,000-mile Powertrain Limited Warranty
- 4-year/Unlimited Mileage Roadside Assistance Program

PARTS CONTENT INFORMATION

For Vehicles in this Car Line: 15%
US/Canadian Parts Content: 15%
Major Source of Foreign Parts Content: 70%
GERMANY: 70%

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

For this Vehicle: SPARTANBURG, SC, USA
Country of Origin: GERMANY
Engine: GERMANY
Transmission: GERMANY

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated

Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash	Driver Passenger	Not Rated
Side Crash <td>Front seat</td> <td>Not Rated</td>	Front seat	Not Rated
Rear seat	Not Rated	
Rollover	Not Rated	

Based on the risk of injury in a side impact.

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

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

BMW Ultimate Service™

\$0 Maintenance Program: For the first 4 years or 50,000 miles, whichever comes first on all factory-recommended services*

Your Maintenance Costs:

Engine Oil Services: \$0
Engine Drive Belts: \$0
Inspection Services: \$0
Brake Pads: \$0
Brake Discs: \$0
Brake Fluid: \$0

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

EPA DOT Fuel Economy and Environment

24 MPG (combined city/hwy)
4.2 gallons per 100 miles

Small SUVs range from 16 to 31 MPG. The best-in-class is 119 MPG.

You spend \$1,000 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$2,400

This vehicle emits 272 grams CO₂ per mile. The best emits 10 grams per mile (tailpipe only). Producing and distributing gasoline emits 10.2 grams per mile. Total emissions: 282 grams per mile.

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

Smog Rating (tailpipe only)

Actual mileage will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 24 MPG and costs \$11.36 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.00 per gallon. MPGs are miles per gallon, urban/combined. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov
Calculate personalized estimates and compare vehicles

BMW of North America, LLC

Woodcliff Lake, NJ 07077

VPC Location: S. CAROLINA

Part of Entry: GREENVILLE-SPARTANBURG
Carrier: WAGGONERS TRUCKING

Sold To: Tom Bush BMW Jacksonville
9876 Atlantic Blvd
Jacksonville, FL (904) 725-0911

Ship To: Tom Bush BMW Orange Park
4914 Standing Blvd
Jacksonville, FL (904) 777-2500

32244-4421

FIGURE 102. Monroney Label

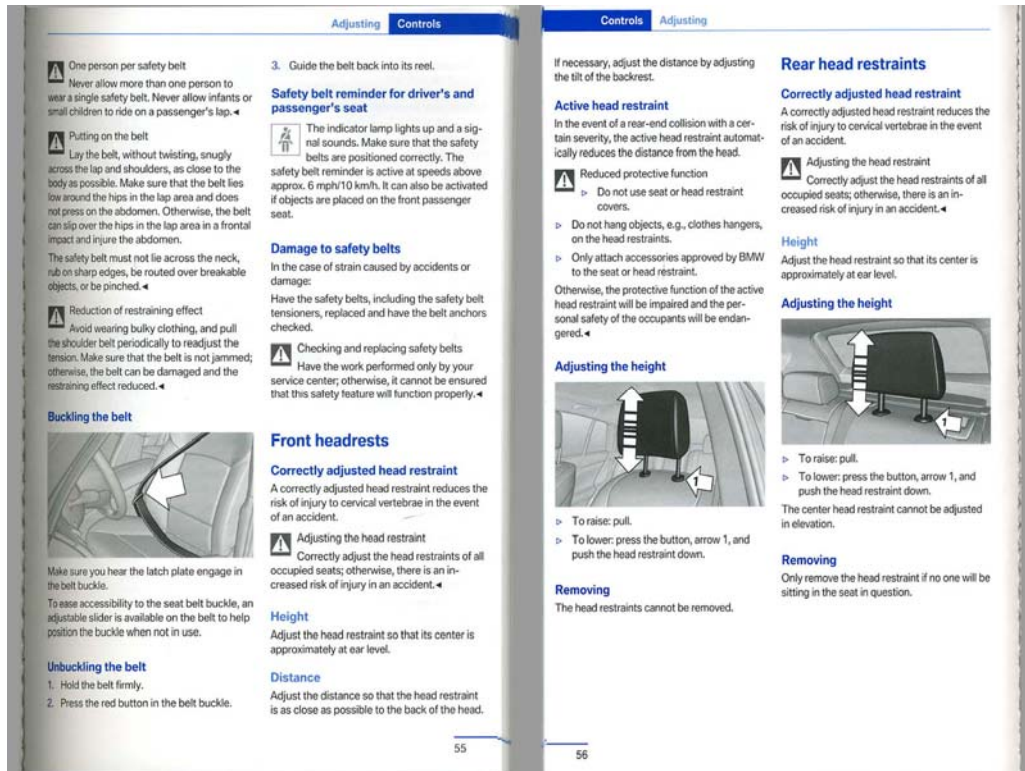


FIGURE 103. Driver Head Restraint Use and Adjustment Information
from Vehicle Owner's Manual

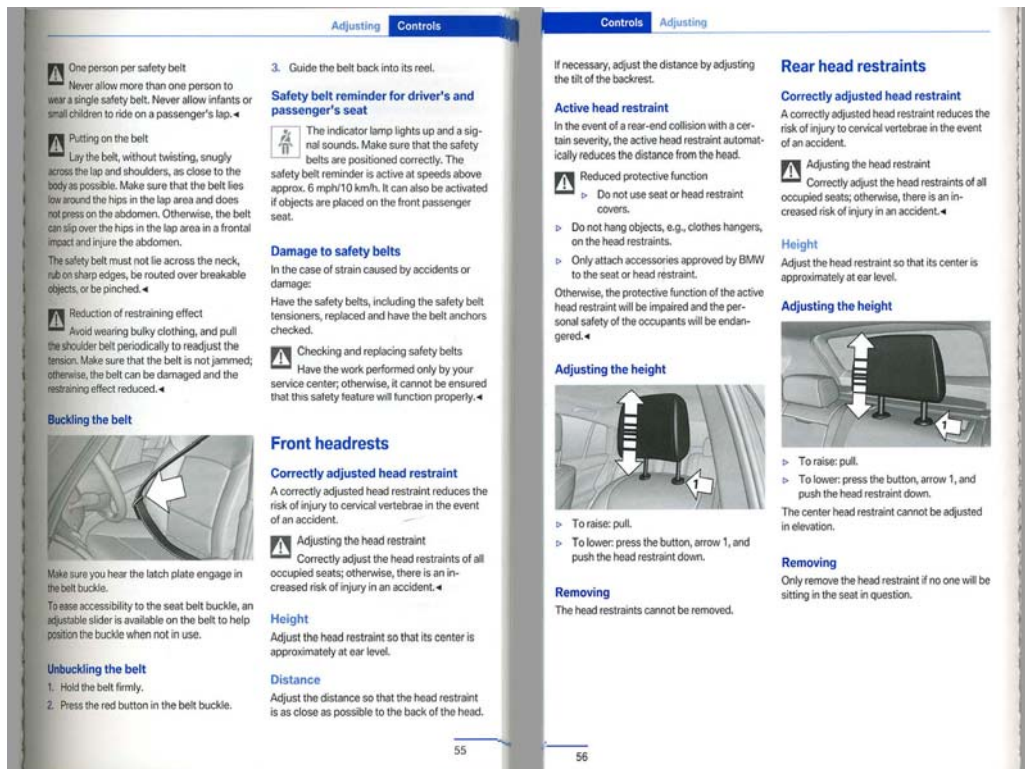


FIGURE 104. Left Rear Passenger Head Restraint Use and Adjustment Information
from Vehicle Owner's Manual

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 Upper Thorax Rib Deflection (Y) vs. Time	B-2
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
8	Driver Thorax Rib Deflection Maximum vs. Time	B-2
9	Driver Anterior Abdominal Force (Y) vs. Time	B-3
10	Driver Middle Abdominal Force (Y) vs. Time	B-3
11	Driver Posterior Abdominal Force (Y) vs. Time	B-3
12	Driver Total Abdominal Force (Y) vs. Time	B-3
13	Driver Pubic Symphysis Force (Y) vs. Time	B-4
14	Passenger Head Acceleration (X) vs. Time Primary	B-5
15	Passenger Head Acceleration (Y) vs. Time Primary	B-5
16	Passenger Head Acceleration (Z) vs. Time Primary	B-5
17	Passenger Head Resultant Acceleration Primary vs. Time	B-5
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website (www.NHTSA.dot.gov)

Additional Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)

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

Vehicle Instrumentation Data

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Right Side Sill at Front Seat Acceleration (X)
Right Side Sill at Front Seat Acceleration (Y)
Right Side Sill at Front Seat Acceleration (Z)
Right Side Sill at Rear Seat Acceleration (X)
Right Side Sill at Rear Seat Acceleration (Y)
Right Side Sill at Rear Seat Acceleration (Z)
Left Side Sill at Front Seat Acceleration (Y)
Left Side Sill at Rear Seat Acceleration (Y)
Lower A-Post Acceleration (Y)
Middle A-Post Acceleration (Y)
Lower B-Post Acceleration (Y)
Middle B-Post Acceleration (Y)
Front Seat Track Acceleration (Y)
Rear Seat Structure Acceleration (Y)
Right Rear Occupant Compartment Acceleration (Y)
Engine Block (X)
Engine Block (Y)
Rear Floorpan Above Axle Acceleration (X)
Rear Floorpan Above Axle Acceleration (Y)
Rear Floorpan Above Axle Acceleration (Z)

MDB Instrumentation Data

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

MDB Rear Acceleration (X)

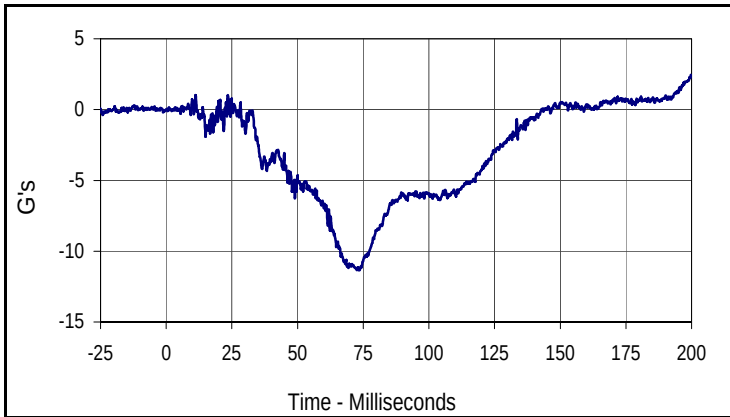
MDB Rear Acceleration (Y)

Left MDB Contact Switch

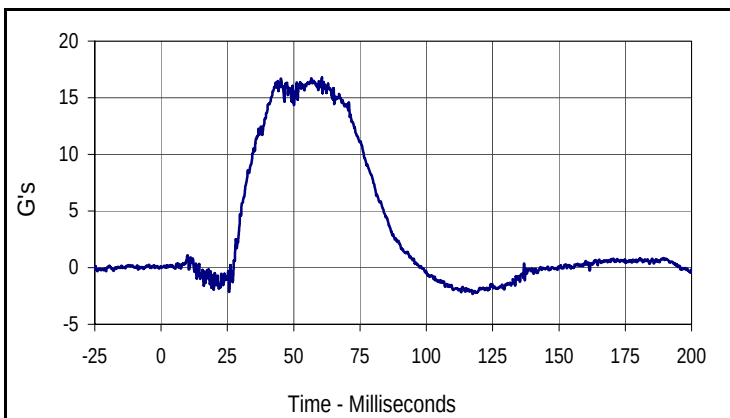
Right MDB Contact Switch

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

NHTSA No.: M20154106
 Test Date: 12/10/14



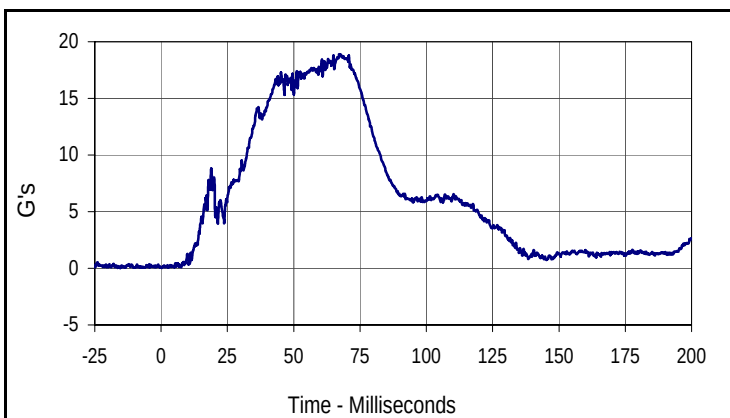
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
2.4	199.8	-11.4	73.3



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
16.8	60.6	-2.3	117.5



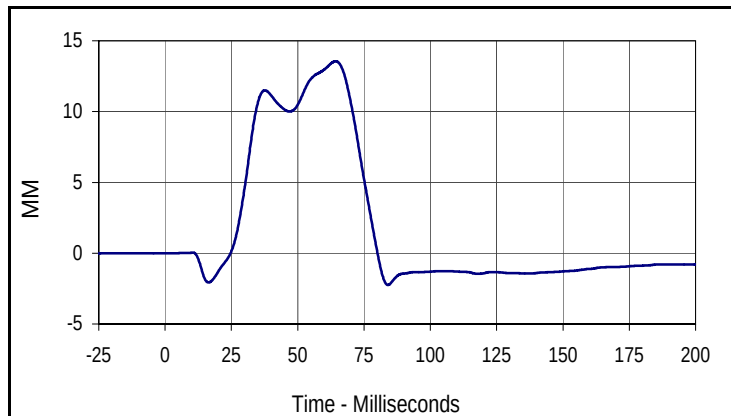
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
8.7	18.9	-4.5	71.5



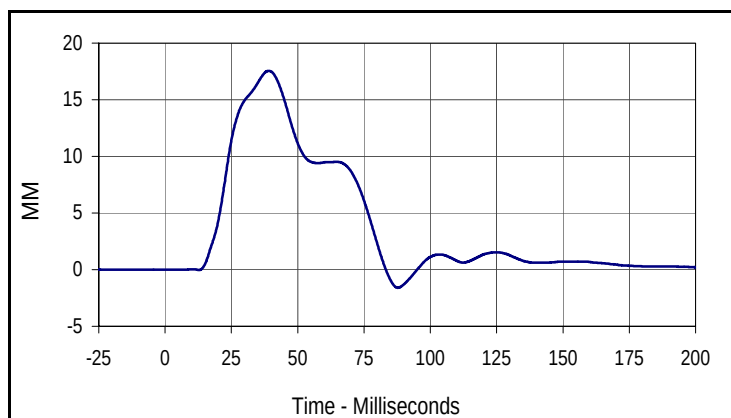
Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
18.9	67.2	0.0	0.3

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

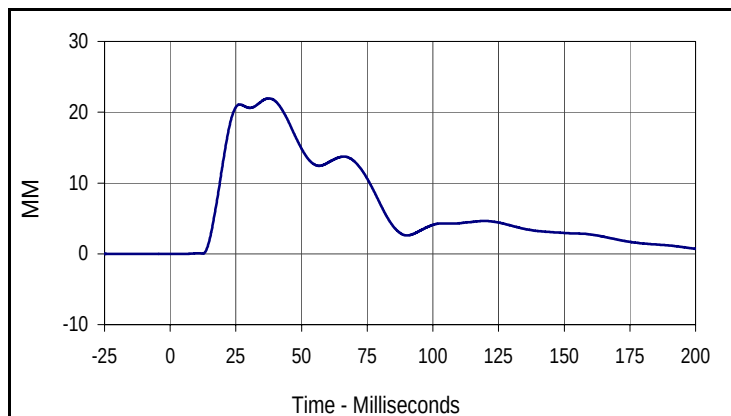
NHTSA No.: M20154106
 Test Date: 12/10/14



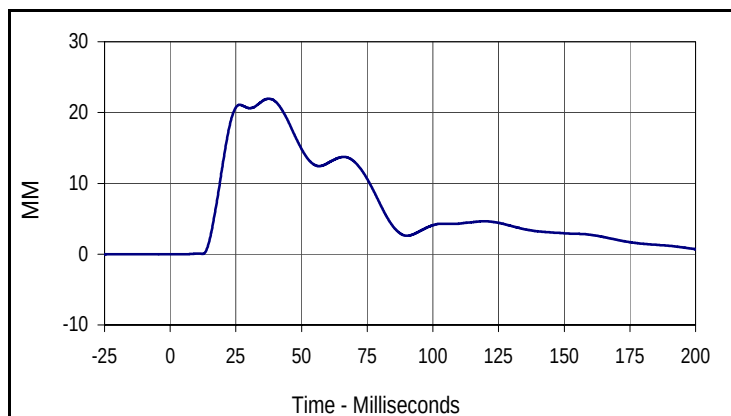
Curve Description			
Driver Upper Thorax Rib Deflection Y			
Plot No.	Type	SAE Class	Units
005	FIL	180	MM
Max	Time	Min	Time
13.6	64.3	-2.3	84.0



Curve Description			
Driver Middle Thorax Rib Deflection Y			
Plot No.	Type	SAE Class	Units
006	FIL	180	MM
Max	Time	Min	Time
17.5	39.1	-1.6	87.8



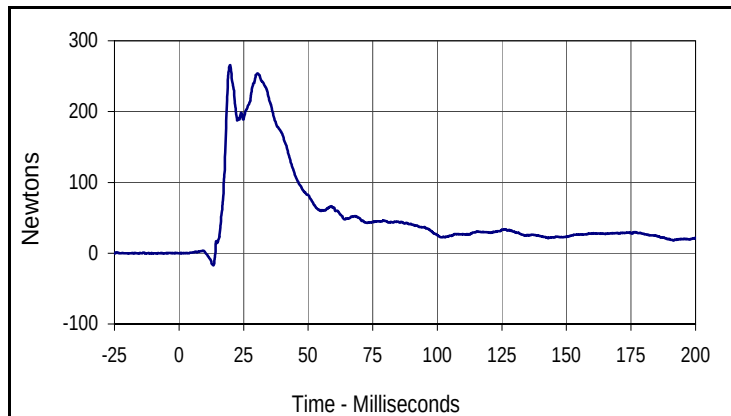
Curve Description			
Driver Lower Thorax Rib Deflection Y			
Plot No.	Type	SAE Class	Units
007	FIL	180	MM
Max	Time	Min	Time
21.9	37.5	0.0	4.1



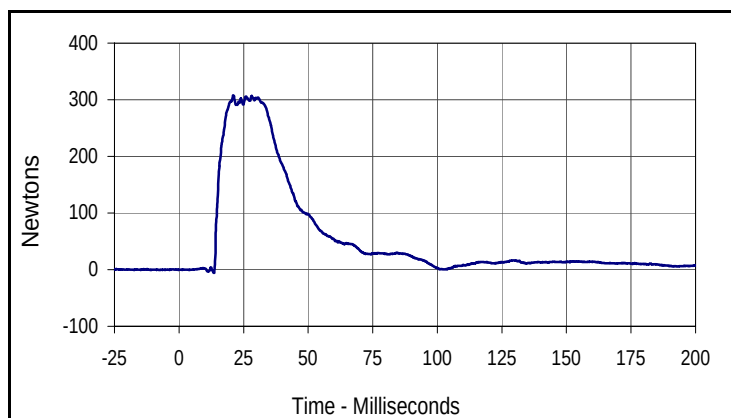
Curve Description			
Driver Thorax Rib Deflection Maximum			
Plot No.	Type	SAE Class	Units
008	FIL	180	MM
Max	Time	Min	Time
21.9	37.5	0.0	4.1

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

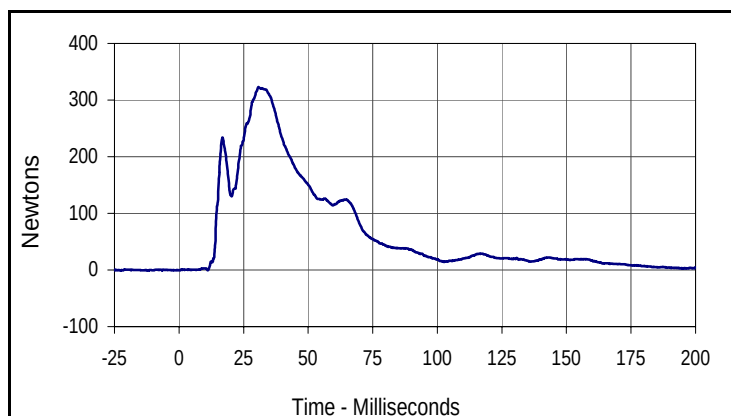
NHTSA No.: M20154106
 Test Date: 12/10/14



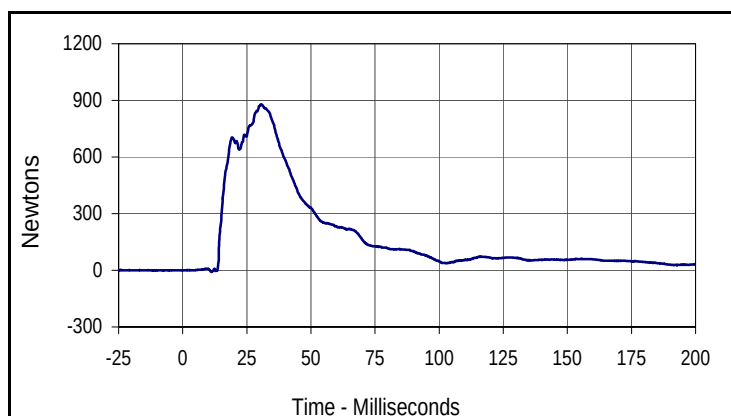
Curve Description			
Driver Anterior Abdominal Force Y			
Plot No.	Type	SAE Class	Units
009	FIL	600	Newtons
Max	Time	Min	Time
265.9	19.8	-17.1	13.3



Curve Description			
Driver Middle Abdominal Force Y			
Plot No.	Type	SAE Class	Units
010	FIL	600	Newtons
Max	Time	Min	Time
307.7	21.0	-5.8	13.5



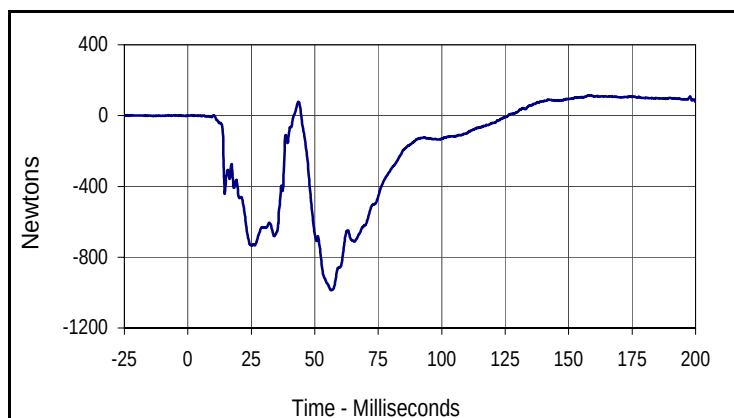
Curve Description			
Driver Posterior Abdominal Force Y			
Plot No.	Type	SAE Class	Units
011	FIL	600	Newtons
Max	Time	Min	Time
323.3	30.7	-0.6	11.1



Curve Description			
Driver Total Abdominal Force			
Plot No.	Type	SAE Class	Units
012	SUM	600	Newtons
Max	Time	Min	Time
879.9	30.6	-8.2	11.2

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

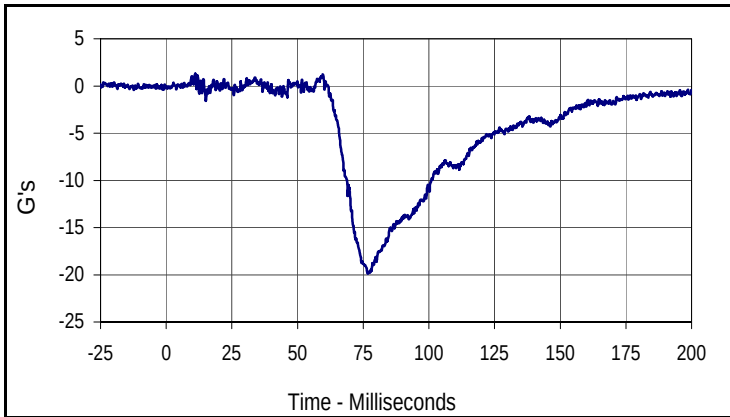
NHTSA No.: M20154106
 Test Date: 12/10/14



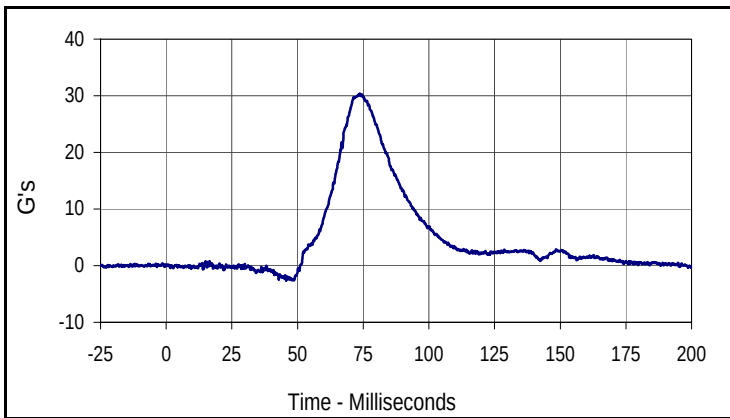
Curve Description			
Driver Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
013	FIL	600	Newtons
Max	Time	Min	Time
113.8	158.5	-986.3	56.4

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

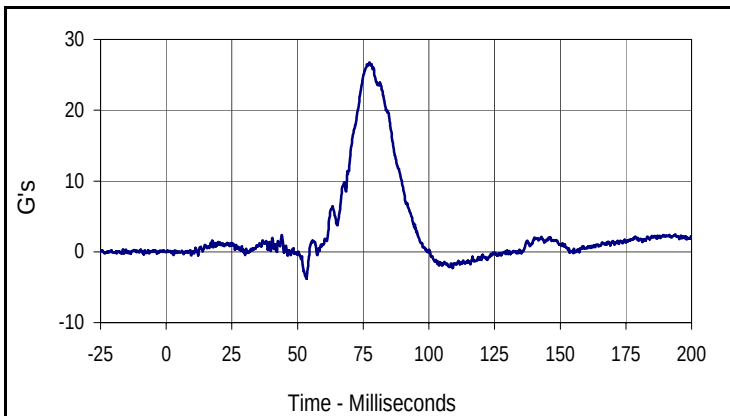
NHTSA No.: M20154106
 Test Date: 12/10/14



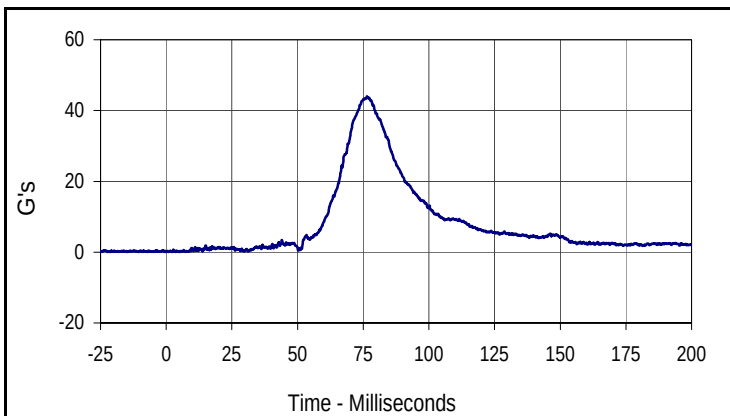
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
014	FIL	1000	G's
Max	Time	Min	Time
1.3	11.0	-19.9	76.7



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
30.4	73.7	-2.6	48.6



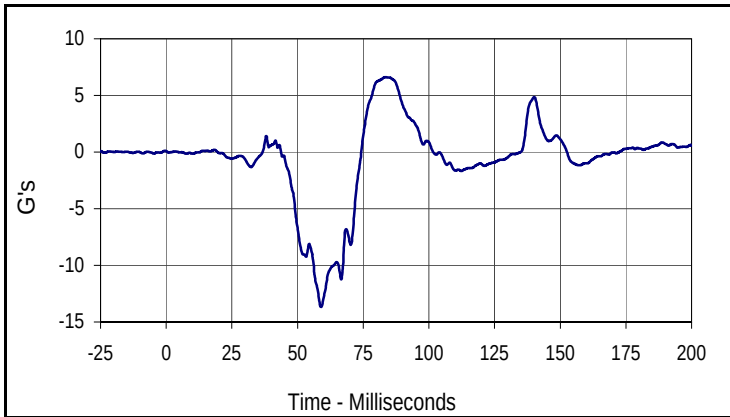
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
26.8	77.3	-3.8	53.4



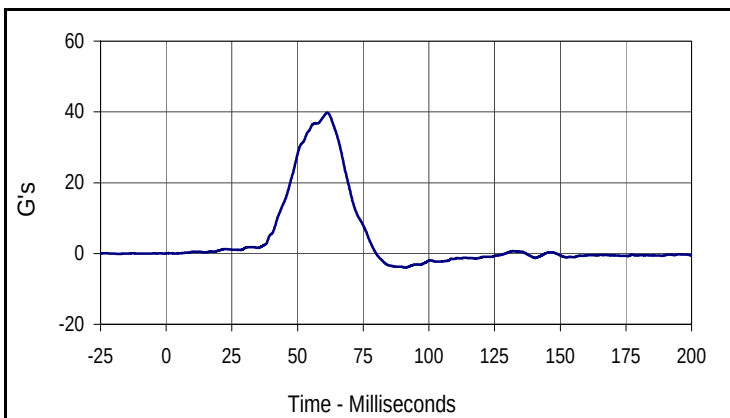
Curve Description			
Passenger Head Acceleration Resultant Primary			
Plot No.	Type	SAE Class	Units
017	RES	1000	G's
Max	Time	Min	Time
44.0	76.5	0.0	4.1

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

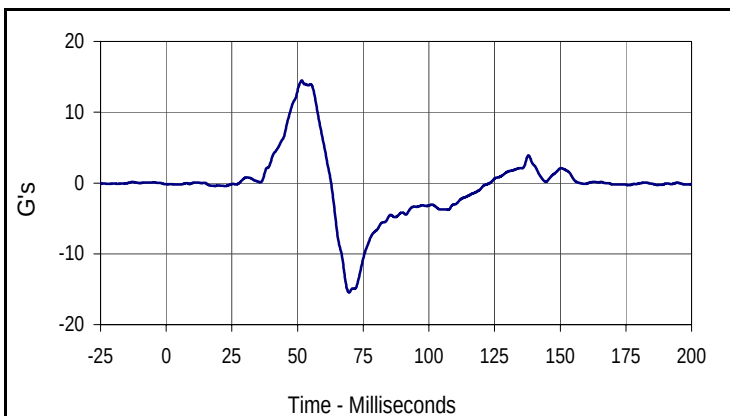
NHTSA No.: M20154106
 Test Date: 12/10/14



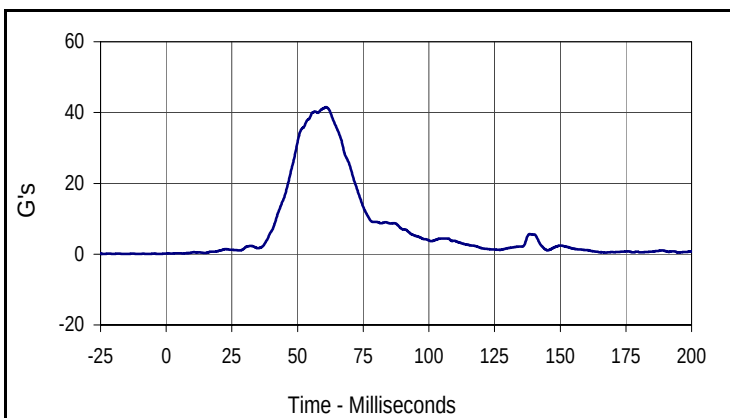
Curve Description			
Passenger Lower Spine T12 Acceleration X			
Plot No.	Type	SAE Class	Units
018	FIL	180	G's
Max	Time	Min	Time
6.6	83.5	-13.7	59.0



Curve Description			
Passenger Lower Spine T12 Acceleration Y			
Plot No.	Type	SAE Class	Units
019	FIL	180	G's
Max	Time	Min	Time
39.8	61.3	-4.0	90.9



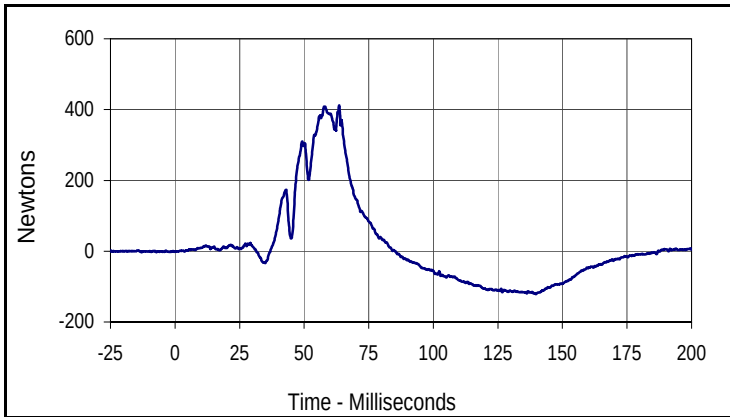
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
Plot No.	Type	SAE Class	Units
020	FIL	180	G's
Max	Time	Min	Time
14.5	51.6	-15.5	69.6



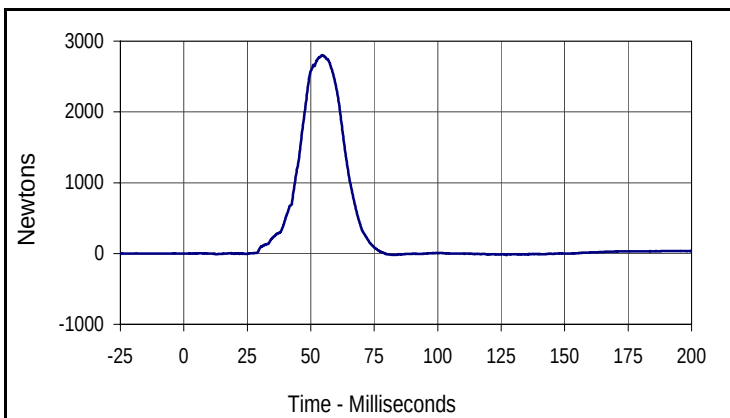
Curve Description			
Passenger Lower Spine T12 Acceleration Resultant			
Plot No.	Type	SAE Class	Units
021	RES	180	G's
Max	Time	Min	Time
41.5	60.9	0.2	2.1

Test Vehicle: 2015 BMW X3 xDrive28i 5-Door MPV
 Test Program: NCAP MDB Side Impact Test

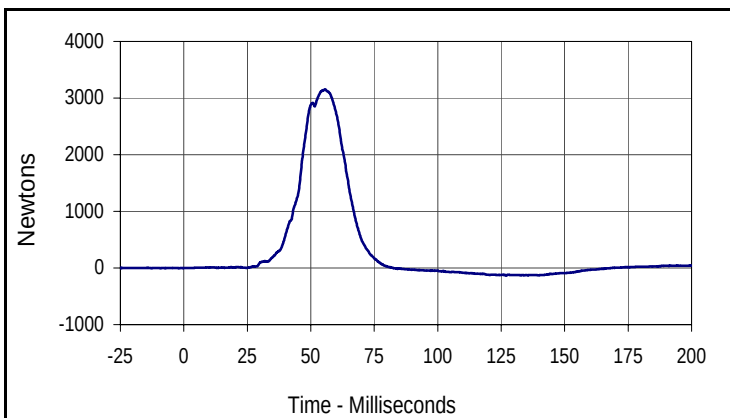
NHTSA No.: M20154106
 Test Date: 12/10/14



Curve Description			
Passenger Iliac Wing Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
022	FIL	600	Newtons
Max	Time	Min	Time
411.6	63.6	-121.2	139.7



Curve Description			
Passenger Acetabulum Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
023	FIL	600	Newtons
Max	Time	Min	Time
2799.5	54.8	-22.3	127.1



Curve Description			
Passenger Total Pelvic Force			
Plot No.	Type	SAE Class	Units
024	SUM	600	Newtons
Max	Time	Min	Time
3153.2	55.7	-133.8	127.0

APPENDIX C
DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

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

Test Program: ES2re External Measurements
 ATD Serial No.: F037

Test Date: 11/20/14
 Test I.D.: N/A



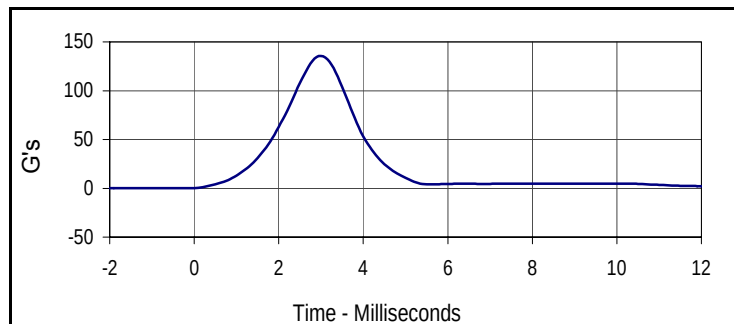
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	30.0	Pass
1	Sitting Height	mm	900 - 918	909	Pass
2	Seat to Shoulder Joint	mm	558 - 572	564	Pass
3	Seat to Lower Face of Thoracic Spine Box	mm	346 - 356	350	Pass
4	Seat to Hip Joint (Center of Bolt)	mm	97 - 103	99	Pass
5	Sole to Seat, Sitting	mm	333 - 451	395	Pass
6	Head Width	mm	152 - 158	156	Pass
7	Shoulder / Arm Width	mm	461 - 479	470	Pass
8	Thorax Width	mm	322 - 332	326	Pass
9	Abdomen Width	mm	273 - 287	280	Pass
10	Pelvis Lap Width	mm	359 - 373	363	Pass
11	Head Depth	mm	196 - 206	201	Pass
12	Thorax Depth	mm	262 - 272	270	Pass
13	Abdomen Width	mm	194 - 204	199	Pass
14	Pelvis Depth	mm	235 - 245	240	Pass
15	Back of Buttocks to Hip Joint (Center of Bolt)	mm	150 - 160	155	Pass
16	Back of Buttocks to Front Knee	mm	597 - 615	608	Pass
Overall Test Results					Pass

Test Program: ES2re Head Drop Test
 ATD Serial No.: F037

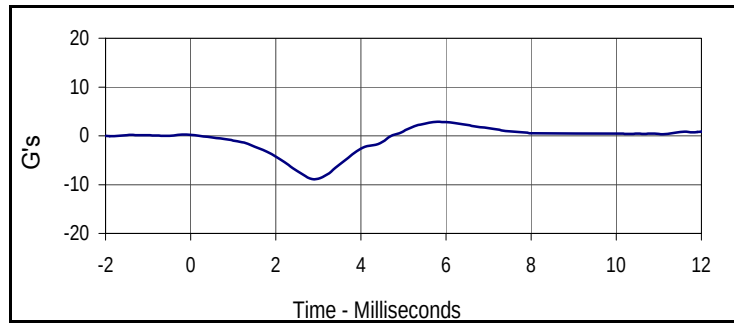
Test Date: 11/20/14
 Test I.D.: F037HD067



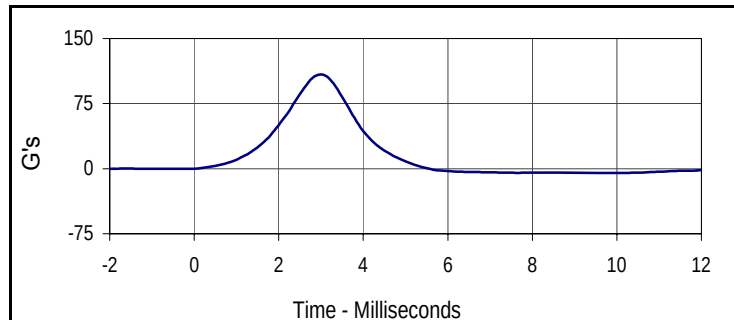
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	275	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.4	Pass
Peak Head Resultant Acceleration	G's	125 to 155	135.6	Pass
Peak Head X Acceleration	G's	≤15	8.9	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	7.8	Pass
Overall Test Results				Pass



Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
135.6	3.0	0.0	-0.5



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.9	5.8	-8.9	2.9



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
108.6	3.0	-4.8	10.2



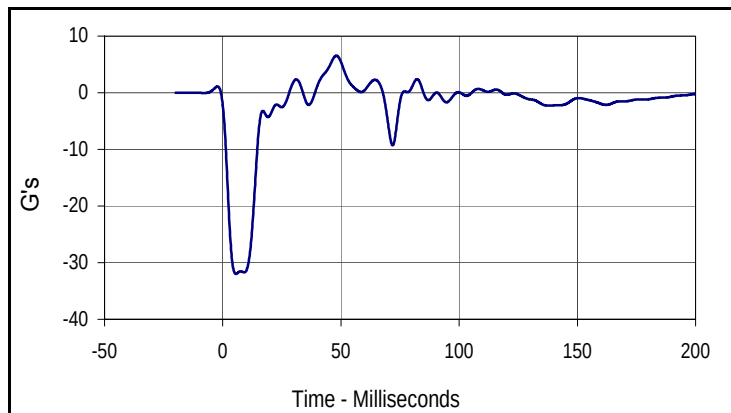
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
80.7	3.0	-0.2	-0.7

Test Program: ES2re Neck Flexion Test
 ATD Serial No.: F037

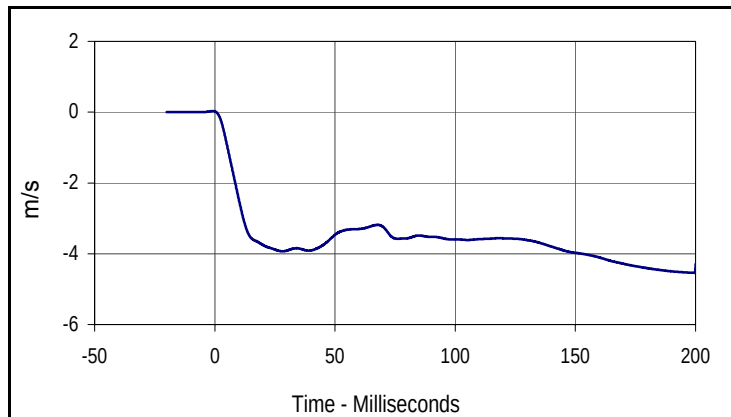
Test Date: 11/20/14
 Test I.D.: F037NB067



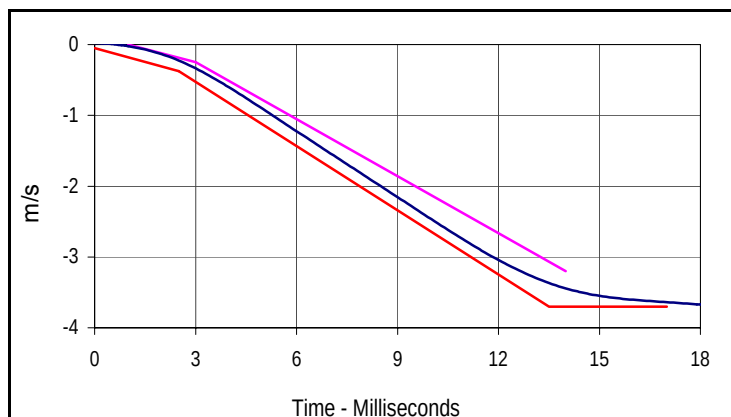
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	310	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.4	Pass
Pendulum Velocity	m/s	3.3 to 3.5	3.41	Pass
Headform Flexion	Max	49 to 59	57.1	Pass
	Time	54 to 66	57.0	Pass
Headform Flexion Decay (Peak to Zero)	msec	53 to 88	61.8	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
6.5	48.1	-32.0	5.6



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.8	-4.5	199.9



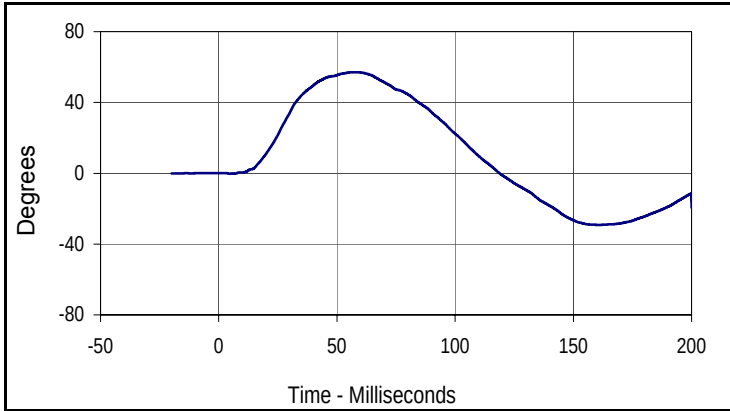
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.8	-4.5	199.9

Velocity Corridors

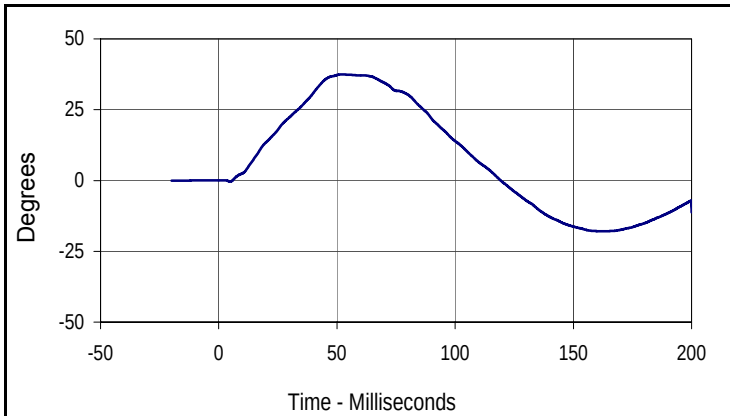
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.03	2.5	-0.375
14.0	-3.20	13.5	-3.70
		17.0	-3.70

Test Program: ES2re Neck Flexion Test
 ATD Serial No.: F037

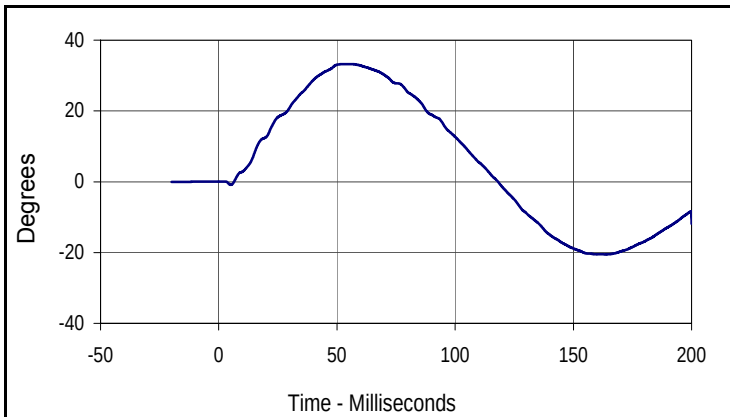
Test Date: 11/20/14
 Test I.D.: F037NB067



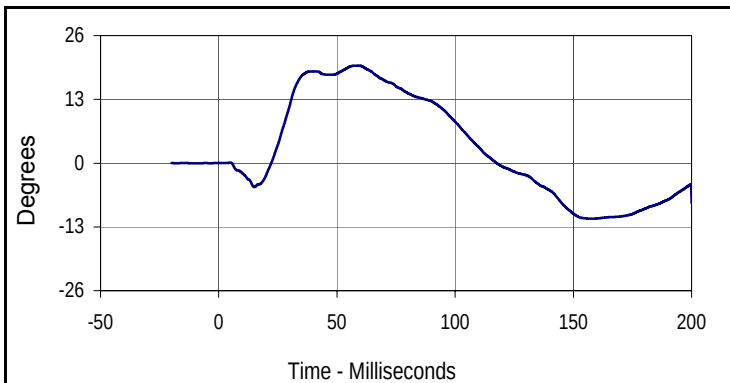
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
57.1	57.0	-29.2	160.4



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
37.5	51.9	-18.0	162.1



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
33.2	54.8	-20.5	163.6



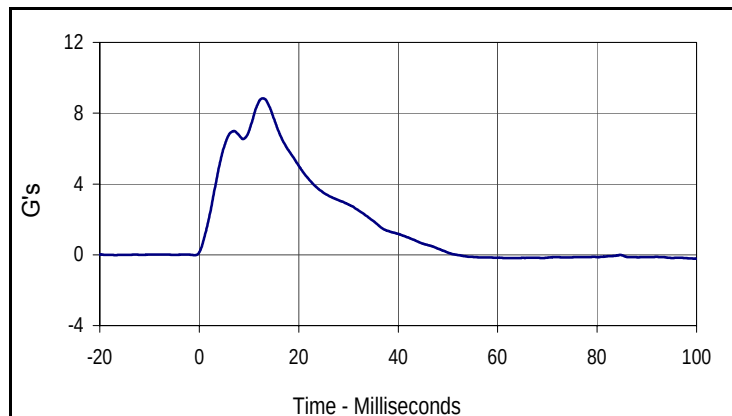
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
19.9	59.0	-11.3	158.5

Test Program: ES2re Shoulder Impact Test
 ATD Serial No.: F037

Test Date: 11/20/14
 Test I.D.: F037SH067



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	375	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.7	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.30	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.8	Pass
Overall Test Results				Pass



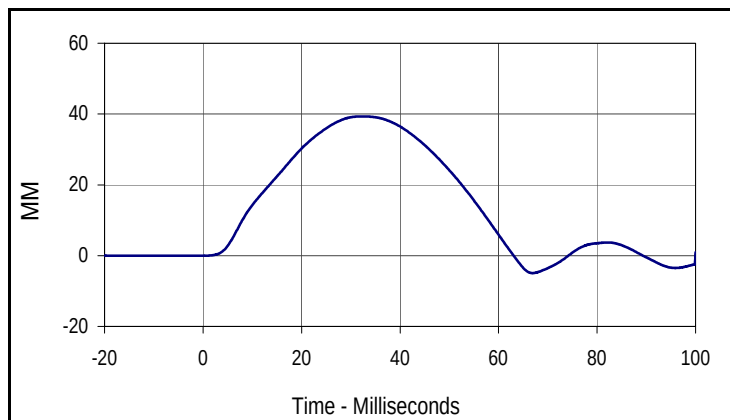
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
8.8	12.8	-0.2	99.6

Test Program: ES2re Thorax - Rib Drop Test
 ATD Serial No.: F037 Rib # 1

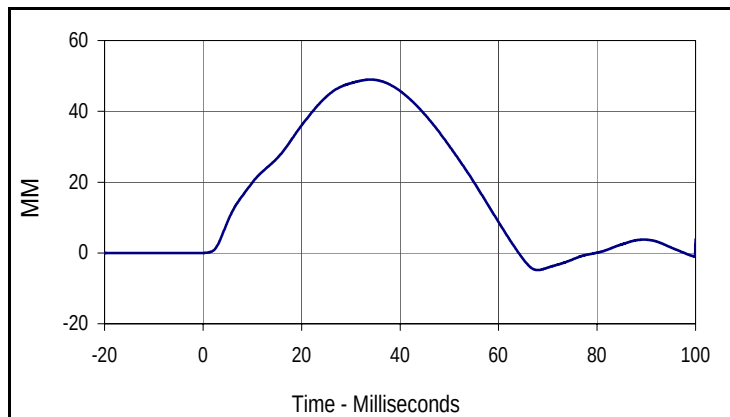
Test Date: 11/20/14
 Test I.D.: F037RB1067



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	430	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.8	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	39.3	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	49.0	Pass
Overall Test Results				Pass



Curve Description			
Upper Rib Deflection (459 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
39.3	32.4	-5.0	66.9



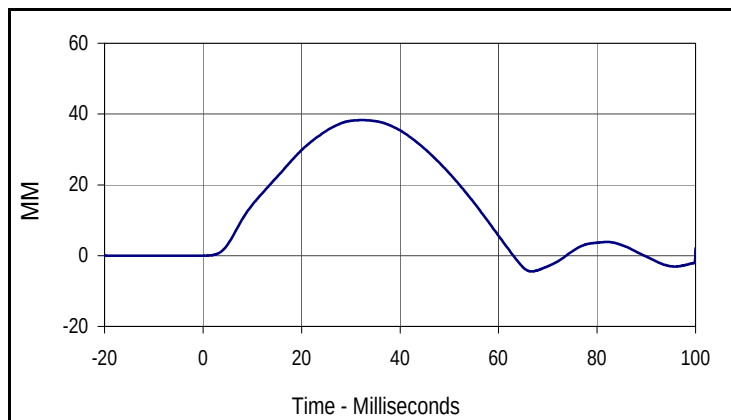
Curve Description			
Upper Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
49.0	34.0	-4.8	68.0

Test Program: ES2re Thorax - Rib Drop Test
 ATD Serial No.: F037 Rib # 2

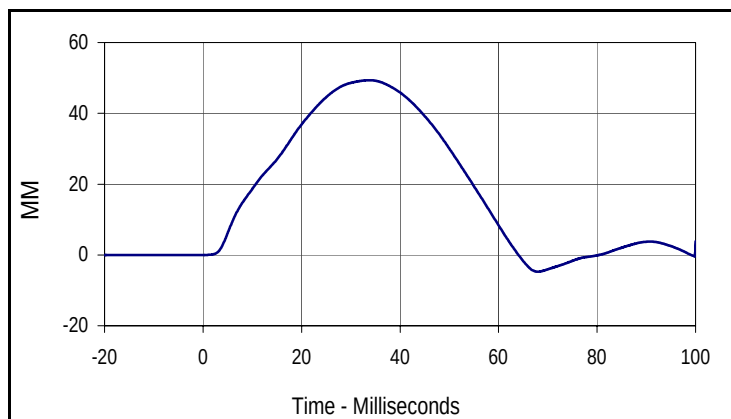
Test Date: 11/20/14
 Test I.D.: F037RB2067



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	475	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.8	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	38.3	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	49.3	Pass
Overall Test Results				Pass



Curve Description			
Middle Rib Deflection (459 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.3	32.2	-4.5	66.7



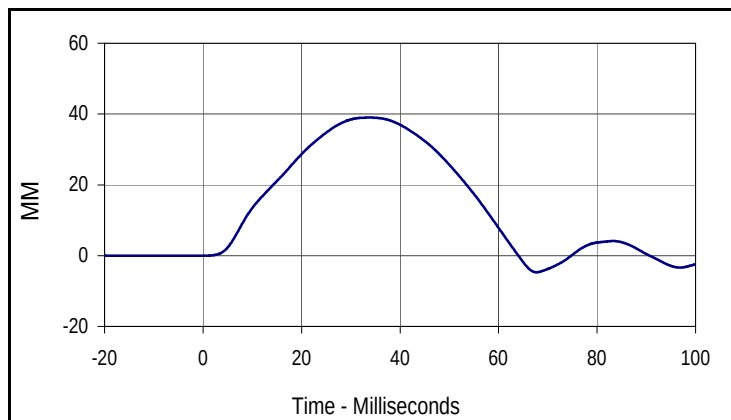
Curve Description			
Middle Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
49.3	33.9	-4.7	68.0

Test Program: ES2re Thorax - Rib Drop Test
 ATD Serial No.: F037 Rib # 3

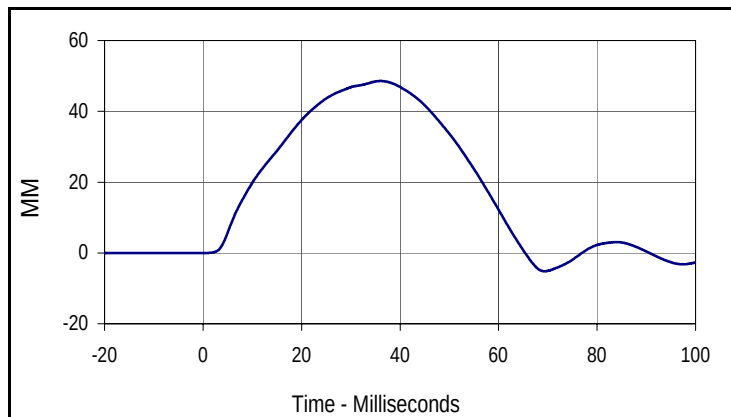
Test Date: 11/20/14
 Test I.D.: F037RB3067



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	520	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.9	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	39.0	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	48.6	Pass
Overall Test Results				Pass



Curve Description			
Lower Rib Deflection (459 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
39.0	34.0	-4.7	67.7



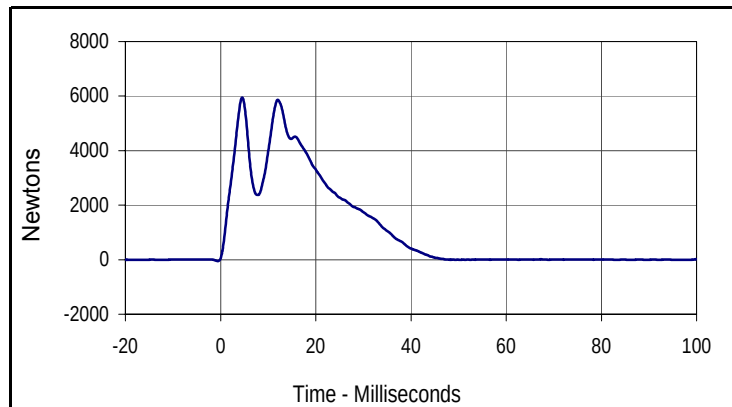
Curve Description			
Lower Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
48.6	36.0	-5.2	69.3

Test Program: ES2re Thorax - Full Body Impact Test
 ATD Serial No.: F037

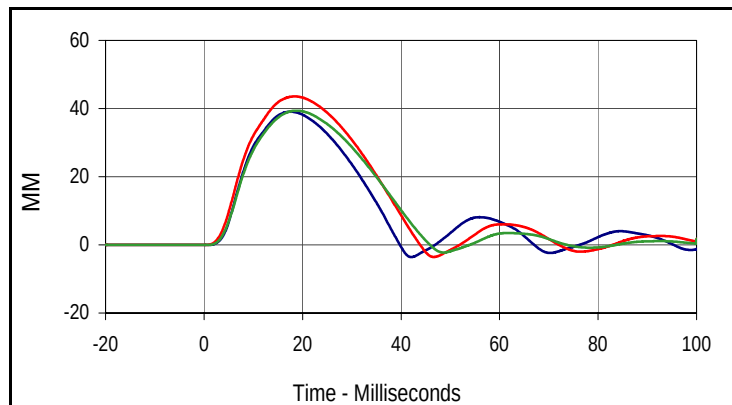
Test Date: 11/20/14
 Test I.D.: F037TH067



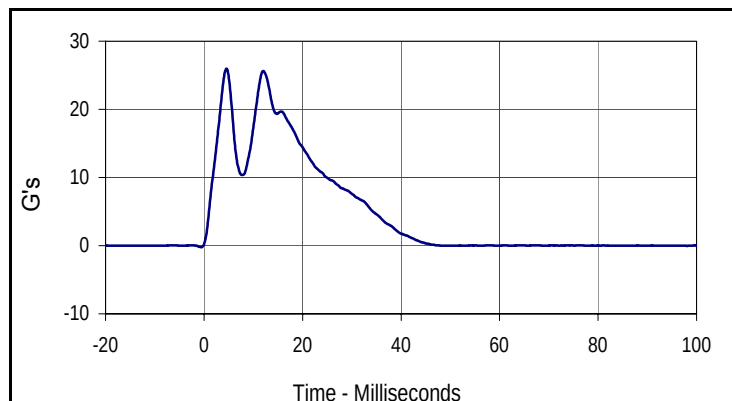
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	565	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	21.1	Pass
Peak Impactor Velocity	m/s	5.4 to 5.6	5.49	Pass
Peak Impactor Force	N	5100 to 6200	5868.8	Pass
	msec	> 6.0 msec	12	Pass
Peak Upper Rib Deflection	mm	34 to 41	39.1	Pass
Peak Middle Rib Deflection	mm	37 to 45	43.6	Pass
Peak Lower Rib Deflection	mm	37 to 44	39.4	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
5947.7	4.6	-50.0	-0.6



Curve Description			
Upper, Middle, Lower Rib Deflections			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max (Upper)	Time	Min (Upper)	Time
39.1	17.5	-3.6	42.1
Max (Middle)	Time	Min (Middle)	Time
43.6	18.4	-3.6	46.6
Max (Lower)	Time	Min (Lower)	Time
39.4	18.8	-2.3	48.7



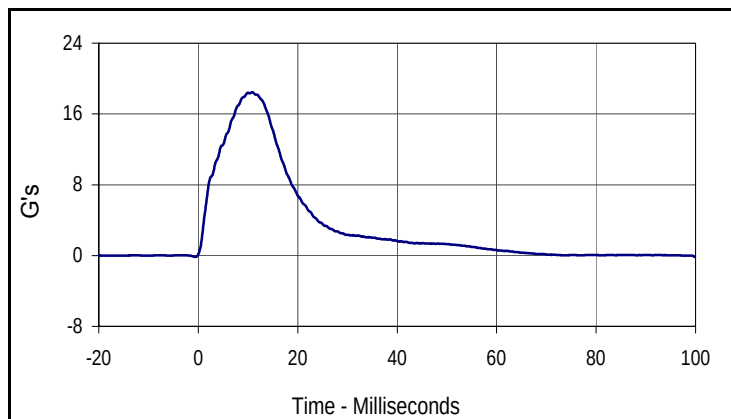
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
26.0	4.6	-0.2	-0.6

Test Program: ES2re Abdomen Impact Test
 ATD Serial No.: F037

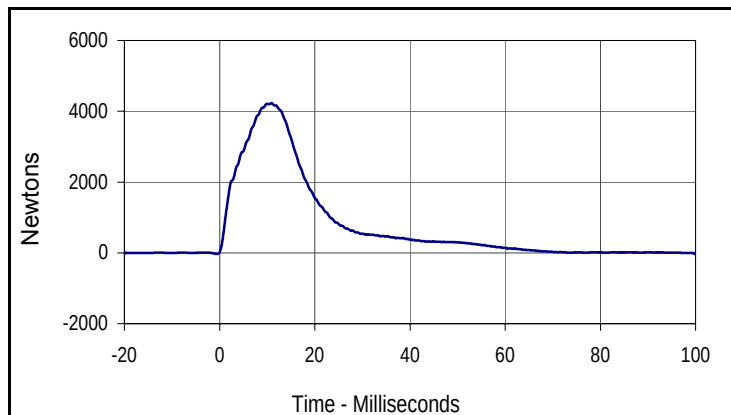
Test Date: 11/20/14
 Test I.D.: F037ABD067



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	635	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	21.1	Pass
Probe Velocity	m/s	3.9 to 4.1	4.00	Pass
Peak Impactor Force	N	4000 to 4800	4231.0	Pass
	msec	10.6 to 13.0	10.9	Pass
Sum of Abdominal Forces	N	2200 to 2700	2437.5	Pass
	msec	10.0 to 12.3	11.1	Pass
Overall Test Results				Pass



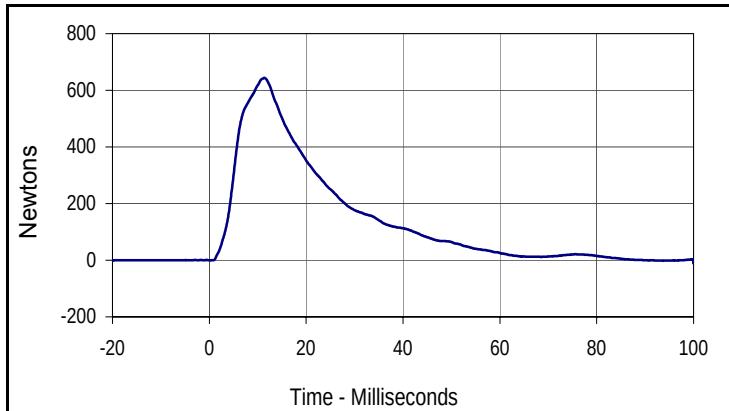
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
18.5	10.9	-0.1	-0.6



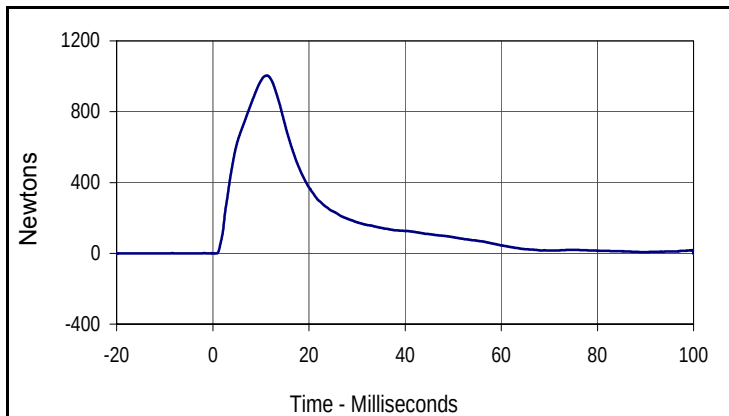
Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4231.0	10.9	-32.9	-0.6

Test Program: ES2re Abdomen Impact Test
 ATD Serial No.: F037

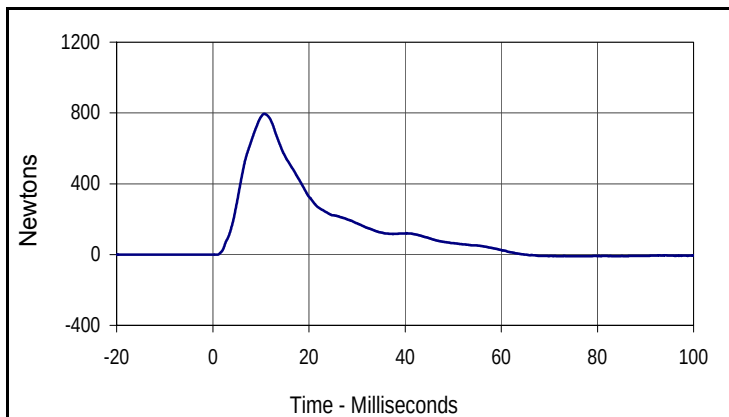
Test Date: 11/20/14
 Test I.D.: F037ABD067



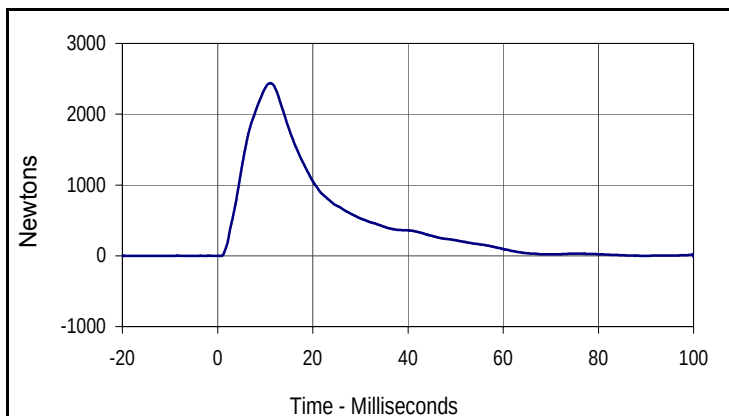
Curve Description			
Front Abdomen Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
643.9	11.4	-10.8	100.0



Curve Description			
Middle Abdomen Force			
Plot No.	Type	SAE Class	Units
004	FIL	600	Newtons
Max	Time	Min	Time
1004.2	11.2	-2.0	100.0



Curve Description			
Rear Abdomen Force			
Plot No.	Type	SAE Class	Units
005	FIL	600	Newtons
Max	Time	Min	Time
794.7	10.7	-10.0	75.3



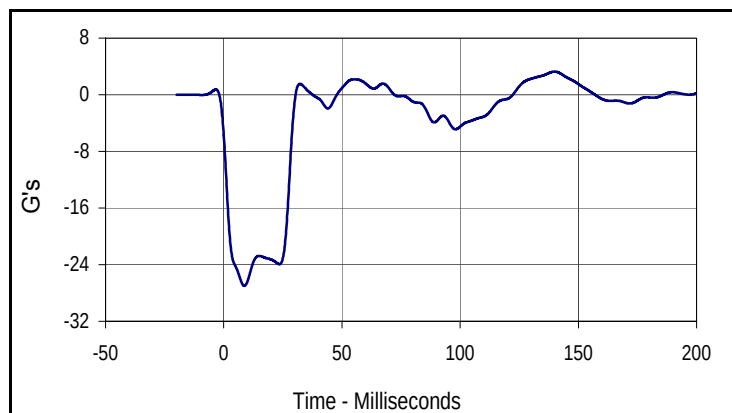
Curve Description			
Abdomen Sum Resultant			
Plot No.	Type	SAE Class	Units
006	RES	600	Newtons
Max	Time	Min	Time
2437.5	11.1	-16.5	100.0

Test Program: ES2re Lumbar Flexion Test
 ATD Serial No.: F037

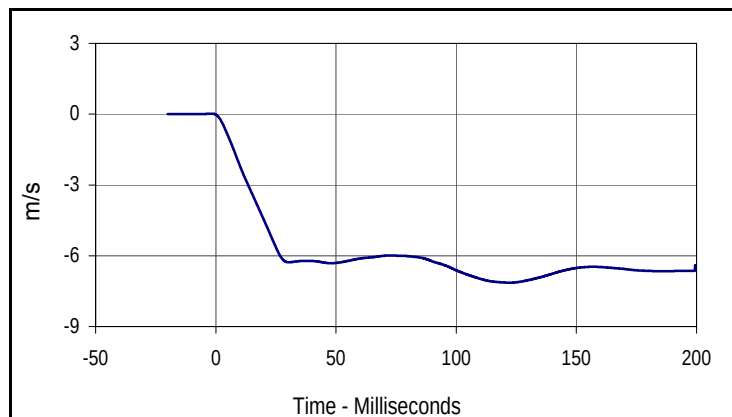
Test Date: 11/20/14
 Test I.D.: F037LB067



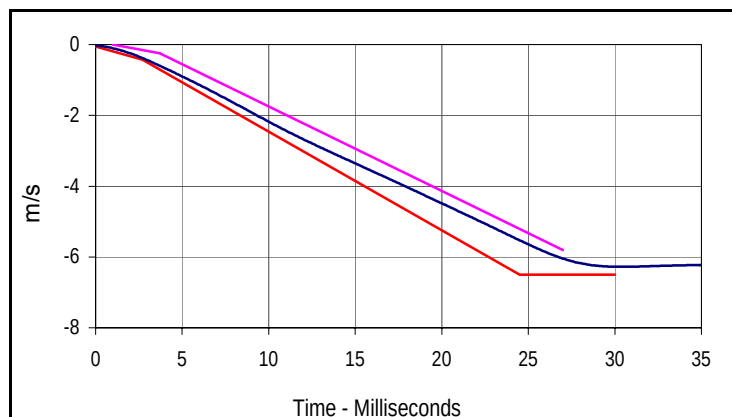
Tested Parameter	Units	Specification	Result	Pass/Fail
Lumbar Spine Assembly Soak Time	Minutes	≥240	710	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	21.0	Pass
Pendulum Velocity	m/s	5.95 to 6.15	6.07	Pass
Headform Rotation	Max	45 to 55	49.6	Pass
	Time	39 to 53	44.6	Pass
Time of Decay to Zero Angle from Peak	msec	37 to 57	41.7	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
3.3	140.5	-27.0	9.3



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.3	-7.1	122.9



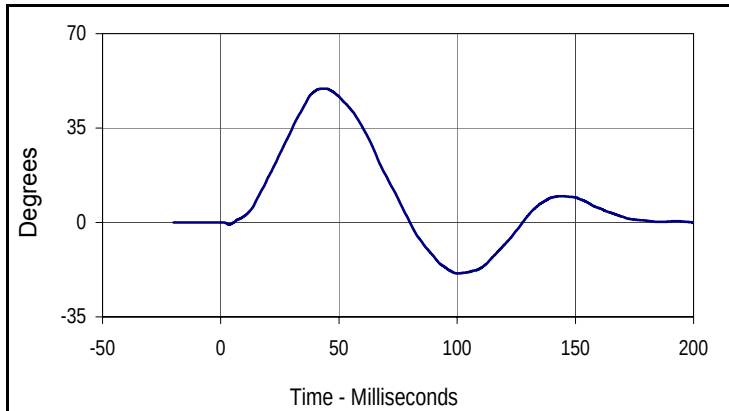
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.3	-7.1	122.9

Velocity Corridors

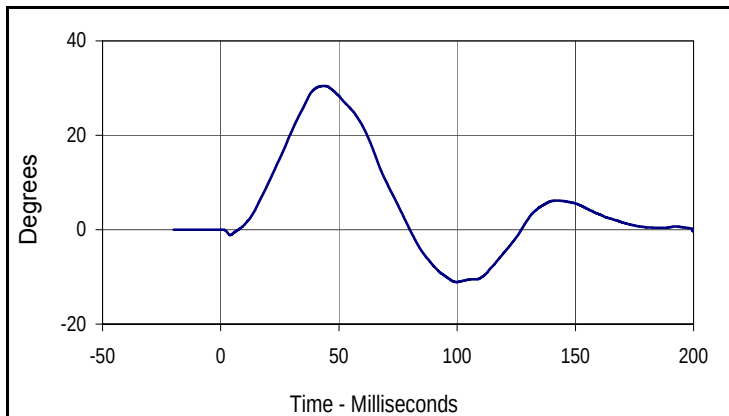
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.50
		30.0	-6.50

Test Program: ES2re Lumbar Flexion Test
 ATD Serial No.: F037

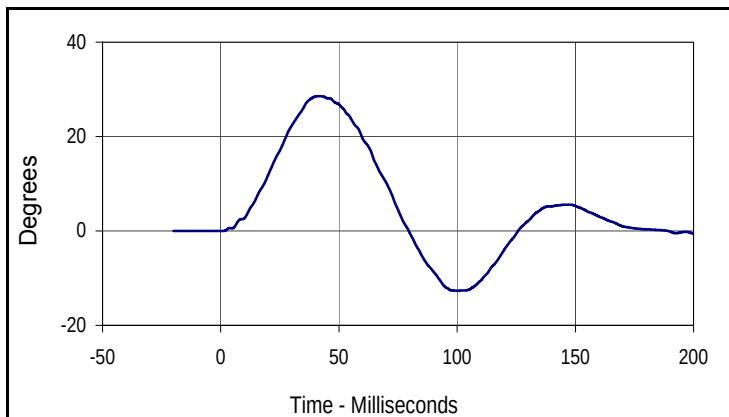
Test Date: 11/20/14
 Test I.D.: F037LB067



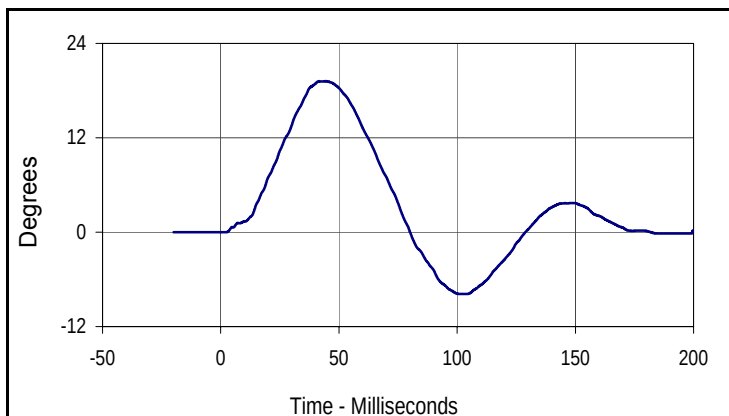
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
49.6	44.6	-18.9	100.8



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
30.4	44.4	-11.1	100.4



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
28.6	42.9	-12.7	100.6



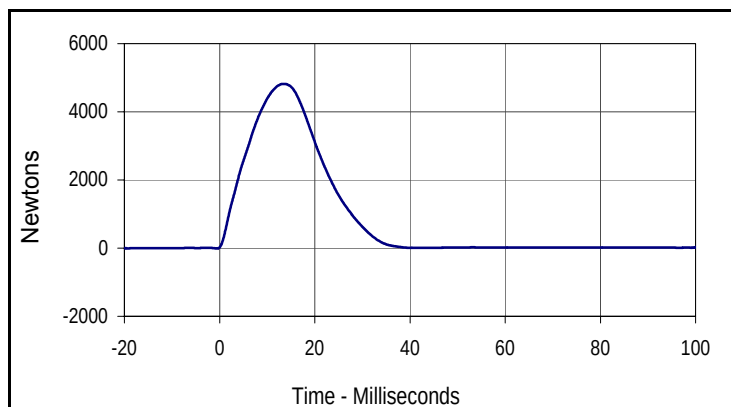
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
19.2	45.0	-7.9	104.2

Test Program: ES2re Pelvis Impact Test
 ATD Serial No.: F037

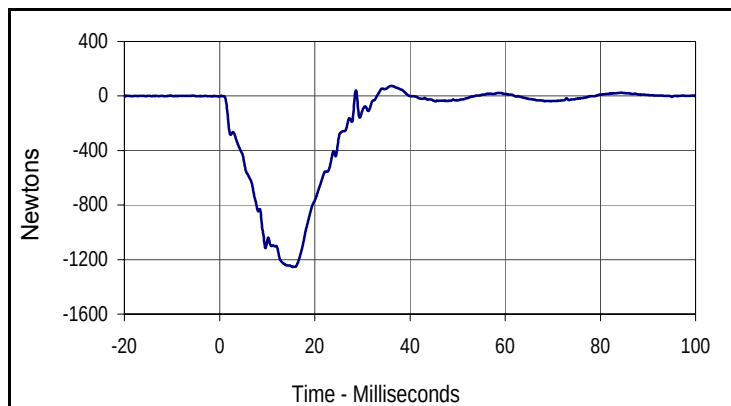
Test Date: 11/20/14
 Test I.D.: F037PL067



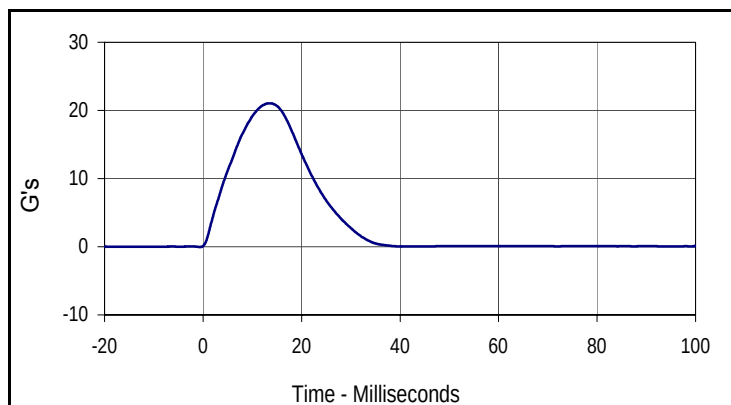
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	765	Pass
Temperature During Soak	Max	20.6 to 22.2	21.4	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	21.3	Pass
	Min		20.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	21.3	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.31	Pass
Peak Impactor Force	N	4700 to 5400	4820.2	Pass
	msec	11.8 to 16.1	13.5	Pass
Peak Pubic Symphysis Load	N	-1230 to -1590	-1254.1	Pass
	msec	12.2 to 17.0	15.4	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4820.2	13.5	-10.2	-0.6



Curve Description			
Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
74.7	36.1	-1254.1	15.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
21.0	13.5	0.0	-0.6

Test Program: SID IIs External Measurements
 ATD Serial No.: 307

Test Date: 11/21/14
 Test I.D.: N/A



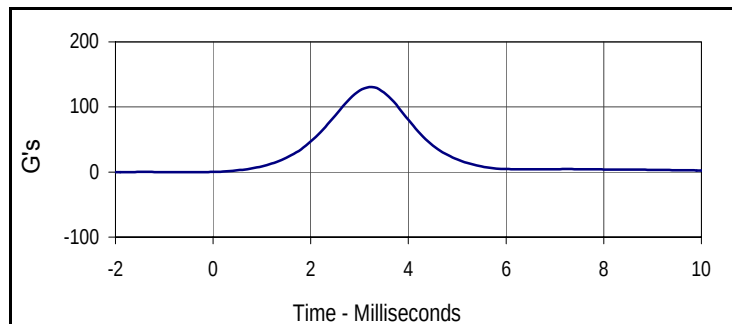
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	20	Pass
A	Sitting Height	mm	772 - 788	778	Pass
B	Shoulder Pivot Height	mm	437 - 453	443	Pass
C	H-Point Height	mm	79 - 89	85	Pass
D	H-Point from Seatback	mm	141 - 151	144	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F	Thigh Clearance	mm	119 - 135	128	Pass
G	Head Breadth	mm	140 - 148	145	Pass
H	Head Back from Backline	mm	40 - 46	43	Pass
I	Head Depth	mm	178 - 188	185	Pass
J	Head Circumference	mm	541 - 551	546	Pass
K	Buttock to Knee Length	mm	514 - 540	525	Pass
L	Popliteal Height	mm	343 - 369	351	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	400	Pass
N	Buttock Popliteal Length	mm	416 - 442	432	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	205	Pass
P	Foot Length	mm	216 - 232	223	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	319	Pass
R	Arm Length	mm	249 - 259	254	Pass
S	Knee Joint to Seatback	mm	477 - 493	483	Pass
V	Shoulder Width	mm	341 - 357	351	Pass
W	Foot Width	mm	78 - 94	89	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.: 307

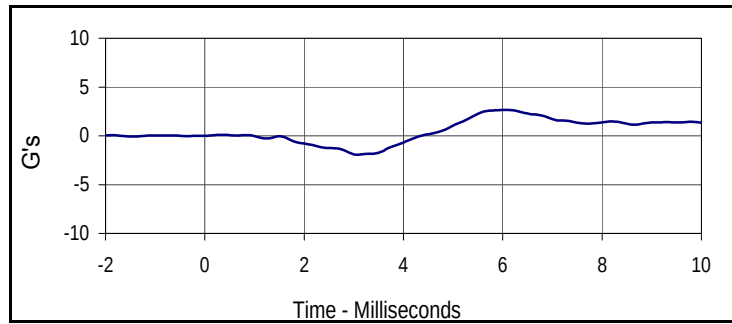
Test Date: 11/21/14
 Test I.D.: 307HD076



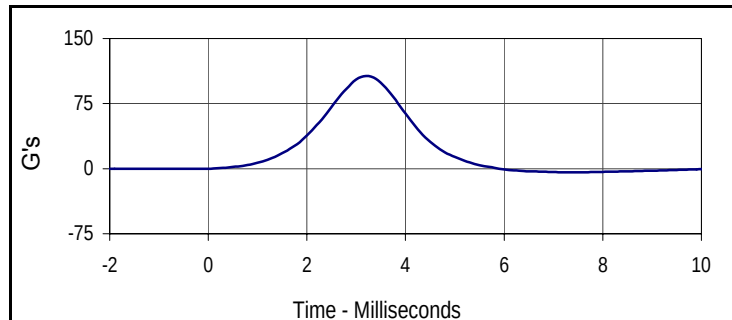
Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	305	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.5	Pass
	Min	°C		21.2	Pass
Humidity During Soak	Max	%	10.0 to 70.0	20.6	Pass
	Min	%		20.3	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	20.4	Pass
Peak Head Resultant Acceleration		G's	115 to 137	130.5	Pass
Peak Head X Acceleration		G's	<15	2.7	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse		%	<15	3.5	Pass
Overall Test Results				Pass	



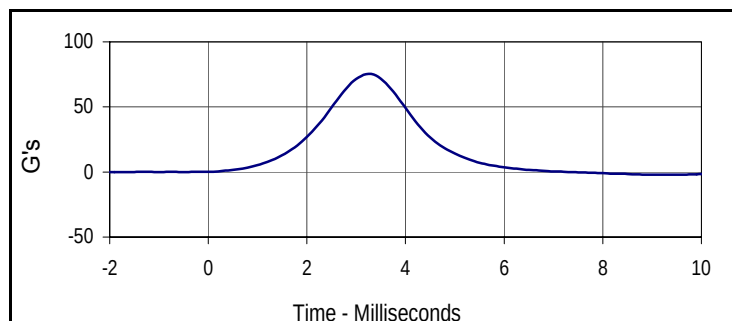
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
130.5	3.2	0.0	-0.5



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.7	6.0	-1.9	3.1



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
106.7	3.2	-4.3	7.3



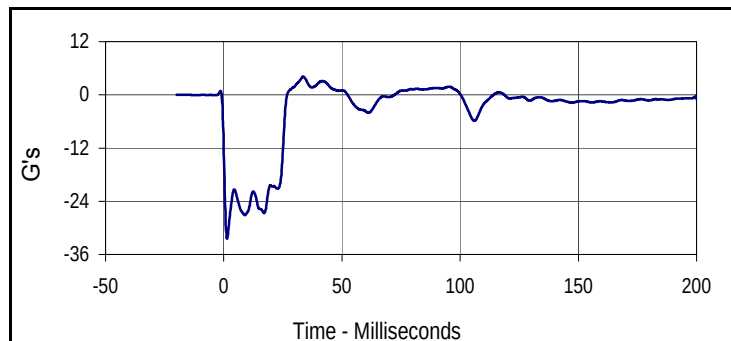
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
75.3	3.3	-2.1	9.5

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 307

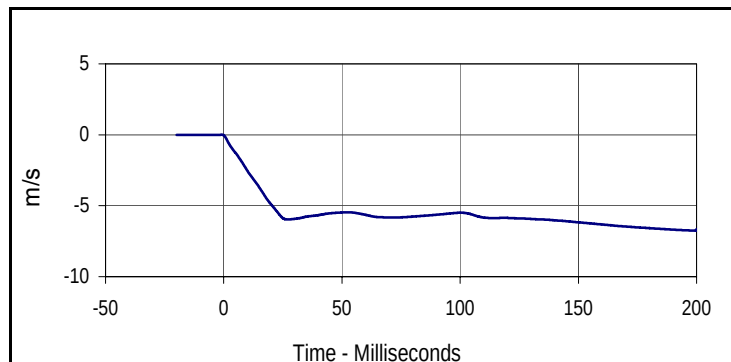
Test Date: 11/21/14
 Test I.D.: 307NB076



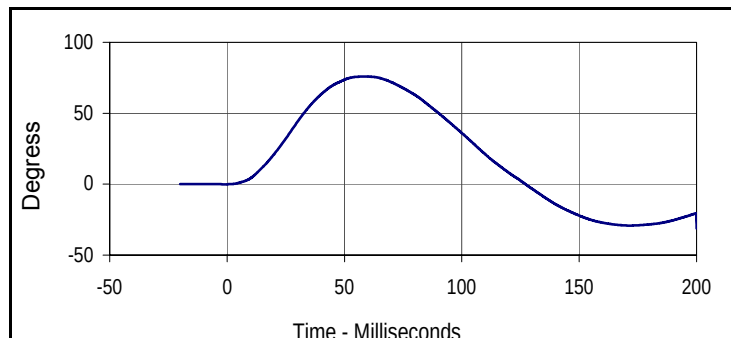
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	440	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	20.6	Pass
	Min		20.3	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.3	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.56	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.53	Pass
	15 msec	-3.30 to -4.10	-3.70	Pass
	20 msec	-4.40 to -5.40	-4.90	Pass
	25 msec	-5.40 to -6.10	-5.88	Pass
	25-100 msec	-5.50 to -6.20	-5.97	Pass
D-Plane Rotation	Max	71 to 81	75.9	Pass
	Time	50 to 70	58.7	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-41.2	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	105.5	Pass
Overall Test Results			Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
4.1	0.0	-32.4	0.0



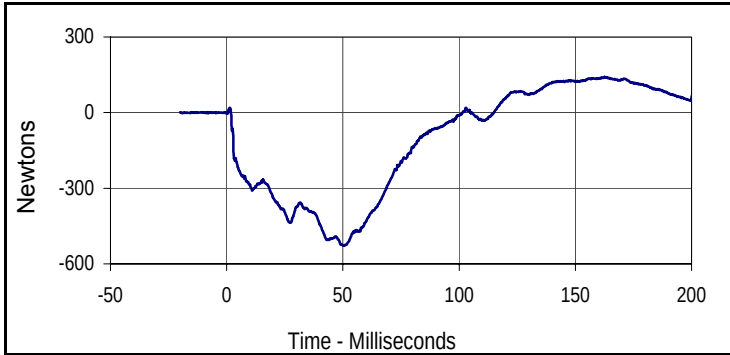
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.9	-6.8	199.9



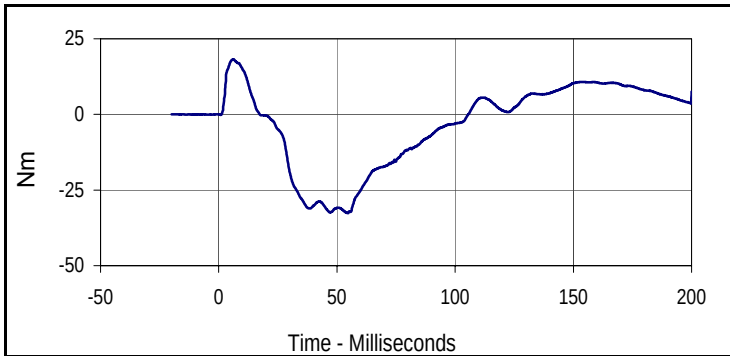
Curve Description			
D-Plane Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degress
Max	Time	Min	Time
75.9	58.7	-31.2	200.0

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 307

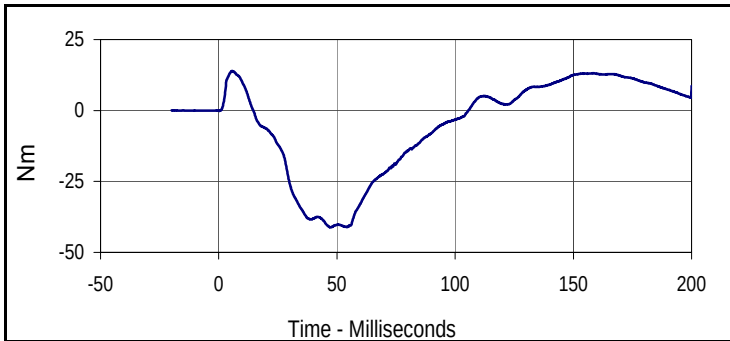
Test Date: 11/21/14
 Test I.D.: 307NB076



Curve Description			
Neck Force Y			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
142.4	162.6	-527.2	50.4



Curve Description			
Neck Moment X			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
18.2	6.3	-32.6	54.7



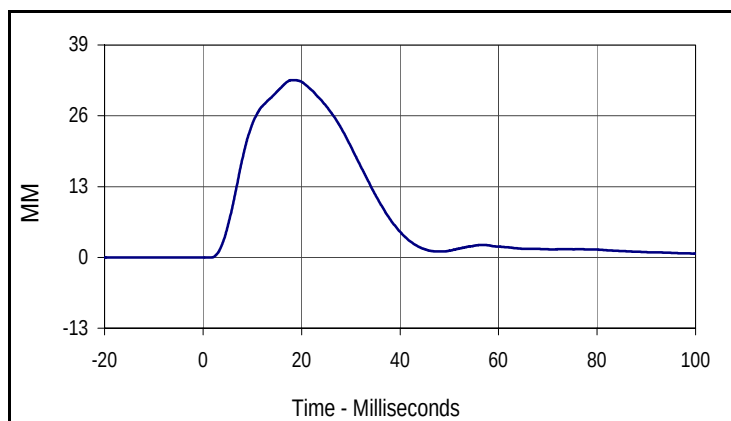
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
006	FIL	600	Nm
Max	Time	Min	Time
13.9	5.7	-41.2	47.2

Test Program: SID IIs Shoulder Impact Test
 ATD Serial No.: 307

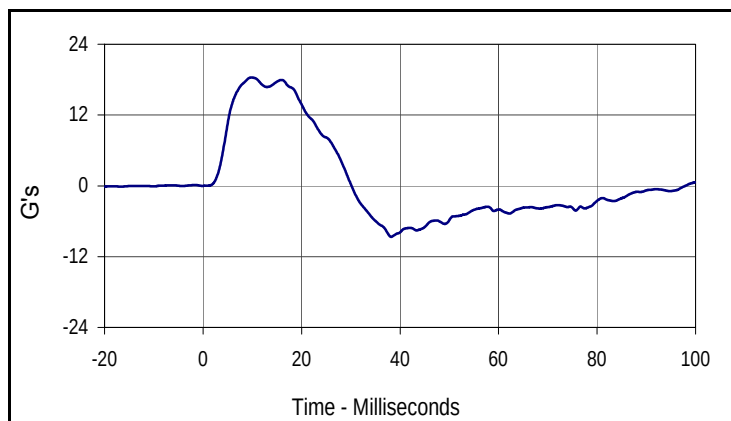
Test Date: 11/21/14
 Test I.D.: 307SH076



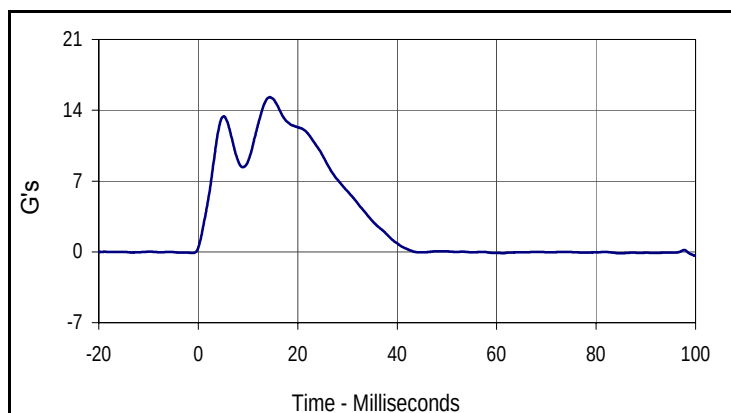
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	495	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.5	Pass
	Min	°C		21.2	Pass
Humidity During Soak	Max	%	10.0 to 70.0	20.6	Pass
	Min	%		20.3	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	20.4	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.33	Pass
Peak Shoulder Deflection		mm	28 to 37	32.5	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	18.4	Pass
Peak Impactor Acceleration		G's	13 to 18	15.3	Pass
Overall Test Results				Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
32.5	18.7	0.0	-9.5



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.4	9.8	-8.7	38.2



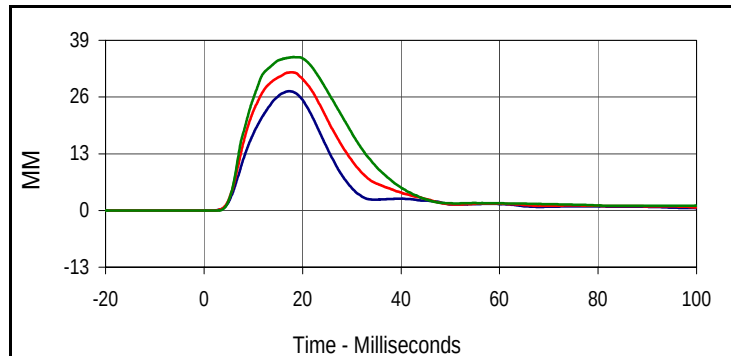
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
15.3	14.4	-0.3	99.8

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 307

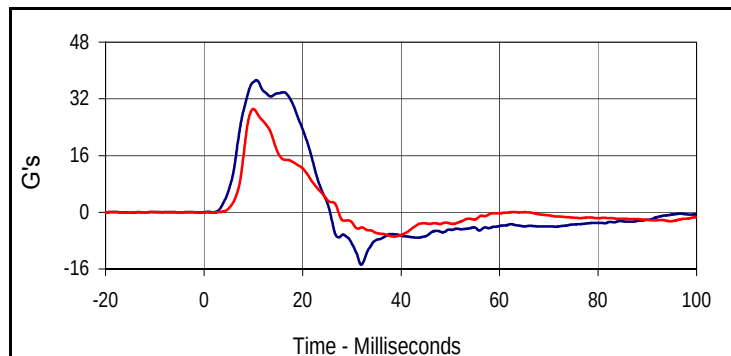
Test Date: 11/21/14
 Test I.D.: 307TWA076



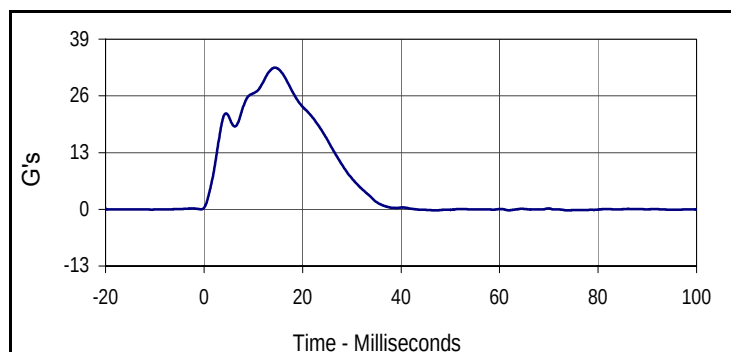
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	540	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	20.6	Pass
	Min		20.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.63	Pass
Peak Shoulder Deflection	mm	31 to 40	33.6	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	27.3	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	31.7	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	35.2	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	37.3	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	29.1	Pass
Peak Impactor Acceleration	G's	30 to 36	32.5	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
27.3	17.3	0.0	-10.8
Middle Thorax Deflection			
Max	Time	Min	Time
31.7	17.8	0.0	-12.5
Lower Thorax Deflection			
Max	Time	Min	Time
35.2	18.2	0.0	-11.0



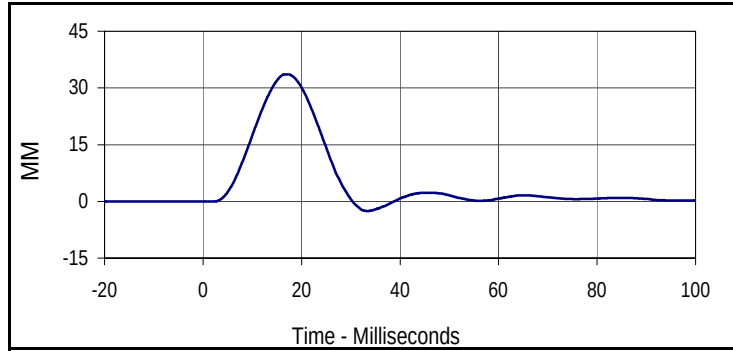
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
37.3	10.6	-14.8	31.9
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
29.1	10.0	-6.8	38.7



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
32.5	14.4	-0.3	47.0

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 307

Test Date: 11/21/14
 Test I.D.: 307TWA076



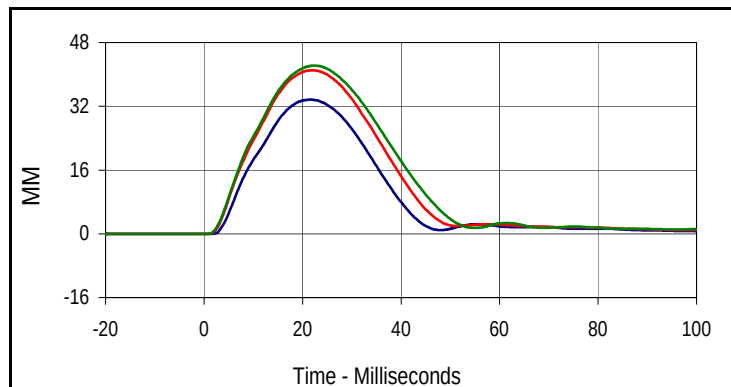
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
33.6	17.3	-2.6	33.4

Test Program: SID IIs Thorax without Arm Impact Test
 ATD Serial No.: 307

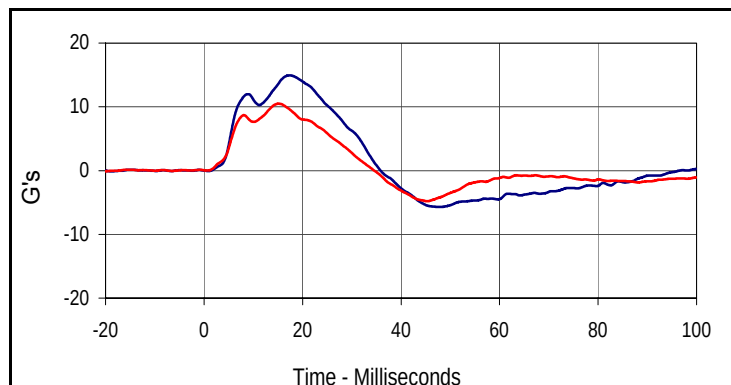
Test Date: 11/21/14
 Test I.D.: 307TWOA076



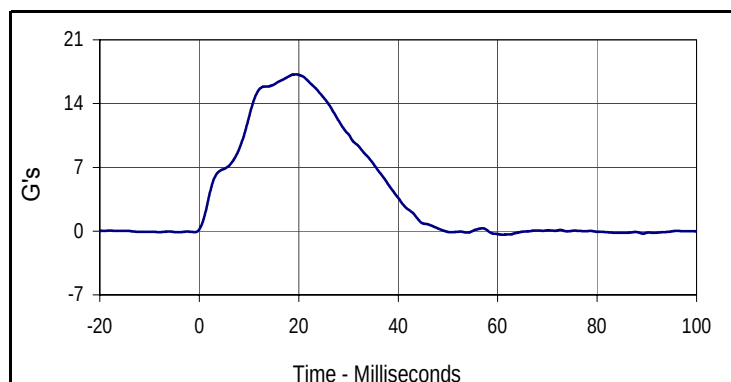
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	590	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.5	Pass
	Min	°C		21.2	Pass
Humidity During Soak	Max	%	10.0 to 70.0	20.6	Pass
	Min	%		20.3	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	20.5	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.30	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	33.7	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	41.0	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	42.2	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	15.0	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	10.5	Pass
Peak Impactor Acceleration		G's	14 to 18	17.2	Pass
Overall Test Results				Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
33.7	21.6	0.0	-4.3
Middle Thorax Deflection			
Max	Time	Min	Time
41.0	22.0	0.0	-6.9
Lower Thorax Deflection			
Max	Time	Min	Time
42.2	22.4	0.0	-7.9



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.0	17.4	-5.7	47.8
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
10.5	15.2	-4.8	45.3



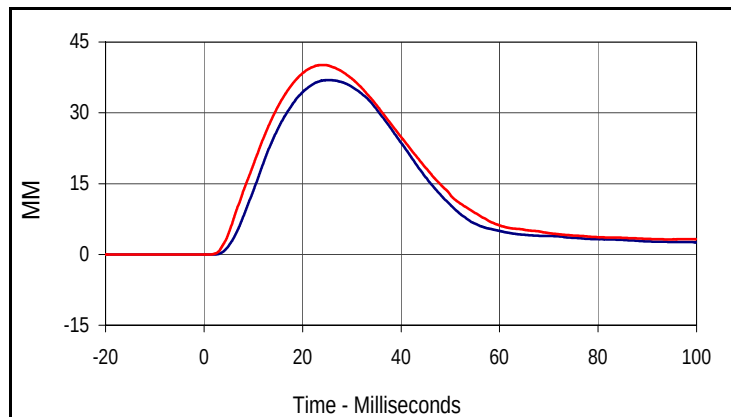
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
17.2	19.4	-0.4	61.1

Test Program: SID IIs Abdomen Impact Test
 ATD Serial No.: 307

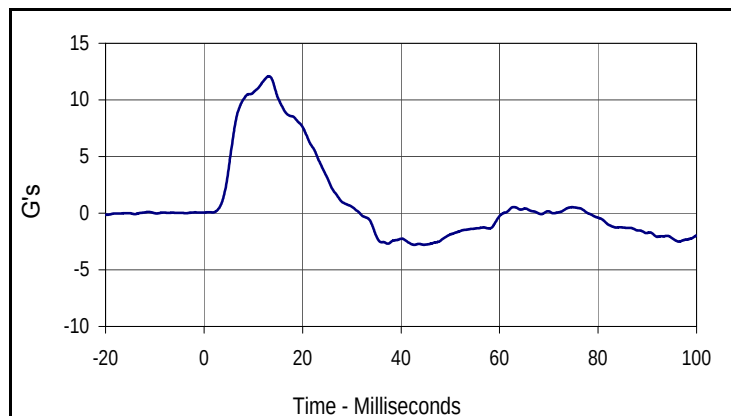
Test Date: 11/21/14
 Test I.D.: 307ABD076



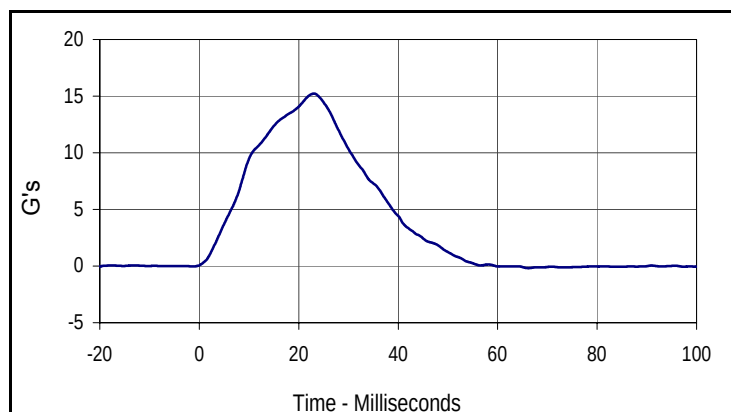
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	625	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	20.6	Pass
	Min		20.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.5	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.31	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	36.9	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	40.1	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	12.1	Pass
Peak Impactor Acceleration	G's	12 to 16	15.2	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
36.9	25.2	0.0	-11.6
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
40.1	24.0	0.0	-5.2

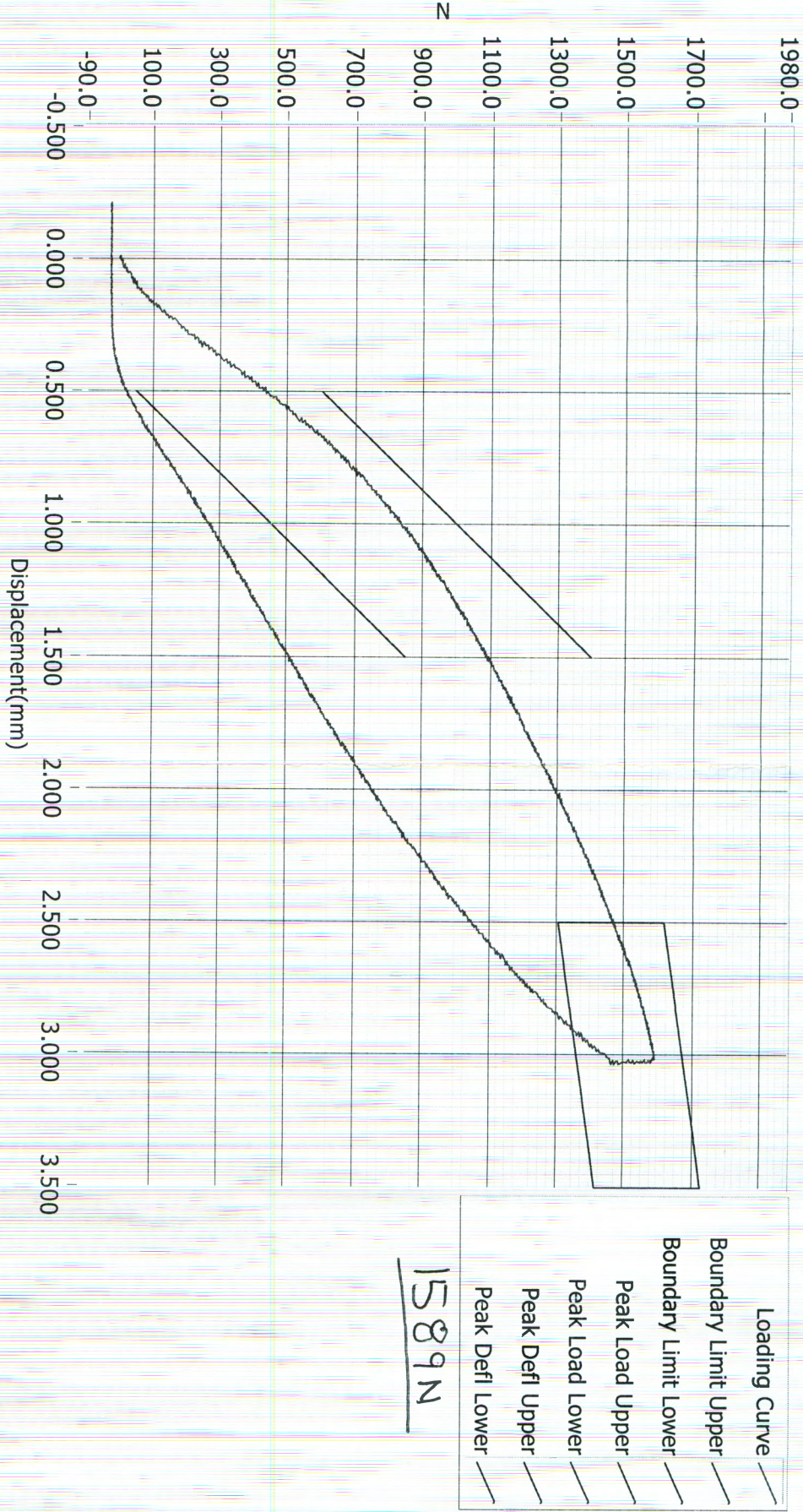


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
12.1	13.2	-2.8	42.7



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.2	23.0	-0.2	66.2

Resultant Data - SIDIIs Plug Compression



ATD Calibration Lab

M20154106 Pre Test

Test ID	Part Serial Number	Test Date	Test Time
	70656	12/12/2013	8:58 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/12/2013

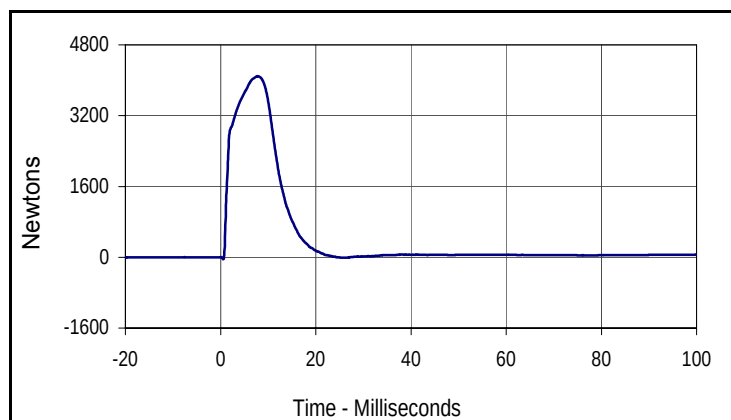
Current Time : 20:58:40

Test Program: SID IIs Pelvis Acetabulum Impact Test
 ATD Serial No.: 307

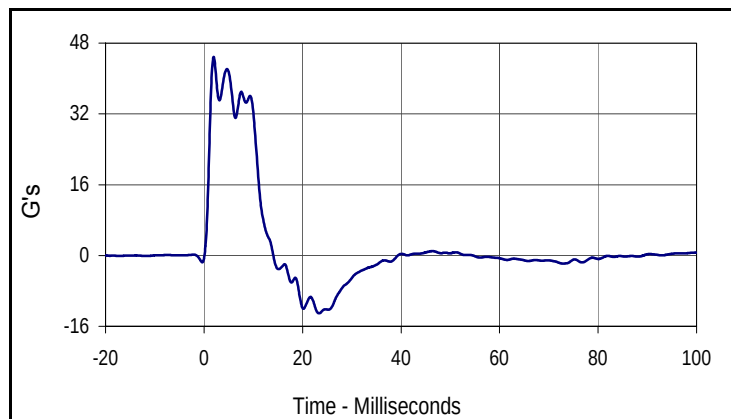
Test Date: 11/21/14
 Test I.D.: 307ACET076



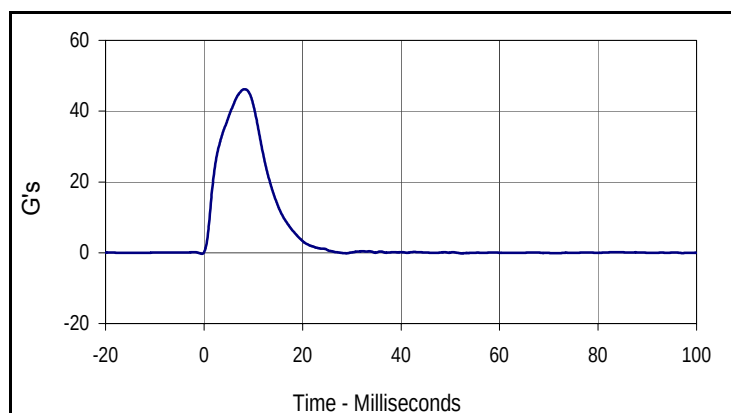
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	670	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.5	Pass
	Min	°C		21.2	Pass
Humidity During Soak	Max	%	10.0 to 70.0	20.6	Pass
	Min	%		20.3	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	20.5	Pass
Impactor Velocity		m/s	6.6 to 6.8	6.66	Pass
Peak Acetabulum Force Y		Newtons	3600 to 4300	4089.2	Pass
Peak Pelvis Y Acceleration After 6 msec.		G's	34 to 42	37.0	Pass
Peak Impactor Acceleration		G's	38 to 47	46.2	Pass
Overall Test Results				Pass	



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4089.2	7.8	-44.7	0.6



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
44.8	1.9	-13.1	23.3



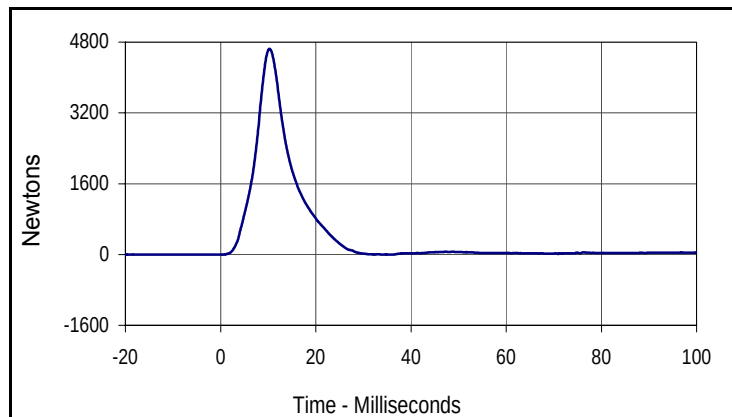
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
46.2	8.2	-0.3	-0.4

Test Program: SID IIs Pelvis Iliac Calibration
 ATD Serial No.: 307

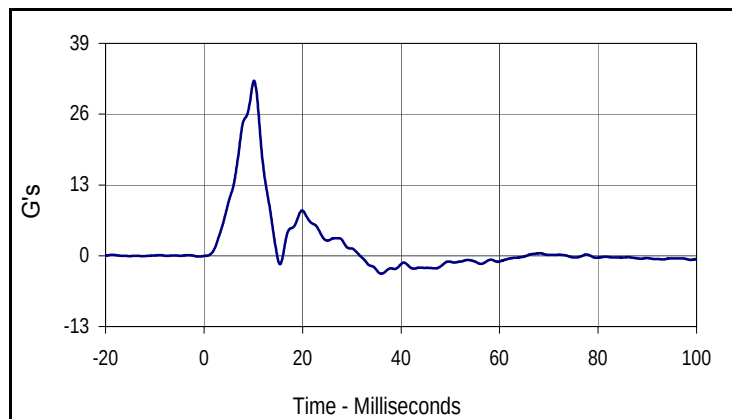
Test Date: 11/21/14
 Test I.D.: 307PL076



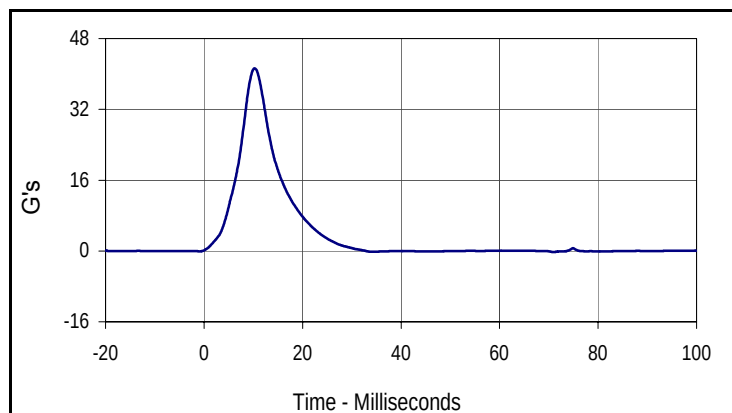
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	740	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	20.6	Pass
	Min		20.3	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	20.6	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.33	Pass
Peak Iliac Force	Newtons	4100 to 5100	4647.7	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	32.1	Pass
Peak Impactor Acceleration	G's	36 to 45	41.3	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4647.7	10.3	-3.0	35.4



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
32.1	10.2	-3.3	36.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
41.3	10.3	-0.3	71.0

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

Test Program: ES2re External Measurements
 ATD Serial No.: F037

Test Date: 12/11/14
 Test I.D.: N/A



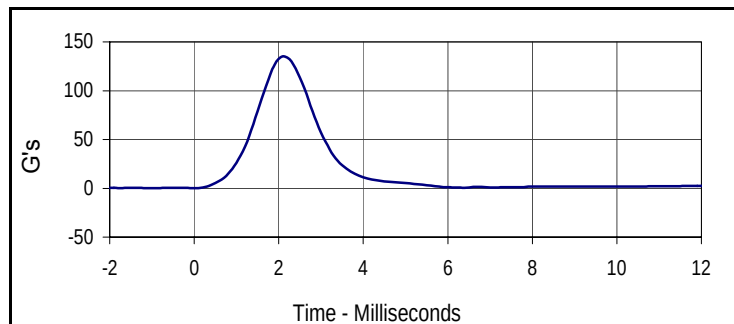
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity		%	10 to 70	30.0	Pass
1	Sitting Height	mm	900 - 918	909	Pass
2	Seat to Shoulder Joint	mm	558 - 572	564	Pass
3	Seat to Lower Face of Thoracic Spine Box	mm	346 - 356	350	Pass
4	Seat to Hip Joint (Center of Bolt)	mm	97 - 103	99	Pass
5	Sole to Seat, Sitting	mm	333 - 451	395	Pass
6	Head Width	mm	152 - 158	156	Pass
7	Shoulder / Arm Width	mm	461 - 479	470	Pass
8	Thorax Width	mm	322 - 332	326	Pass
9	Abdomen Width	mm	273 - 287	280	Pass
10	Pelvis Lap Width	mm	359 - 373	363	Pass
11	Head Depth	mm	196 - 206	201	Pass
12	Thorax Depth	mm	262 - 272	270	Pass
13	Abdomen Width	mm	194 - 204	199	Pass
14	Pelvis Depth	mm	235 - 245	240	Pass
15	Back of Buttocks to Hip Joint (Center of Bolt)	mm	150 - 160	155	Pass
16	Back of Buttocks to Front Knee	mm	597 - 615	608	Pass
Overall Test Results					Pass

Test Program: ES2re Head Drop Test
 ATD Serial No.: F037

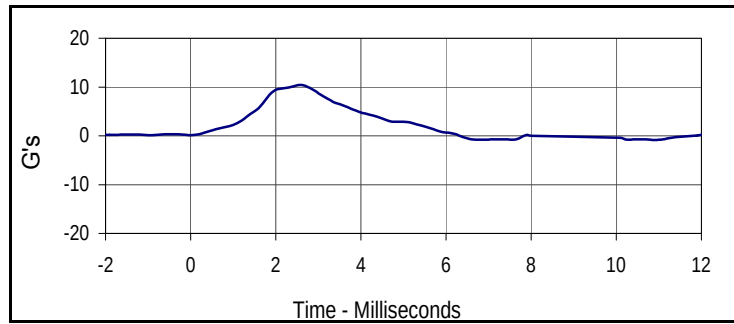
Test Date: 12/11/14
 Test I.D.: F037HD068



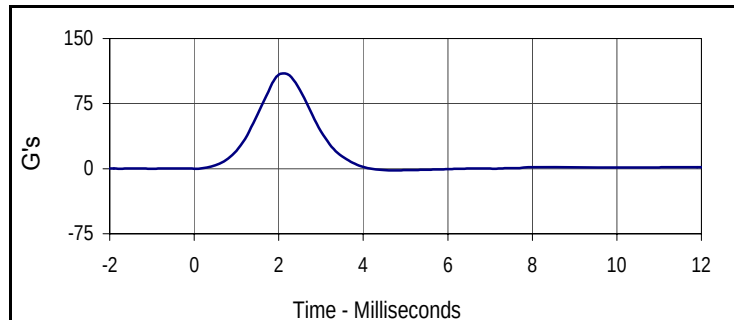
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	301	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	39.0	Pass
Peak Head Resultant Acceleration	G's	125 to 155	135.1	Pass
Peak Head X Acceleration	G's	≤15	10.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	4.0	Pass
Overall Test Results				Pass



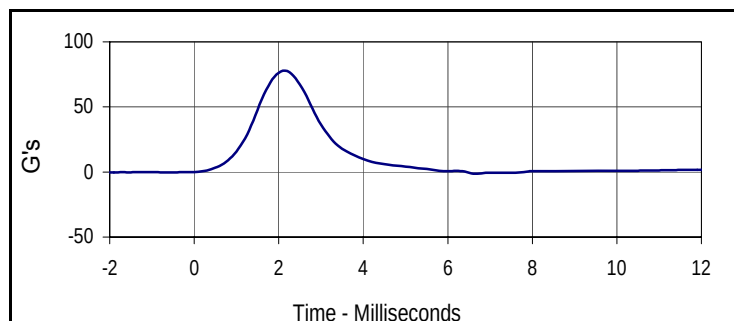
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
135.1	2.1	0.1	0.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
10.4	2.6	0.1	-0.9



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
110.0	2.1	-2.0	4.8



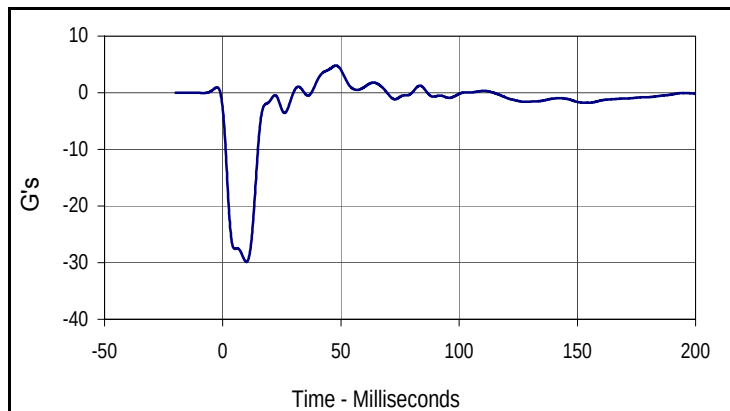
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
77.9	2.1	-1.4	6.7

Test Program: ES2re Neck Flexion Test
 ATD Serial No.: F037

Test Date: 12/11/14
 Test I.D.: F037NB068



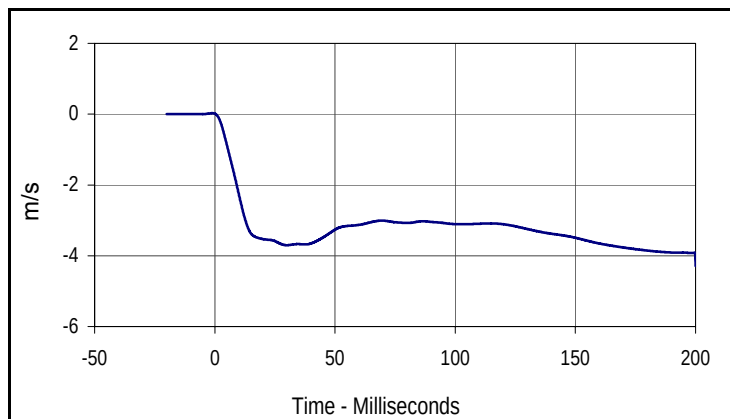
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	336	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	39.0	Pass
Pendulum Velocity	m/s	3.3 to 3.5	3.45	Pass
Headform Flexion	Max	49 to 59	52.2	Pass
	Time	54 to 66	56.4	Pass
Headform Flexion Decay (Peak to Zero)	msec	53 to 88	58.1	Pass
Overall Test Results				Pass



Curve Description

Pendulum Deceleration

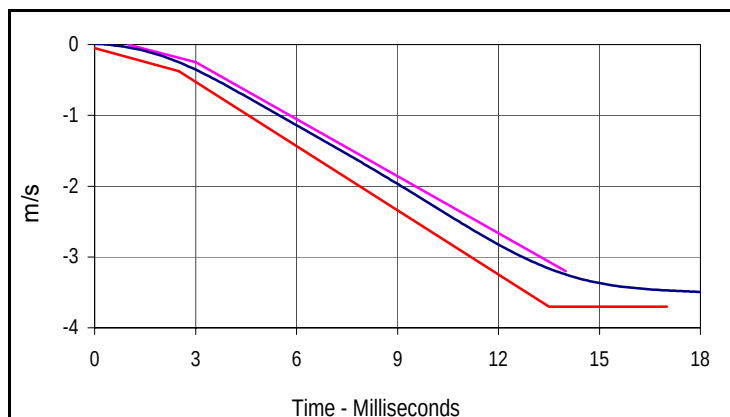
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
4.8	47.9	-29.9	10.0



Curve Description

Pendulum Velocity

Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.0	-4.3	200.0



Curve Description

Pendulum Velocity

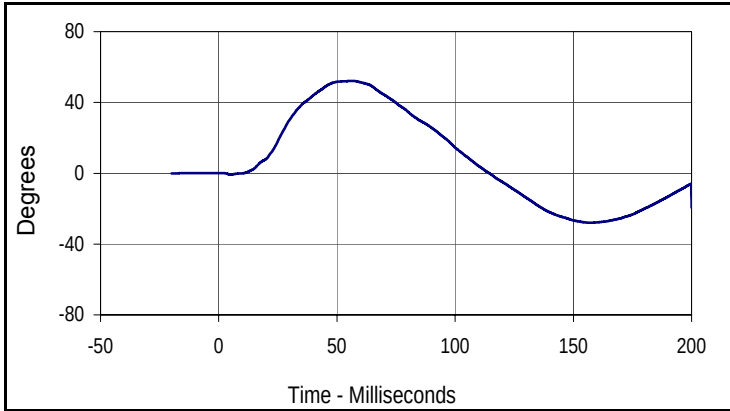
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.0	-4.3	200.0

Velocity Corridors

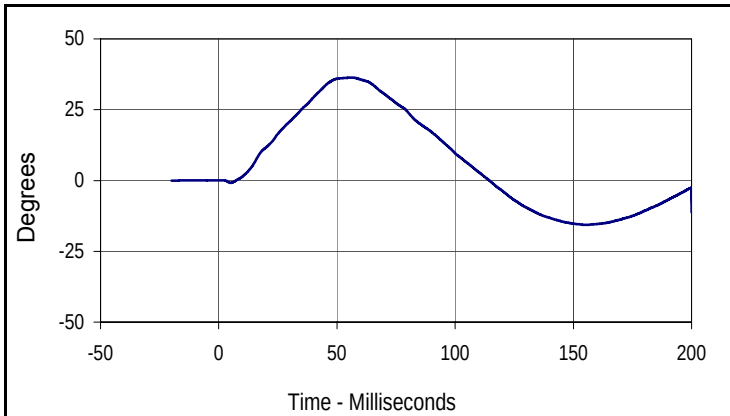
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.03	2.5	-0.375
14.0	-3.20	13.5	-3.70
		17.0	-3.70

Test Program: ES2re Neck Flexion Test
 ATD Serial No.: F037

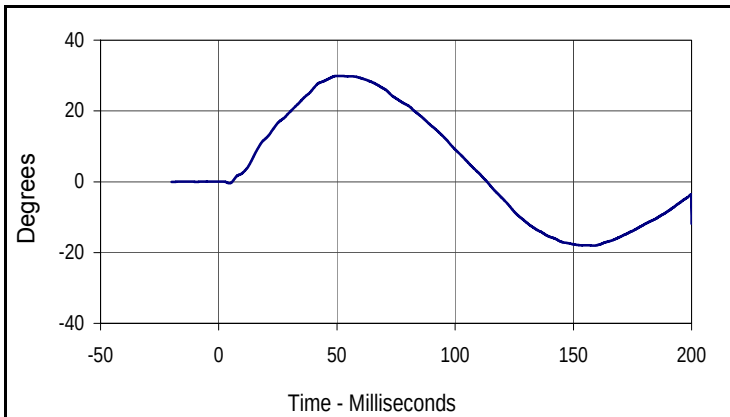
Test Date: 12/11/14
 Test I.D.: F037NB068



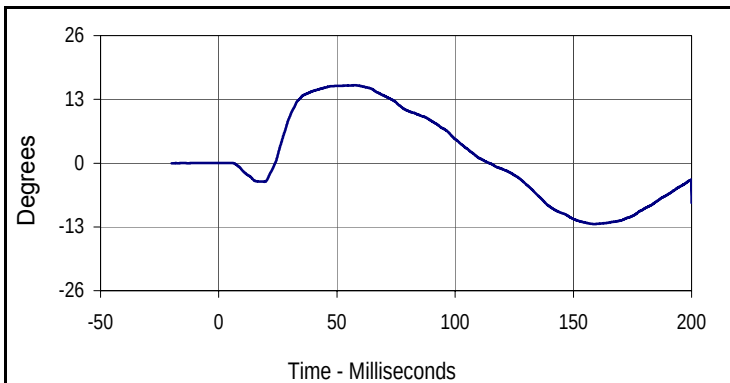
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
52.2	56.4	-27.9	157.2



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
36.4	56.3	-15.7	155.1



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
29.9	50.2	-18.1	158.5



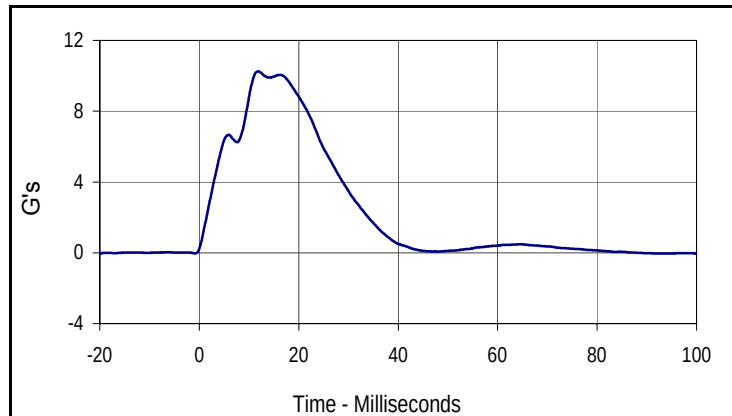
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
15.9	57.7	-12.4	159.0

Test Program: ES2re Shoulder Impact Test
 ATD Serial No.: F037

Test Date: 12/11/14
 Test I.D.: F037SH068



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	401	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	39.1	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.32	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	10.3	Pass
Overall Test Results				Pass



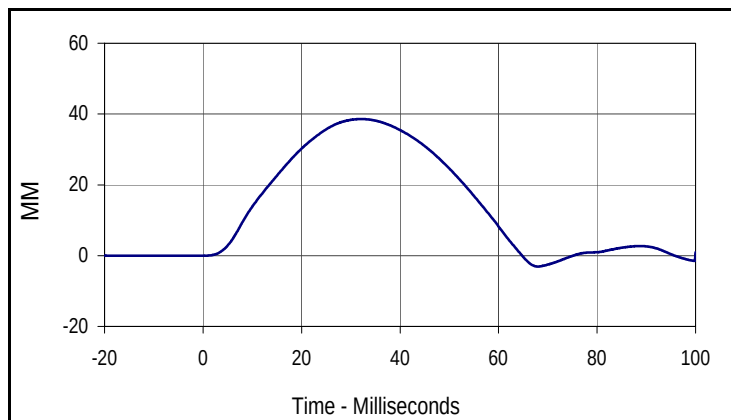
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
10.3	11.8	0.0	93.1

Test Program: ES2re Thorax - Rib Drop Test
 ATD Serial No.: F037 Rib # 1

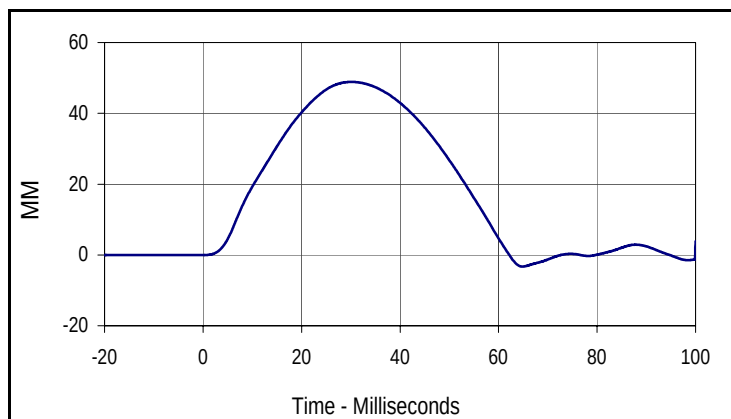
Test Date: 12/11/14
 Test I.D.: F037RB1068



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	456	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	39.0	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	38.6	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	48.9	Pass
Overall Test Results			Pass	



Curve Description			
Upper Rib Deflection (459 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
38.6	32.1	-3.1	68.0



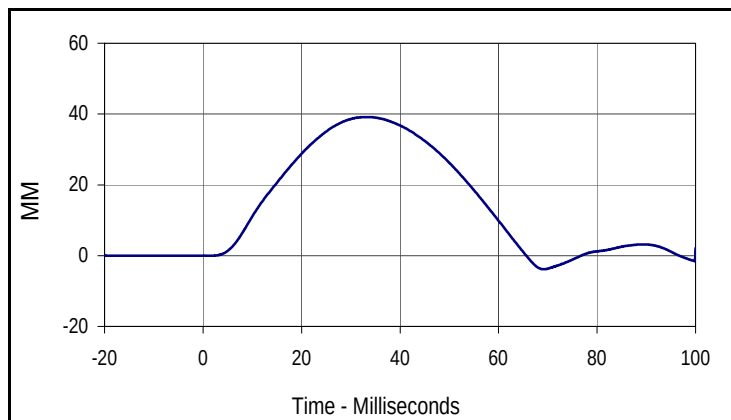
Curve Description			
Upper Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
48.9	30.1	-3.3	64.9

Test Program: ES2re Thorax - Rib Drop Test
 ATD Serial No.: F037 Rib # 2

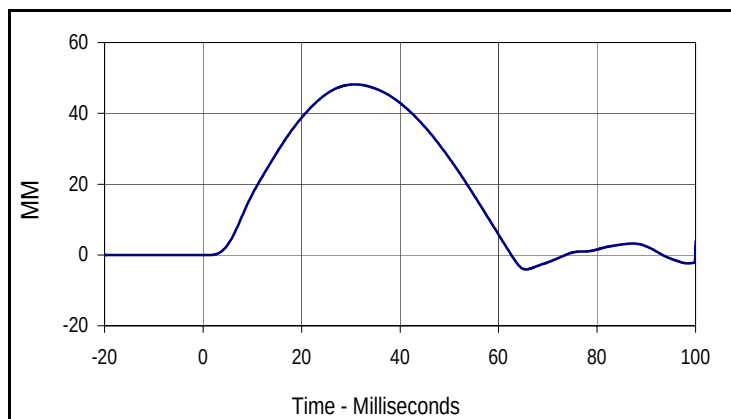
Test Date: 12/11/14
 Test I.D.: F037RB2068



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	501	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.9	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	39.2	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	48.2	Pass
Overall Test Results				Pass



Curve Description			
Middle Rib Deflection (459 MM Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
39.2	33.3	-3.8	69.2



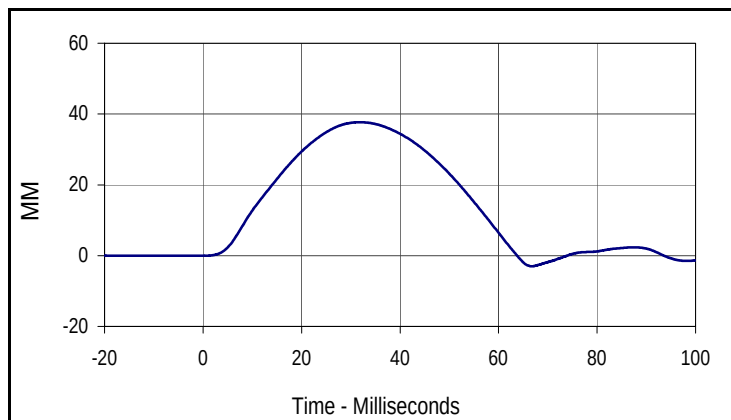
Curve Description			
Middle Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
48.2	30.8	-4.1	65.6

Test Program: ES2re Thorax - Rib Drop Test
 ATD Serial No.: F037 Rib # 3

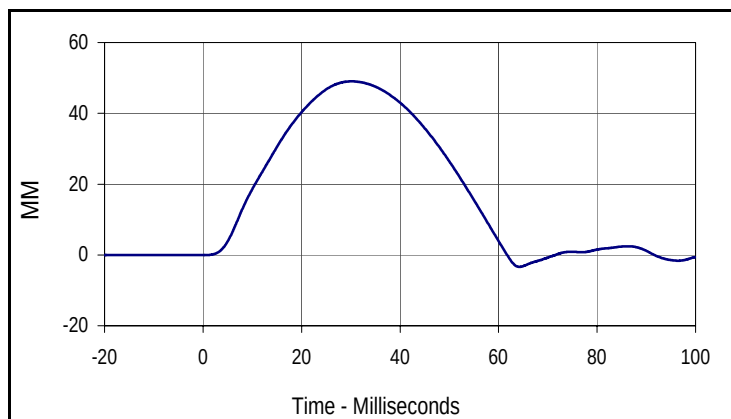
Test Date: 12/11/14
 Test I.D.: F037RB3068



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	546	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.8	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	37.7	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	49.0	Pass
Overall Test Results			Pass	



Curve Description			
Lower Rib Deflection (459 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
37.7	31.8	-3.0	66.7



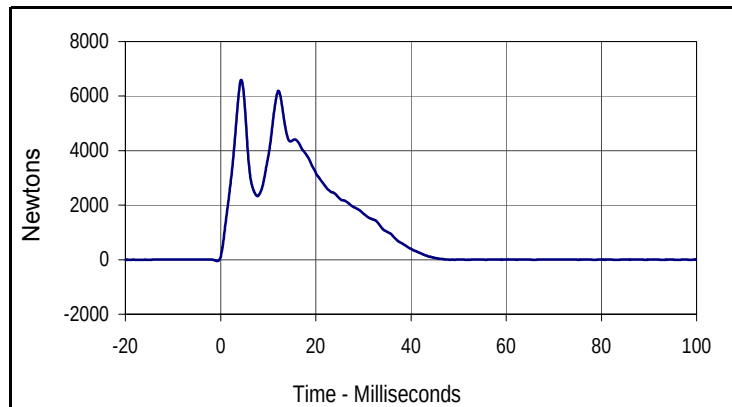
Curve Description			
Lower Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
49.0	30.2	-3.4	64.2

Test Program: ES2re Thorax - Full Body Impact Test
 ATD Serial No.: F037

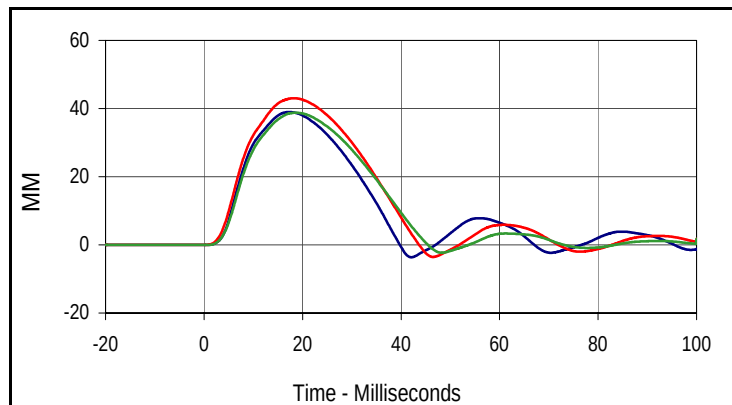
Test Date: 12/11/14
 Test I.D.: F037TH068



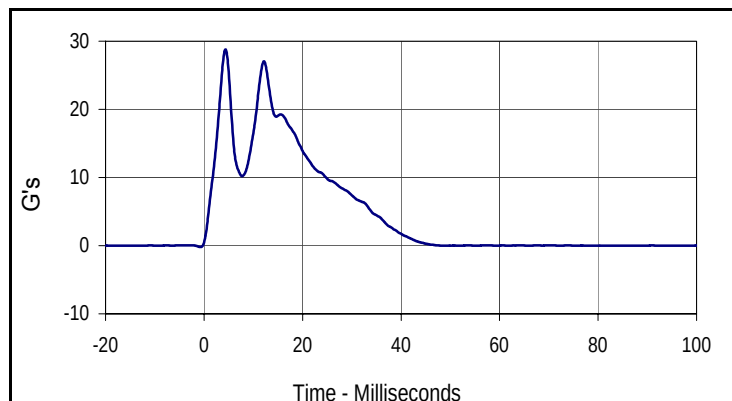
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	591	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.7	Pass
Peak Impactor Velocity	m/s	5.4 to 5.6	5.45	Pass
Peak Impactor Force	N	5100 to 6200	6191.5	Pass
	msec	> 6.0 msec	12.2	Pass
Peak Upper Rib Deflection	mm	34 to 41	39.0	Pass
Peak Middle Rib Deflection	mm	37 to 45	43.0	Pass
Peak Lower Rib Deflection	mm	37 to 44	38.8	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
6590.3	4.4	-47.4	-0.7



Curve Description			
Upper, Middle, Lower Rib Deflections			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max (Upper)	Time	Min (Upper)	Time
39.0	17.3	-3.6	42.1
Max (Middle)	Time	Min (Middle)	Time
43.0	18.3	-3.5	46.5
Max (Lower)	Time	Min (Lower)	Time
38.8	18.6	-2.3	48.3



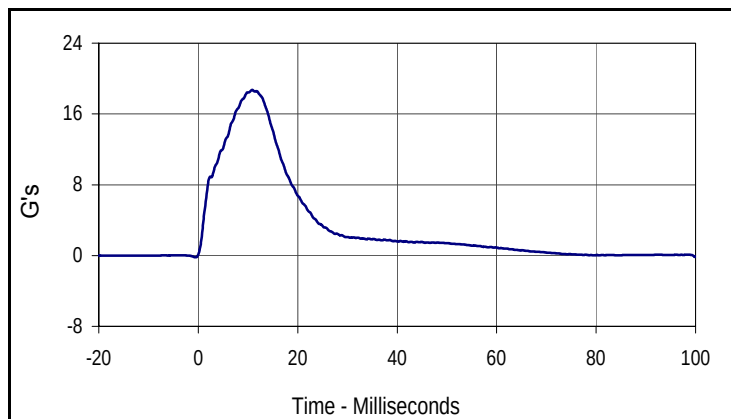
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
28.8	4.4	-0.2	-0.7

Test Program: ES2re Abdomen Impact Test
 ATD Serial No.: F037

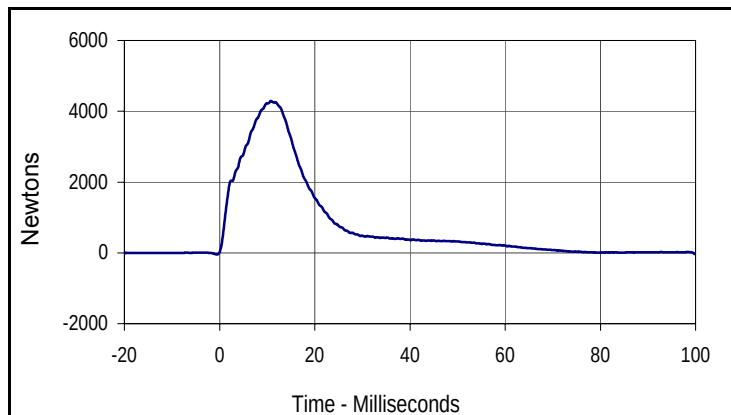
Test Date: 12/11/14
 Test I.D.: F037ABD068



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	661	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.7	Pass
Probe Velocity	m/s	3.9 to 4.1	4.05	Pass
Peak Impactor Force	N	4000 to 4800	4287.0	Pass
	msec	10.6 to 13.0	10.8	Pass
Sum of Abdominal Forces	N	2200 to 2700	2474.5	Pass
	msec	10.0 to 12.3	11.0	Pass
Overall Test Results				Pass



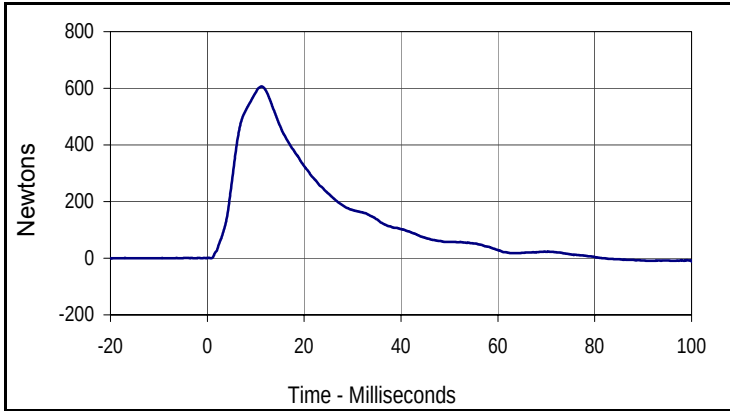
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
18.7	10.8	-0.2	-0.6



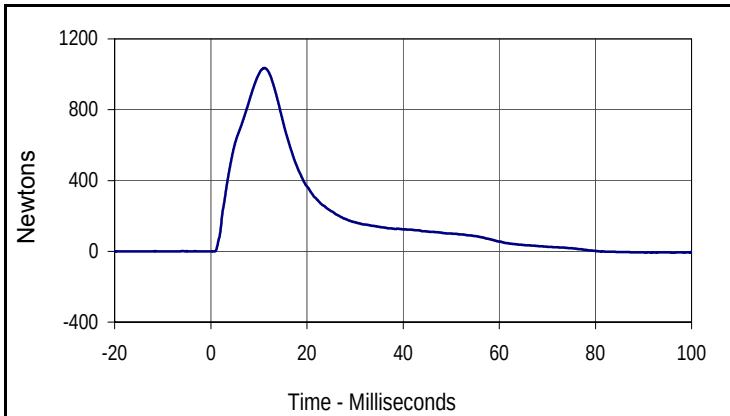
Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4287.0	10.8	-44.9	-0.6

Test Program: ES2re Abdomen Impact Test
 ATD Serial No.: F037

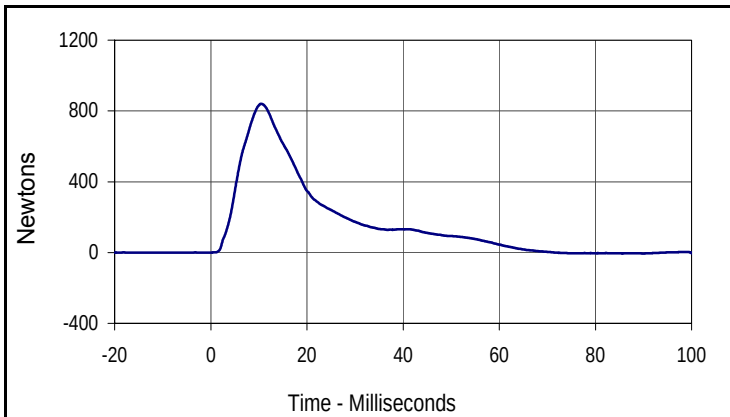
Test Date: 12/11/14
 Test I.D.: F037ABD068



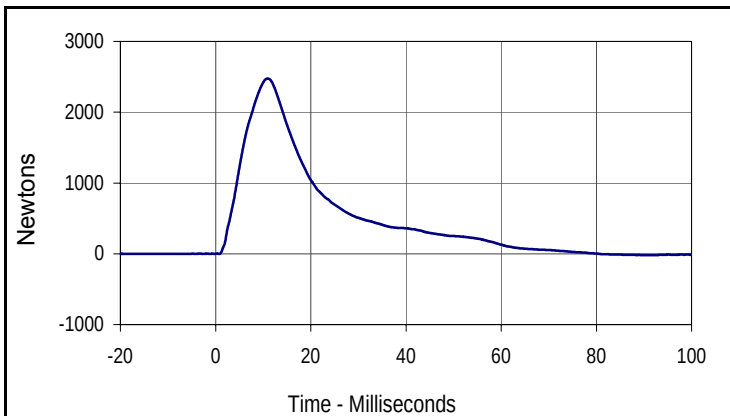
Curve Description			
Front Abdomen Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
606.5	11.2	-10.8	100.0



Curve Description			
Middle Abdomen Force			
Plot No.	Type	SAE Class	Units
004	FIL	600	Newtons
Max	Time	Min	Time
1035.2	11.2	-7.5	96.2



Curve Description			
Rear Abdomen Force			
Plot No.	Type	SAE Class	Units
005	FIL	600	Newtons
Max	Time	Min	Time
840.7	10.5	-6.3	170.0



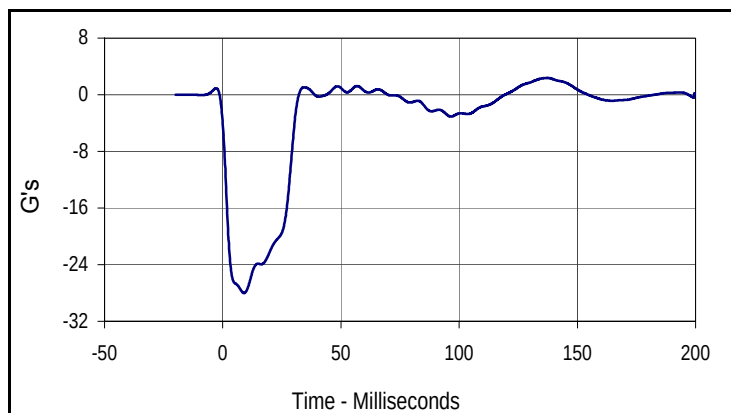
Curve Description			
Abdomen Sum Resultant			
Plot No.	Type	SAE Class	Units
006	RES	600	Newtons
Max	Time	Min	Time
2474.5	11.0	-20.8	90.5

Test Program: ES2re Lumbar Flexion Test
 ATD Serial No.: F037

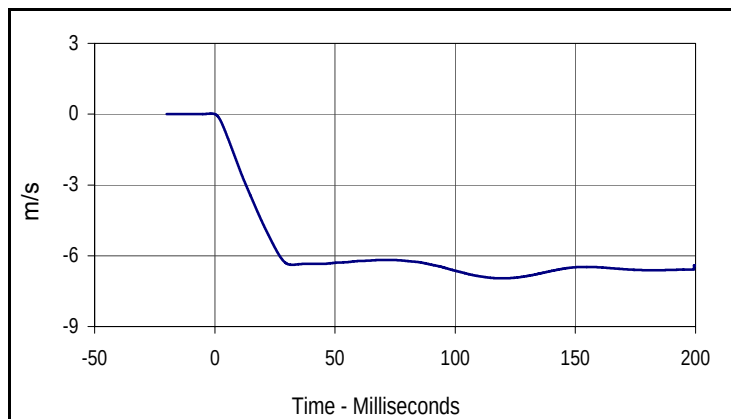
Test Date: 12/11/14
 Test I.D.: F037LB068



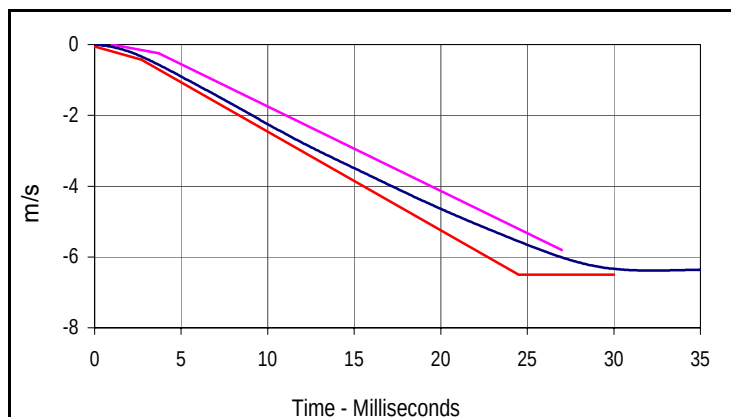
Tested Parameter	Units	Specification	Result	Pass/Fail
Lumbar Spine Assembly Soak Time	Minutes	≥240	736	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.7	Pass
Pendulum Velocity	m/s	5.95 to 6.15	5.98	Pass
Headform Rotation	Max	45 to 55	48.5	Pass
	Time	39 to 53	40.3	Pass
Time of Decay to Zero Angle from Peak	msec	37 to 57	46.0	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
2.4	137.8	-28.0	9.6



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.8	-7.0	119.9



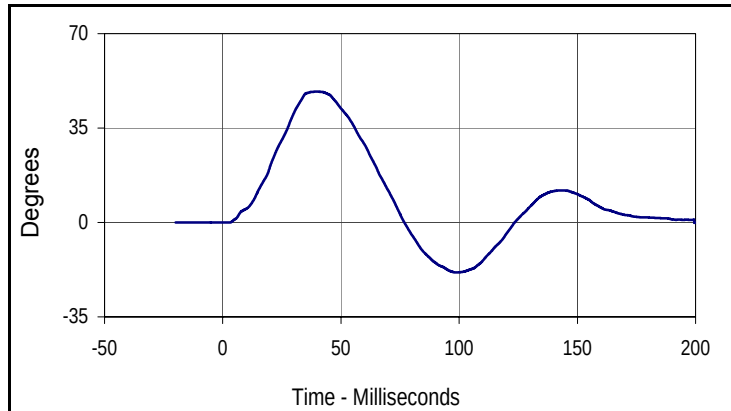
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.8	-7.0	119.9

Velocity Corridors

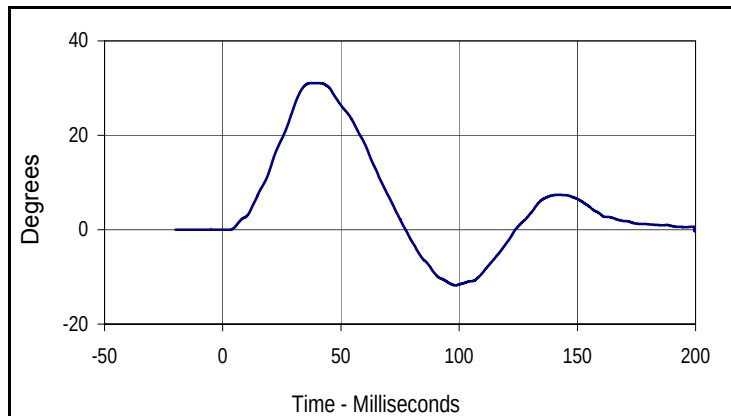
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.50
		30.0	-6.50

Test Program: ES2re Lumbar Flexion Test
 ATD Serial No.: F037

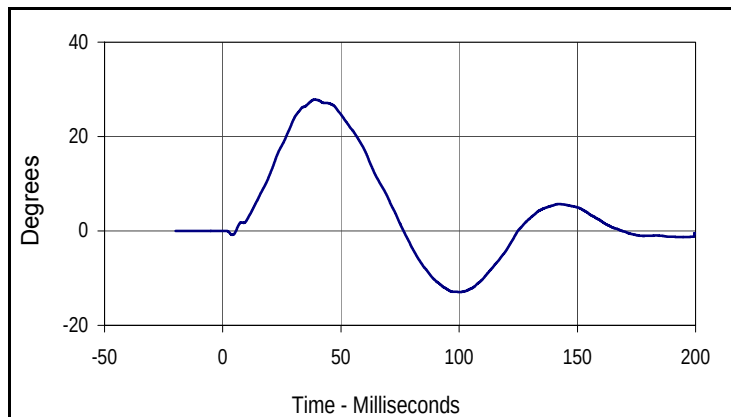
Test Date: 12/11/14
 Test I.D.: F037LB068



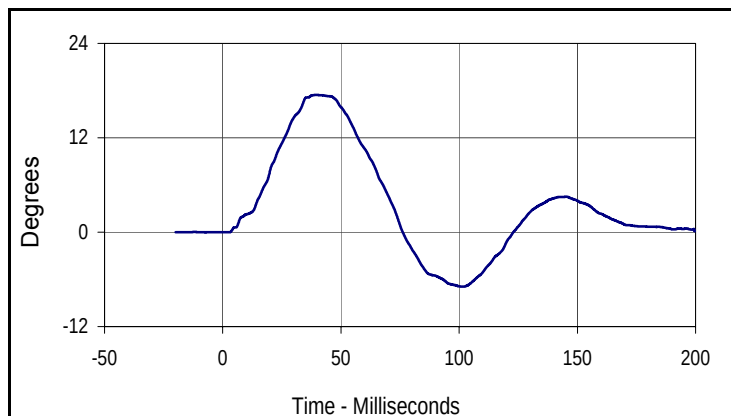
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
48.5	40.3	-18.6	99.6



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
31.1	40.5	-11.8	99.0



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
27.8	39.4	-13.0	100.8



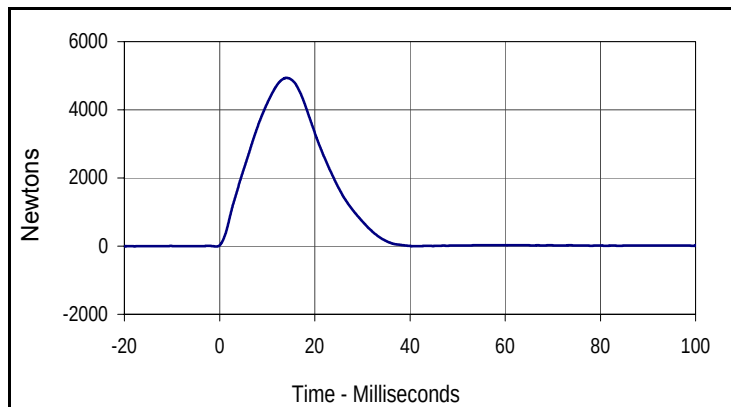
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
17.4	40.3	-6.9	102.3

Test Program: ES2re Pelvis Impact Test
 ATD Serial No.: F037

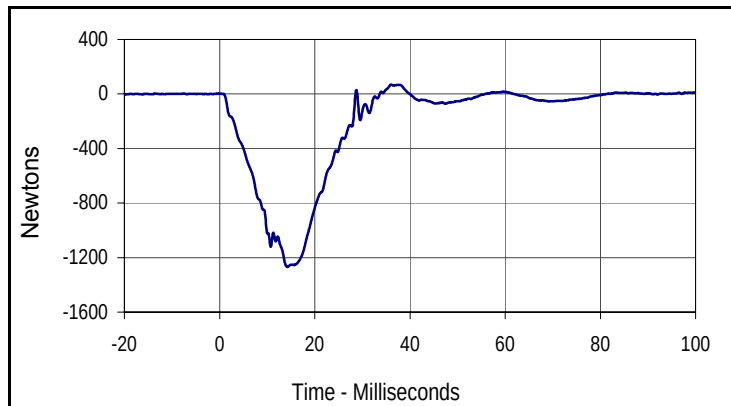
Test Date: 12/11/14
 Test I.D.: F037PL068



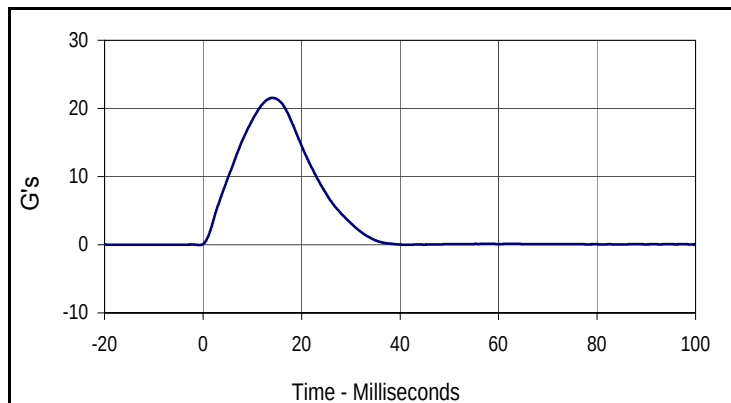
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	791	Pass
Temperature During Soak	Max	20.6 to 22.2	21.5	Pass
	Min		21.3	Pass
Humidity During Soak	Max	10.0 to 70.0	39.1	Pass
	Min		38.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.9	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.35	Pass
Peak Impactor Force	N	4700 to 5400	4936.9	Pass
	msec	11.8 to 16.1	14.1	Pass
Peak Pubic Symphysis Load	N	-1230 to -1590	-1268.5	Pass
	msec	12.2 to 17.0	14.2	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4936.9	14.1	-9.9	-0.7



Curve Description			
Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
69.3	36.0	-1268.5	14.2



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
21.6	14.1	0.0	-0.7

Test Program: SID IIs External Measurements
 ATD Serial No.: 307

Test Date: 12/12/14
 Test I.D.: N/A



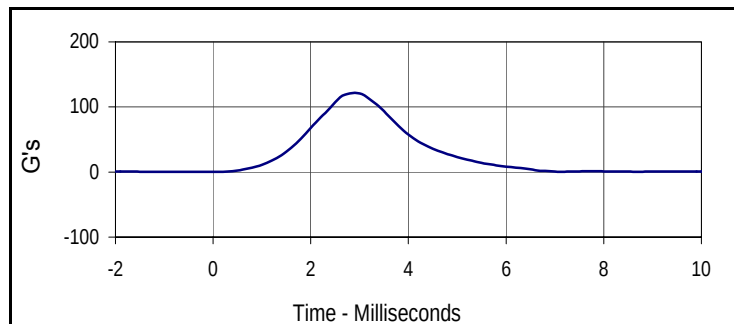
Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		°C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	38	Pass
A	Sitting Height	mm	772 - 788	778	Pass
B	Shoulder Pivot Height	mm	437 - 453	443	Pass
C	H-Point Height	mm	79 - 89	85	Pass
D	H-Point from Seatback	mm	141 - 151	144	Pass
E	Shoulder Pivot from Backline	mm	97 - 107	102	Pass
F	Thigh Clearance	mm	119 - 135	128	Pass
G	Head Breadth	mm	140 - 148	145	Pass
H	Head Back from Backline	mm	40 - 46	43	Pass
I	Head Depth	mm	178 - 188	185	Pass
J	Head Circumference	mm	541 - 551	546	Pass
K	Buttock to Knee Length	mm	514 - 540	525	Pass
L	Popliteal Height	mm	343 - 369	351	Pass
M	Knee Pivot to Floor Height	mm	392 - 409	400	Pass
N	Buttock Popliteal Length	mm	416 - 442	432	Pass
O	Chest Depth w/o Jacket	mm	195 - 211	205	Pass
P	Foot Length	mm	216 - 232	223	Pass
Q	Hip Breadth with Pelvic Plug	mm	313 - 323	319	Pass
R	Arm Length	mm	249 - 259	254	Pass
S	Knee Joint to Seatback	mm	477 - 493	483	Pass
V	Shoulder Width	mm	341 - 357	351	Pass
W	Foot Width	mm	78 - 94	89	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.: 307

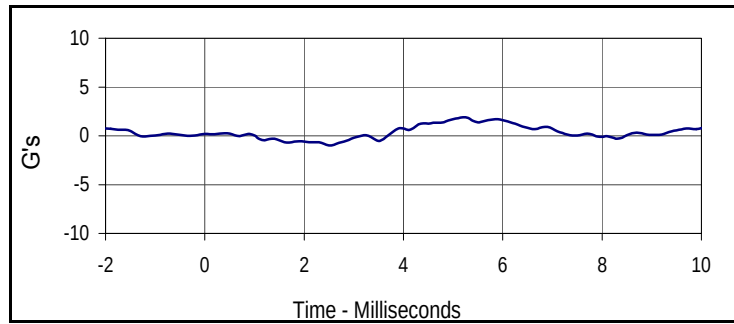
Test Date: 12/12/14
 Test I.D.: 307HD077



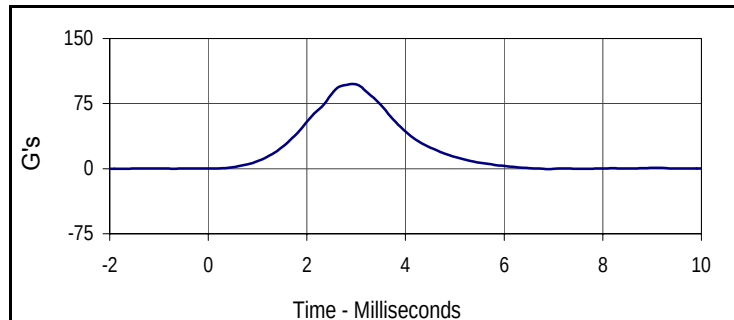
Tested Parameter		Units	Specification	Result	Pass/Fail
Head Assembly Soak Time		Minutes	≥240	296	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		21.4	Pass
Humidity During Soak	Max	%	10.0 to 70.0	38.5	Pass
	Min	%		38.2	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	38.4	Pass
Peak Head Resultant Acceleration		G's	115 to 137	121.8	Pass
Peak Head X Acceleration		G's	<15	1.9	Pass
Is Acceleration Unimodal?		Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse		%	<15	1.1	Pass
Overall Test Results				Pass	



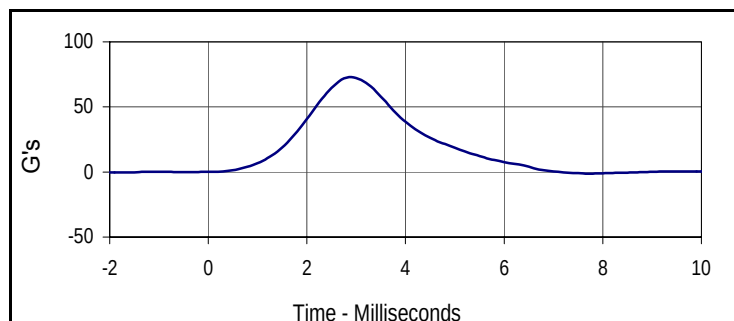
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
121.8	2.9	0.2	-0.5



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
1.9	5.2	-1.0	2.5



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
97.5	2.9	-0.3	6.9



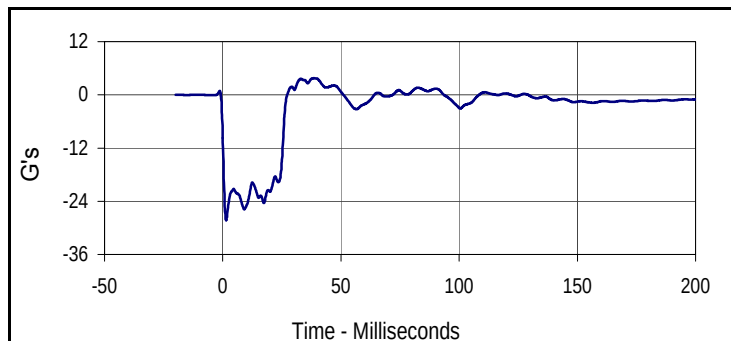
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
72.9	2.9	-1.3	7.7

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 307

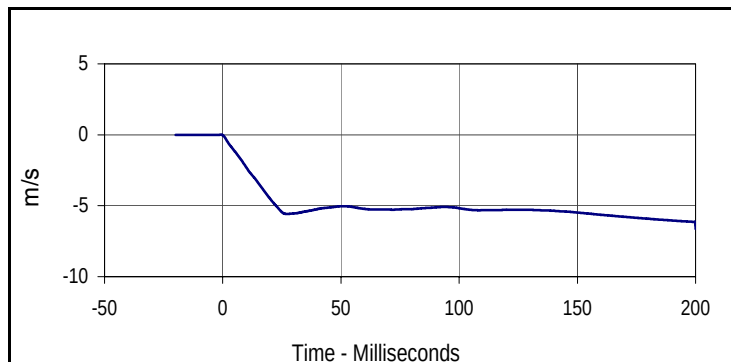
Test Date: 12/12/14
 Test I.D.: 307NB077



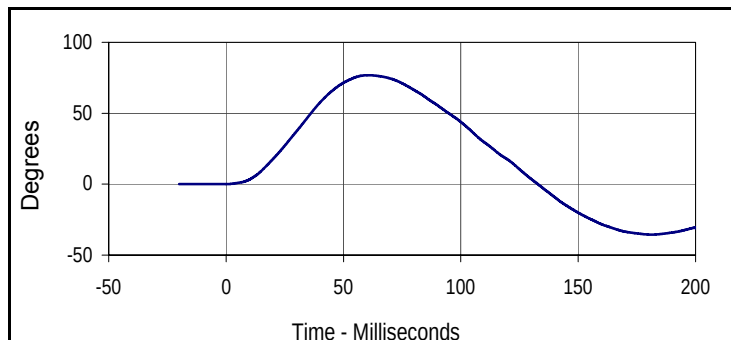
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	341	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.5	Pass
	Min		38.2	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.5	Pass
Pendulum Velocity	m/s	5.51 to 5.63	5.58	Pass
Pendulum Deceleration	10 msec	-2.20 to -2.80	-2.31	Pass
	15 msec	-3.30 to -4.10	-3.38	Pass
	20 msec	-4.40 to -5.40	-4.50	Pass
	25 msec	-5.40 to -6.10	-5.45	Pass
	25-100 msec	-5.50 to -6.20	-5.58	Pass
D-Plane Rotation	Max	71 to 81	76.8	Pass
	Time	50 to 70	60.1	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-43.2	Pass
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	120.0	Pass
Overall Test Results			Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
3.8	0.0	-28.3	0.0



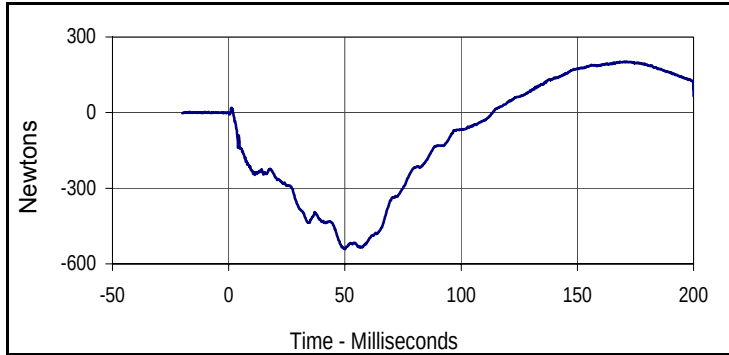
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.8	-6.6	200.0



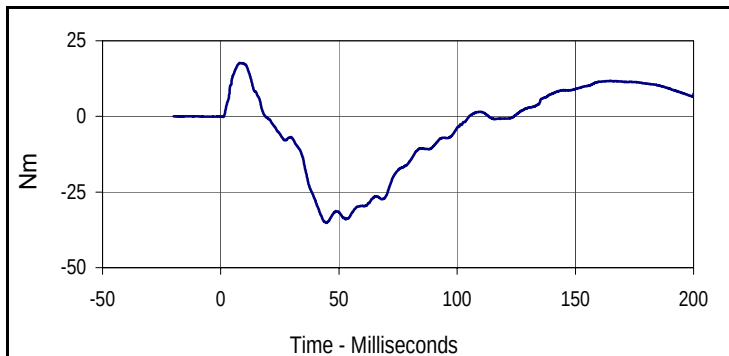
Curve Description			
D-Plane Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
76.8	60.1	-35.5	181.2

Test Program: SID IIs Neck Flexion Test
 ATD Serial No.: 307

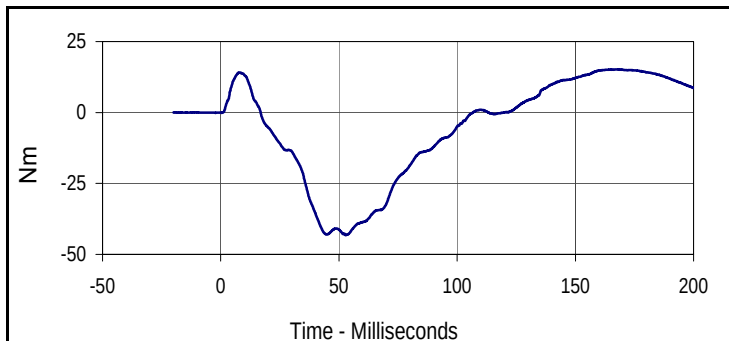
Test Date: 12/12/14
 Test I.D.: 307NB077



Curve Description			
Neck Force Y			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
202.4	171.3	-541.0	50.1



Curve Description			
Neck Moment X			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
17.7	8.0	-35.2	44.6



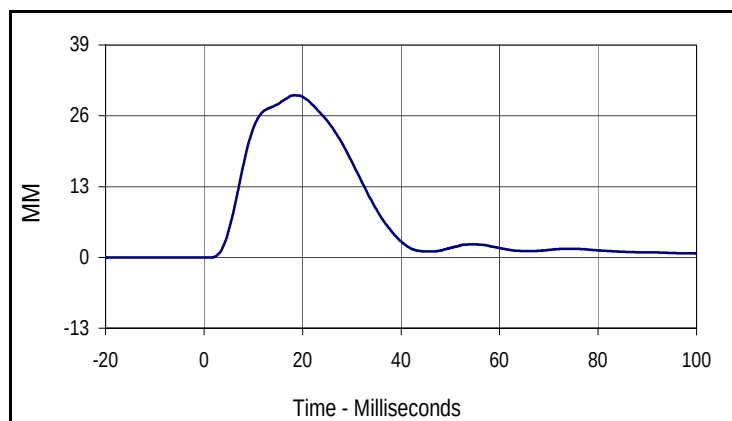
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
006	FIL	600	Nm
Max	Time	Min	Time
15.2	165.7	-43.2	52.8

Test Program: SID IIs Shoulder Impact Test
 ATD Serial No.: 307

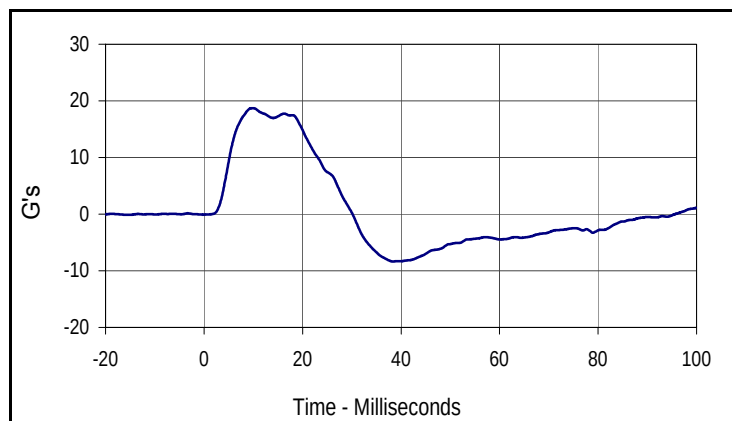
Test Date: 12/12/14
 Test I.D.: 307SH077



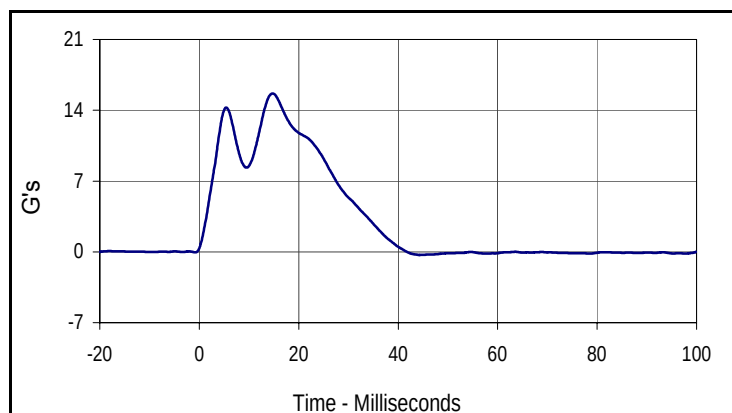
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	396	Pass
Temperature During Soak	Max	°C	20.6 to 22.2	21.6	Pass
	Min	°C		21.4	Pass
Humidity During Soak	Max	%	10.0 to 70.0	38.5	Pass
	Min	%		38.2	Pass
Laboratory Temperature During Test		°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	38.4	Pass
Impactor Velocity		m/s	4.20 to 4.40	4.34	Pass
Peak Shoulder Deflection		mm	28 to 37	29.7	Pass
Peak Lateral Spine Acceleration Y		G's	17 to 22	18.7	Pass
Peak Impactor Acceleration		G's	13 to 18	15.7	Pass
Overall Test Results				Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
29.7	18.4	0.0	-4.4



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.7	10.0	-8.4	38.3



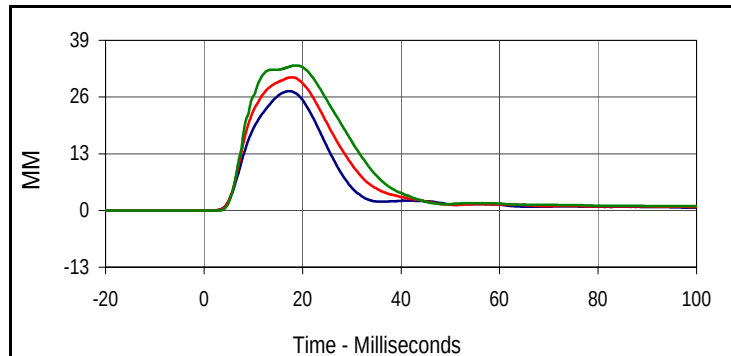
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
15.7	14.8	-0.3	100.0

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 307

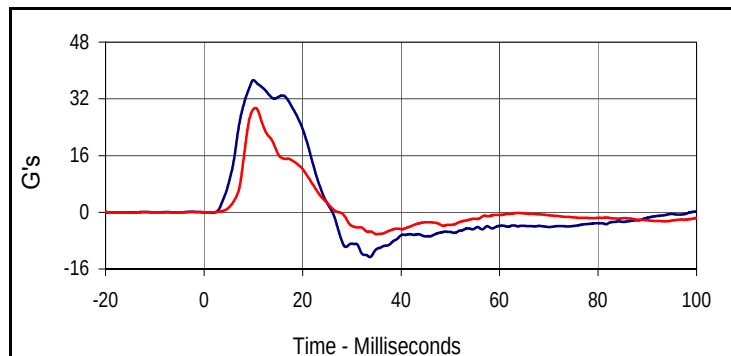
Test Date: 12/12/14
 Test I.D.: 307TWA077



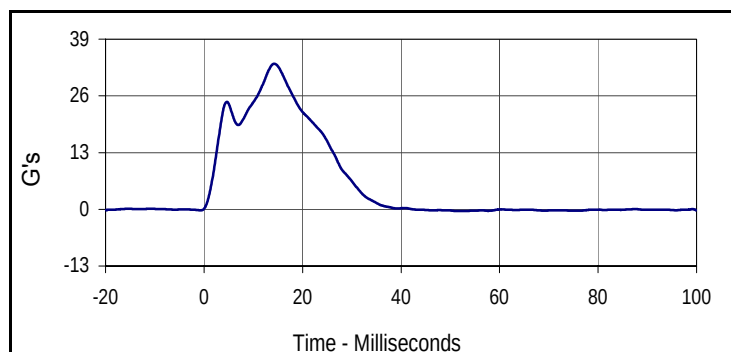
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	441	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.5	Pass
	Min		38.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.4	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.62	Pass
Peak Shoulder Deflection	mm	31 to 40	34.5	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	27.3	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	30.5	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	33.2	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	37.3	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	29.4	Pass
Peak Impactor Acceleration	G's	30 to 36	33.4	Pass
Overall Test Results			Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
27.3	17.4	0.0	-1.0
Middle Thorax Deflection			
Max	Time	Min	Time
30.5	17.9	0.0	-0.5
Lower Thorax Deflection			
Max	Time	Min	Time
33.2	18.5	0.0	-18.4



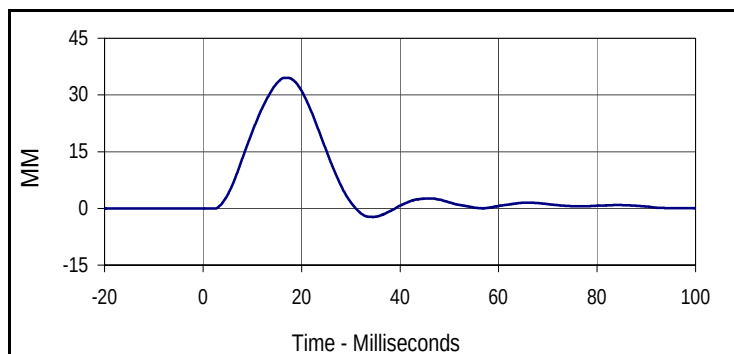
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
37.3	10.0	-12.6	33.7
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
29.4	10.4	-6.2	35.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
33.4	14.2	-0.4	52.7

Test Program: SID IIs Thorax with Arm Impact Test
 ATD Serial No.: 307

Test Date: 12/12/14
 Test I.D.: 307TWA077



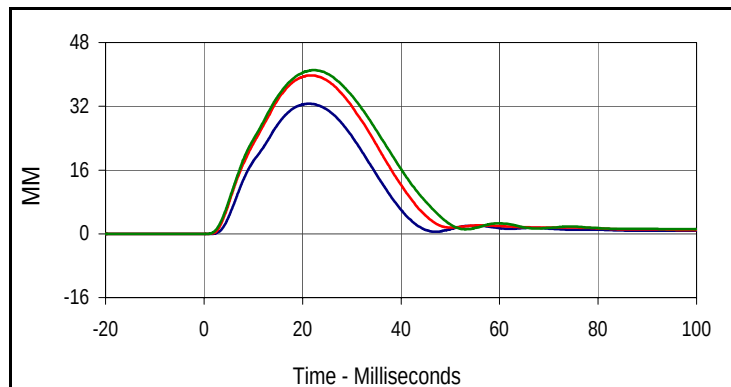
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
34.5	17.0	-2.3	34.5

Test Program: SID IIs Thorax without Arm Impact Test
 ATD Serial No.: 307

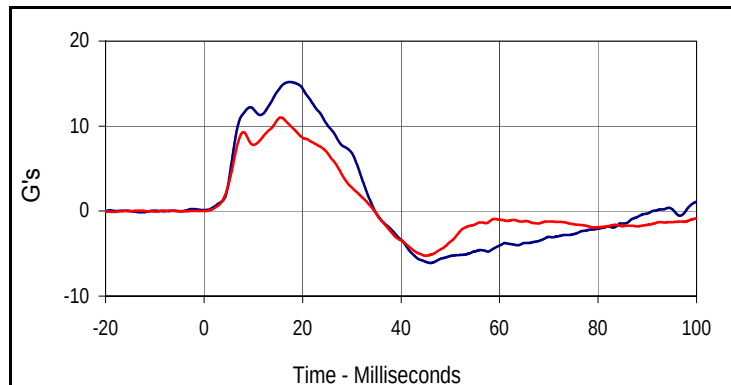
Test Date: 12/12/14
 Test I.D.: 307TWOA077



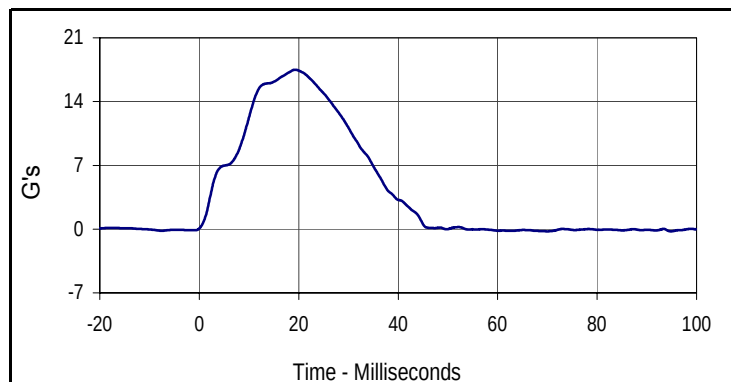
Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥180	496	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.6	Pass
	Min	°C		21.4	Pass
Humidity During Soak	Max	%	10.0 to 70.0	38.5	Pass
	Min	%		38.2	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	38.3	Pass
Impactor Velocity		m/s	4.2 to 4.4	4.38	Pass
Peak Upper Thorax Rib Deflection		mm	32 to 40	32.6	Pass
Peak Middle Thorax Rib Deflection		mm	39 to 45	39.8	Pass
Peak Lower Thorax Rib Deflection		mm	35 to 43	41.1	Pass
Peak Upper Spine Y Acceleration		G's	13 to 17	15.2	Pass
Peak Lower Spine Y Acceleration		G's	7 to 11	11.0	Pass
Peak Impactor Acceleration		G's	14 to 18	17.5	Pass
Overall Test Results				Pass	



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
32.6	21.3	0.0	-2.8
Middle Thorax Deflection			
Max	Time	Min	Time
39.8	21.6	0.0	0.2
Lower Thorax Deflection			
Max	Time	Min	Time
41.1	22.3	0.0	-0.1



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.2	17.5	-6.1	46.0
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
11.0	15.6	-5.3	45.1



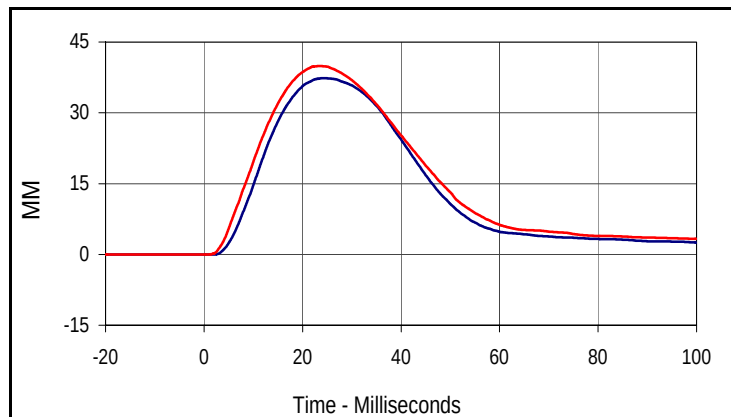
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
17.5	19.3	-0.2	94.8

Test Program: SID IIs Abdomen Impact Test
 ATD Serial No.: 307

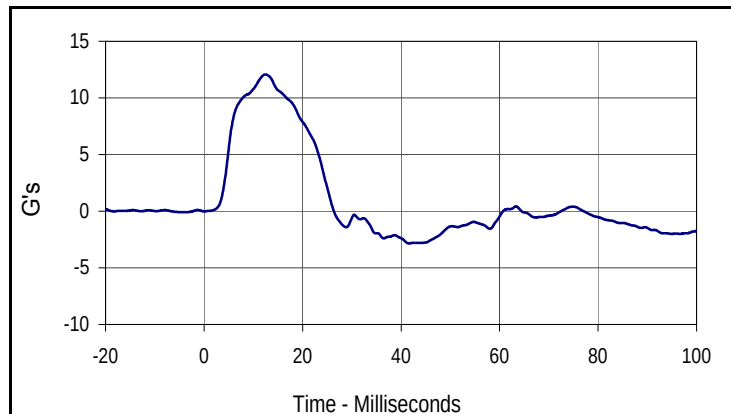
Test Date: 12/12/14
 Test I.D.: 307ABD077



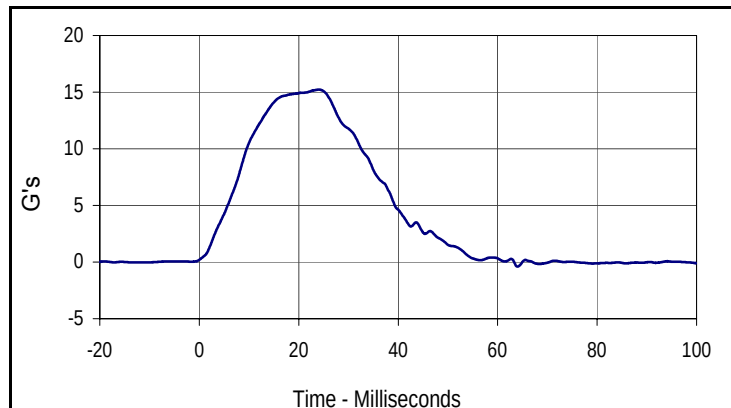
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	551	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.5	Pass
	Min		38.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.2	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.35	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	37.3	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	39.9	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	12.1	Pass
Peak Impactor Acceleration	G's	12 to 16	15.2	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
37.3	24.1	0.0	-9.3
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
39.9	23.5	0.0	-12.5

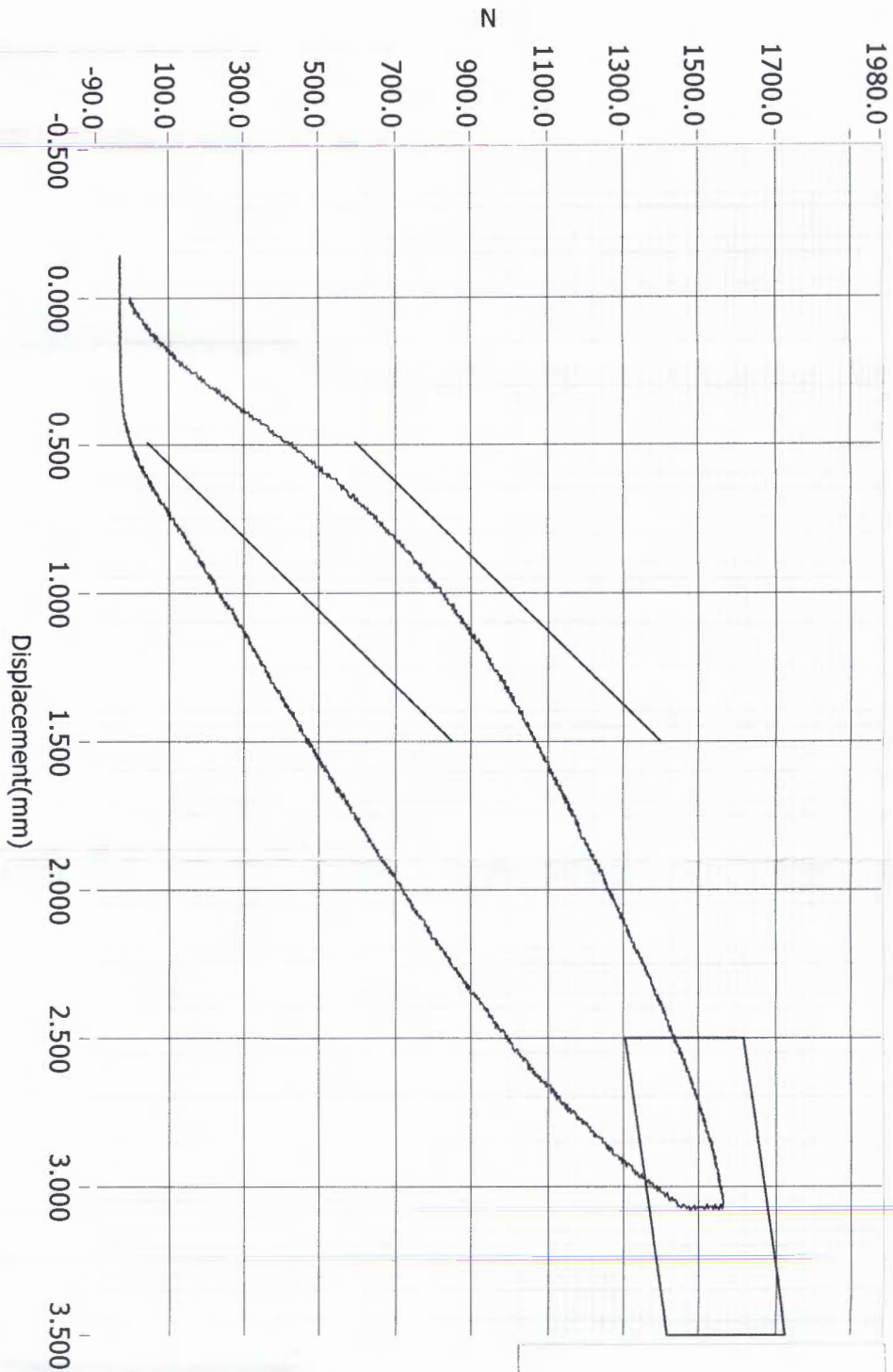


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
12.1	12.5	-2.8	41.6



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.2	24.0	-0.4	64.0

Resultant Data - SIDIIs Plug Compression



1555N

- Loading Curve
- Boundary Limit Upper
- Boundary Limit Lower
- Peak Load Upper
- Peak Load Lower
- Peak Defl Upper
- Peak Defl Lower

ATD Calibration Lab

M20154106 Post Test

Test ID
Cert ID

Part Serial Number
70732
ATD Serial Number
N/A
Test Date
12/12/2013
ATD Type
SIDIIs
Test Time
10:37 PM

Current Date : 12/12/2013

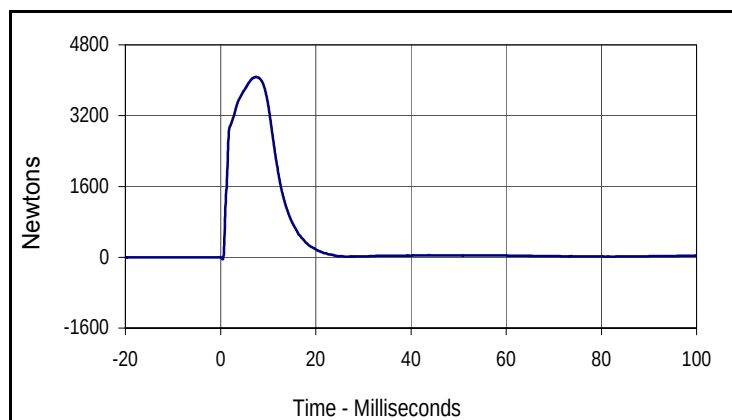
Current Time : 22:38:17

Test Program: SID IIs Pelvis Acetabulum Impact Test
 ATD Serial No.: 307

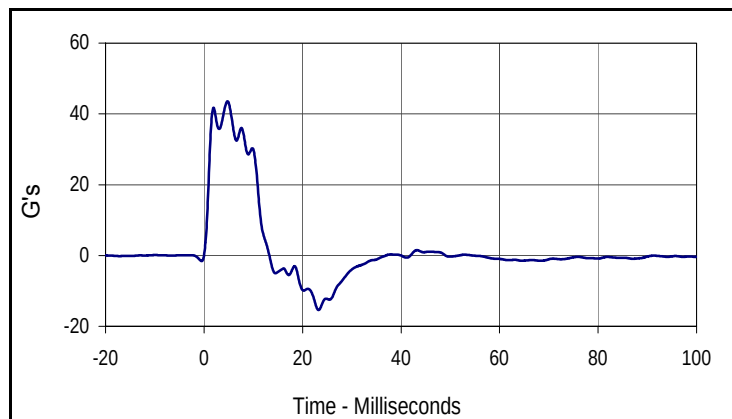
Test Date: 12/12/14
 Test I.D.: 307ACET077



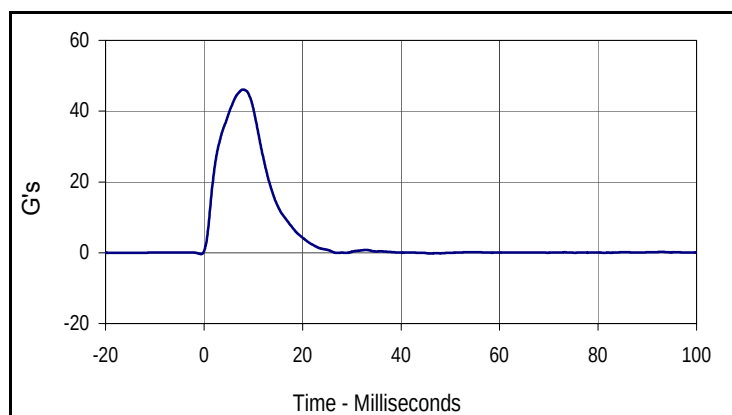
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	601	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.5	Pass
	Min		38.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.2	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.67	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	4073.9	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	36.0	Pass
Peak Impactor Acceleration	G's	38 to 47	46.1	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4073.9	7.5	-45.1	0.5



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
43.6	4.8	-15.4	23.2



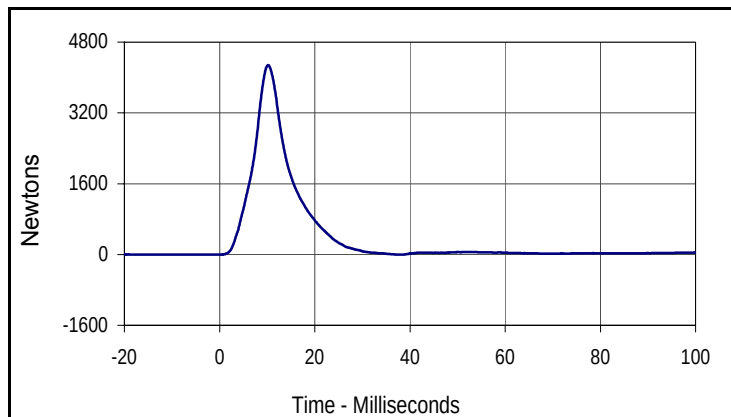
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
46.1	7.9	-0.4	-0.6

Test Program: SID IIs Pelvis Iliac Calibration
 ATD Serial No.: 307

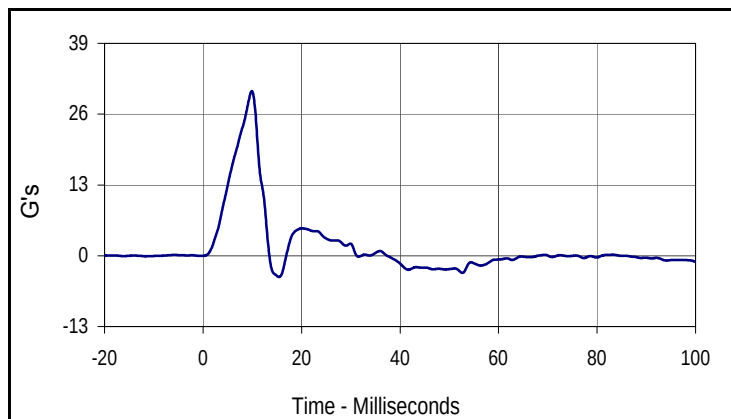
Test Date: 12/12/14
 Test I.D.: 307PL077



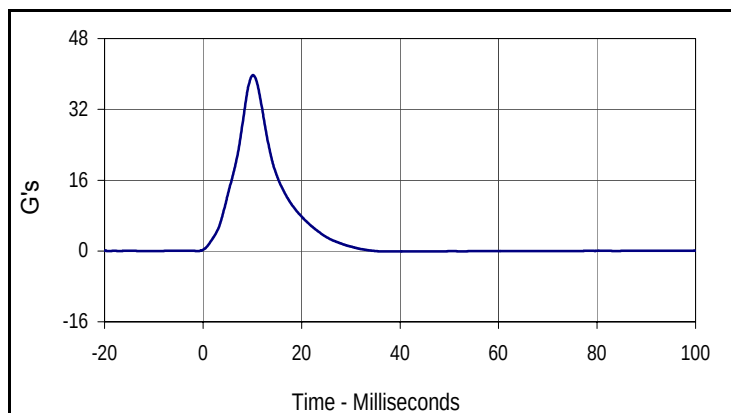
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	656	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	38.5	Pass
	Min		38.2	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	38.2	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.26	Pass
Peak Iliac Force	Newtons	4100 to 5100	4282.0	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	30.2	Pass
Peak Impactor Acceleration	G's	36 to 45	39.7	Pass
Overall Test Results			Pass	



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4282.0	10.2	-3.6	37.8



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
30.2	9.9	-3.9	15.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
39.7	10.1	-0.1	37.5

APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – Dummy Instrumentation (ES-2re)

			ES-2re S/N F037		
			Serial Number	Manufacturer	Calibration
Head Accelerometers	Primary	X	P58858	Endevco	10/11/14
		Y	P58865	Endevco	10/11/14
		Z	P58867	Endevco	10/11/14
	Redundant	X	P58859	Endevco	10/11/14
		Y	P58866	Endevco	10/11/14
		Z	P58873	Endevco	10/11/14
Thorax Rib Displacement Potentiometers	Upper	Y	209	FTSS	10/12/14
	Middle	Y	210	FTSS	10/12/14
	Lower	Y	207	FTSS	10/12/14
Abdomen Load Cells	Forward	Y	1504	Denton	5/1/14
	Middle	Y	1505	Denton	5/1/14
	Rear	Y	1506	Denton	5/1/14
Lower Spine Accelerometers (T12)		X	P16336	Endevco	10/11/14
		Y	P52027	Endevco	10/11/14
		Z	P58877	Endevco	10/11/14
Pubic Symphysis Load Cell		Y	DG6784	Denton	5/15/14

TABLE 2 – Dummy Instrumentation (SID-IIs)

				SID-IIs S/N 307			
				Serial Number	Manufacturer	Calibration	
Head Accelerometers			Primary	X	P58900	Endevco	9/29/14
				Y	P58902	Endevco	9/29/14
				Z	P58983	Endevco	9/29/14
			Redundant	X	P58901	Endevco	9/29/14
				Y	P58906	Endevco	9/29/14
				Z	P58989	Endevco	9/29/14
Displacement Potentiometers		Thoracic Rib	Upper	Y	1249	FTSS	9/30/14
			Middle	Y	1265	FTSS	9/30/14
			Lower	Y	1277	FTSS	9/30/14
		Abdominal Rib	Upper	Y	1286	FTSS	9/30/14
			Lower	Y	1290	FTSS	9/30/14
Lower Spine Accelerometers (T12)				X	AHRW5	Endevco	9/30/14
				Y	P59015	Endevco	9/30/14
				Z	P58995	Endevco	9/30/14
Acetabulum Load Cell				Y	260	Denton	5/8/14
Iliac Wing Load Cell				Y	272	Denton	4/4/14
Pelvis Plug (Struck Side)					70963	FTSS	12/13/13
Pelvis Plug (Non-Struck Side)					72941	FTSS	2/8/14

TABLE 3 – Vehicle Instrumentation

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A147448	MSI	9/11/14
	Vehicle Center of Gravity	Y	A145459	MSI	8/16/14
	Vehicle Center of Gravity	Z	A145481	MSI	8/16/14
2	Right Sill at Front Seat	X	A147446	MSI	9/11/14
	Right Sill at Front Seat	Y	A147452	MSI	9/11/14
	Right Sill at Front Seat	Z	A147466	MSI	9/11/14
3	Right Sill at Rear Seat	X	A147465	MSI	9/11/14
	Right Sill at Rear Seat	Y	A147449	MSI	9/11/14
	Right Sill at Rear Seat	Z	A147434	MSI	9/11/14
4	Left Sill at Front Door	Y	A145461	MSI	8/13/14
5	Left Sill at Rear Door	Y	A136723	MSI	8/20/14
6	Left A-Post Lower	Y	A147444	MSI	9/11/14
7	Left A-Post Middle	Y	A147455	MSI	9/11/14
8	Left B-Post Lower	Y	A147457	MSI	9/11/14
9	Left B-Post Middle	Y	A147471	MSI	9/11/14
10	Front Seat Track	Y	A145492	MSI	8/13/14
11	Rear Seat Structure	Y	N/A	N/A	N/A
12	Right Rear Occ. Compartment	Y	A145469	MSI	8/13/14
13	Engine Block	X	A145454	MSI	8/16/14
	Engine Block	Y	A145439	MSI	8/16/14
14	Rear Floorpan Above Axle	X	A145448	MSI	8/13/14
	Rear Floorpan Above Axle	Y	A145470	MSI	8/16/14
	Rear Floorpan Above Axle	Z	A145479	MSI	8/16/14

TABLE 4 – MDB Instrumentation

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A128040	MSI	10/3/14
MDB Center of Gravity	Y	A124105	MSI	10/3/14
MDB Center of Gravity	Z	A104832	MSI	10/3/14
Left Frame at Rear Axle Centerline	X	A104798	MSI	10/3/14
Left Frame at Rear Axle Centerline	Y	A104808	MSI	10/3/14