

**REPORT NUMBER: SINCAP-KAR-16-004**

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

**TOYOTA MOTOR CORPORATION  
2016 LEXUS ES 350 4-DOOR SEDAN**

**NHTSA No: M20165102**

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



**NOVEMBER 24, 2015**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF CRASHWORTHINESS STANDARDS  
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## TECHNICAL REPORT DOCUMENTATION PAGE

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<b>7. Authors</b> Mr. Javier J. Martinez, Project Engineer, KARCO Mr. Frank Richardson, Program Manager, KARCO	<b>8. Performing Organization Report No.</b> TR-P35003-04-NC	
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	<b>15. Supplementary Notes</b>	

### 16. Abstract

A 61.9 / 38.5 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2016 Lexus ES 350 4-door sedan 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 November 10, 2015.

The impact velocity of the Moving Deformable Barrier was 62.06 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 12.2° C. The target vehicle's maximum post-test static crush was 192 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 (HC <sub>36</sub> )		1000	171.4
Maximum Thoracic Rib Deflection	mm	44	24
Total Abdominal Force	N	2500	773
Pubic Symphysis Force	N	6000	1608

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HC <sub>36</sub> )		1000	228.7
Resultant Lower Spine Acceleration	g	82	49
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	3017
Maximum Thoracic Rib Deflection	mm	38*	25
Maximum Abdominal Rib Deflection	mm	45*	31

The 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. The driver window broke upon impact.

\* Proposed IARV

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**SECTION 1**  
**TEST PURPOSE AND PROCEDURE**

This moving deformable barrier side impact test is part of the MY 2016 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00355. The purpose of this test is to generate comparative side impact performance in a 2016 Lexus ES 350 4-door sedan. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated October 2015.

## SECTION 2

### SUMMARY OF TEST RESULTS

A 2016 Lexus ES 350 4-door sedan was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27.6° crabbed position to the tow road guidance system at a velocity of 62.06 km/h (38.56 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 November 10, 2015. 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 October 2015. 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 <sub>36</sub> )		1000	171.4
Maximum Thoracic Rib Deflection	mm	44	24
Combined Abdominal Force	N	2500	773
Pubic Symphysis Force	N	6000	1608

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	228.7
Lower Spine (T12) Resultant Acceleration	g	82	49
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	3017
Maximum Thoracic Rib Deflection	mm	38*	25
Maximum Abdominal Rib Deflection	mm	45*	31

\*Proposed IARV

Supplemental restraint information is given below:

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

### GENERAL COMMENTS

The 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. The parking brake became disengaged during impact which led to the rear bumper hitting a wall.

### SECTION 3

#### OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

#### 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 <sup>2</sup>	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: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA Number	M20165102
Model Year	2016
Make	Lexus
Model	ES 350
Body Style	4-Door Sedan
VIN	JTHBK1GGXG2211196
Body Color	Silver Lining Met
Odometer Reading (km / mi)	48 / 30
Engine Displacement (L)	3.5
Type / No. of Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	Front
Roof Rack	No
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes

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

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

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Toyota Motor Corporation
Date of Manufacture	Jul-15
Vehicle Type	Passenger Car

GVWR (kg)	2132
GAWR Front (kg)	1190
GAWR Rear (kg)	1152

**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

A  
B  
A-B

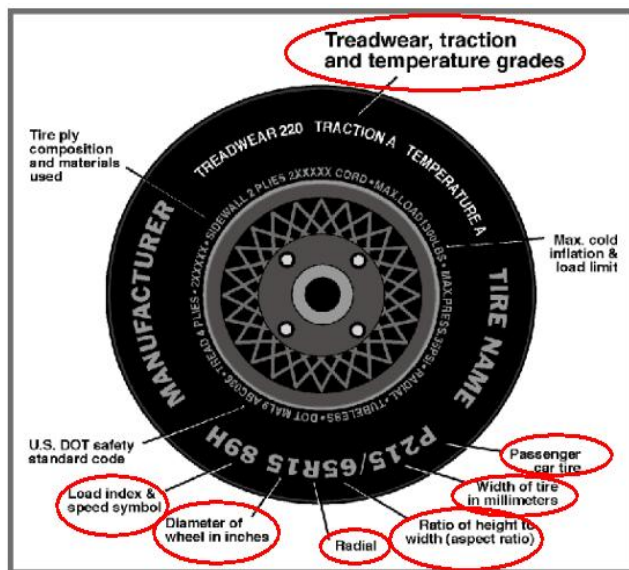
**VEHICLE SEAT TYPE**

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

## DATA SHEET NO. 1 ... (CONTINUED)

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	P215/55R17	P215/55R17
Tire Size on Vehicle	P215/55R17	P215/55R17
Tire Manufacturer	Michelin	Michelin
Tire Model	Primacy MXV4	Primacy MXV4
Treadware	500	500
Traction Grade	A	A
Temperature Grade	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 1 Polyamide, 2 Steel	1 Polyester, 1 Polyamide, 2 Steel
Load Index/Speed Symbol	93V	93V
Tire Material	Polyester, Polyamide, Steel	Polyester, Polyamide, Steel
DOT Safety Code Left	M33F 009X 0215	M33F 009X 1115
DOT Safety Code Right	M33F 009X 0215	M33F 009X 1115

**DATA SHEET NO. 1 ... (CONTINUED)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**TIRE PRESSURES**

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

**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	508.0	305.0		553.5	400.0		545.0	394.5	
Right	kg	491.5	310.0		485.5	363.5		491.0	375.5	
Ratio	%	61.9%	38.1%	100.0%	57.6%	42.4%	100.0%	57.4%	42.6%	100.0%
Total	kg	999.5	615.0	1614.5	1039.0	763.5	1802.5	1036.0	770.0	1806.0

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1614.5	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 (TVT <sub>W</sub> )	kg	1809.3	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	705	707	Yes
RF	mm	718	714	Yes
LR	mm	689	693	Yes
RR	mm	704	703	Yes
Vehicle CG (Aft of Front Axle)	mm	1199	1191	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	32	46	

\*\*\*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: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW**

Component Description	Weight (kg)
Spare Tire	14.5
Rear Trunk Trim	7.0
Spare Tire Tools	3.0
Ballast / Equipment Added	68.4

Test Height Adjustable Setting (If Applicable)	
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**DATA SHEET NO. 2**

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

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**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	20.0	9.4	14.7
Front Passenger Seat	20.2	10.1	15.2
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	14.7	463	Max	492	503	514
			Mid	472	483	494
			Min	452	463	474
Front Passenger Seat	15.2	467	Max	495	509	518
			Mid	475	488	496.5
			Min	455	467	475
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: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

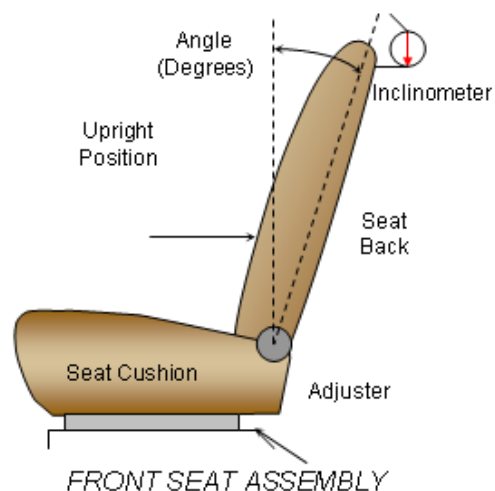
**SEAT FORE/AFT POSITION**

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	260		130	
Front Passenger Seat	260		130	
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 head rest post.



**SEAT BACK POSITION**

Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/Seated Dummy	52.7		5.0	
Front Passenger Seat	52.3		5.0	
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: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

#### 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	4	H
Rear Seat	Fixed	Fixed

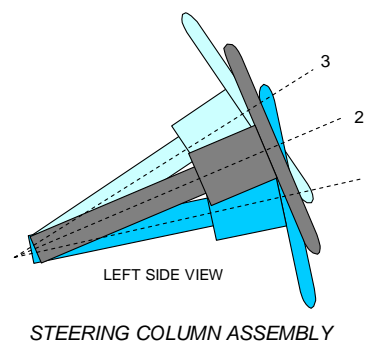
#### HEAD RESTRAINT ADJUSTMENT

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	2 (0-1) Vertical Adjustment 4 (0-3) Horizontal Adjustment	Full Up Full Forward
Rear Seat	2 (0-1) Vertical Adjustment	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	20.4	67
Geometric Center - Position 2	22.5	87
Uppermost - Position 3	24.6	107
Telescoping Steering Wheel Travel		40
Test Position	22.5	87

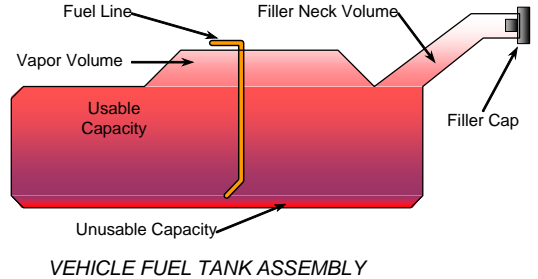
**DATA SHEET NO. 2 ... (CONTINUED)**

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

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**FUEL PUMP**

The vehicle is equipped with an electric fuel pump. Fuel pump cycles for a brief period when the key is moved to the "ON" position, but does not pump fuel unless engine is running.



**FUEL TANK CAPACITY**

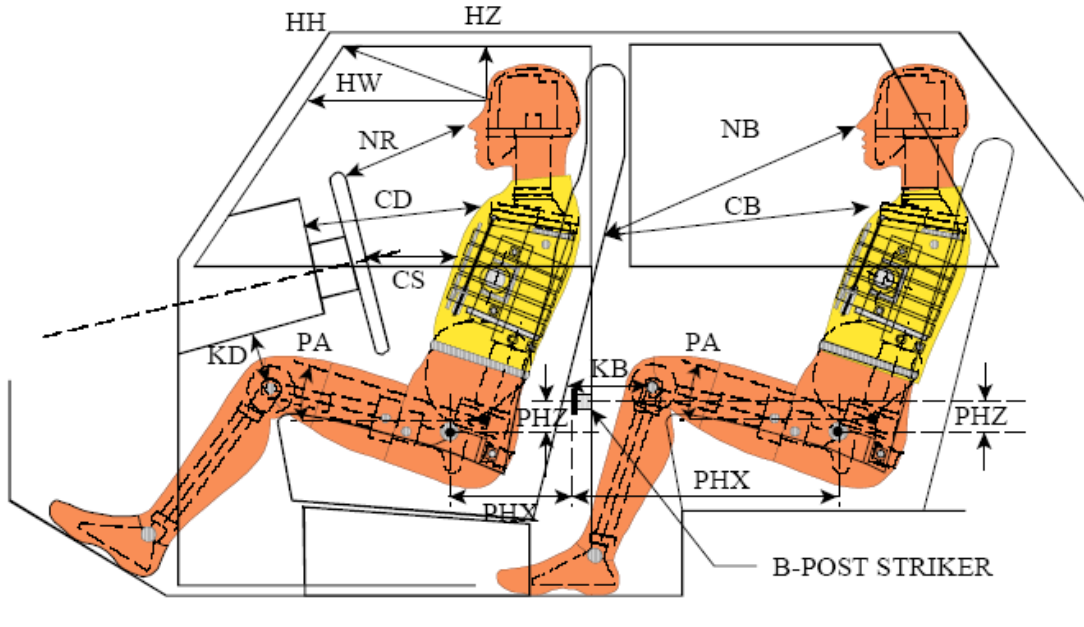
Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	63.44
Usable Capacity of "Optional Tank" (see Form No. 1)	
Usable Capacity of "Standard Tank" (see Owner's Manual)	
Usable Capacity of "Optional Tank" (see Owner's Manual)	
93% of Usable Capacity	59.00
Actual amount of Solvent Used in Test	59.00
1/3 of Usable Capacity	21.15

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

### DATA SHEET NO. 3

### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**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

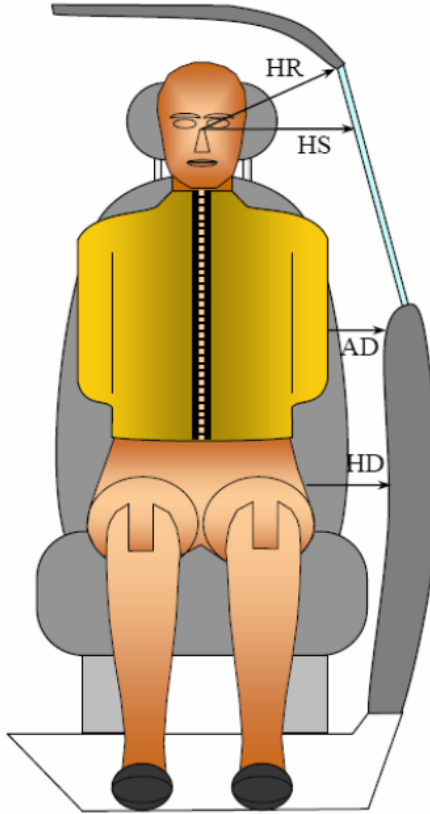
### DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

Driver Code	Pass. Code	Description	Driver		Passenger	
			Length (mm)	Angle (°)	Length (mm)	Angle (°)
HH		Head to Header	376			
HW		Head to Windshield	563			
HZ	HZ	Head to Roof	128		246	
NR	NB	Nose to Rim/Seat Back	476		582	
CD	CB	Chest to Dash/Seat Back	573		573	
CS		Chest to Steering Wheel	338			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	222	21.6	347	33.6
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	216	24.1	338	38.3
PAX°	PAX°	Pelvic Tilt Angle X		17.0		21.9
	PAY°	Pelvic Tilt Angle Y		0.1		0.3
PHX	PHX	Hip Point to Striker (x-axis)	241		321	
PHZ	PHZ	Hip Point to Striker (z-axis)	256		342	

**DATA SHEET NO. 4**

**DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



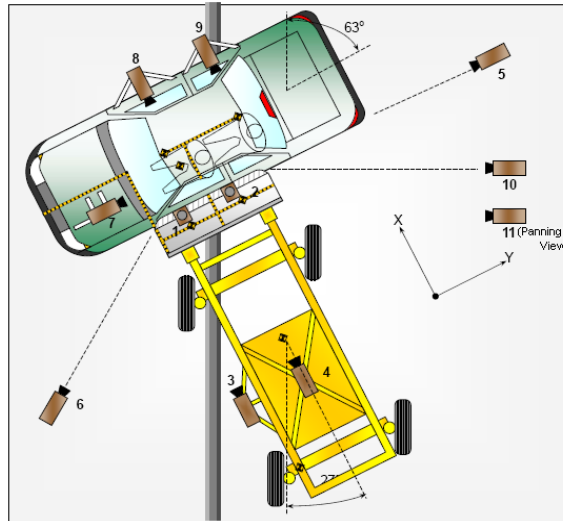
**DUMMY LATERAL CLEARANCE DIMENSION INFORMATION**

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	195	248
HS	Head to Side Window	mm	329	379
AD	Arm to Door	mm	116	161
HD	H-Point to Door	mm	150	189

**DATA SHEET NO. 5**

**CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**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)	551	-742	-810	25	1000
8	Driver Side (On-Board)	1745	749	-412	14	1000
9	Passenger Side (On-Board)	1707	1648	-450	14	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
<b>Total</b>	<b>59</b>

**DATA SHEET NO. 6**

**TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

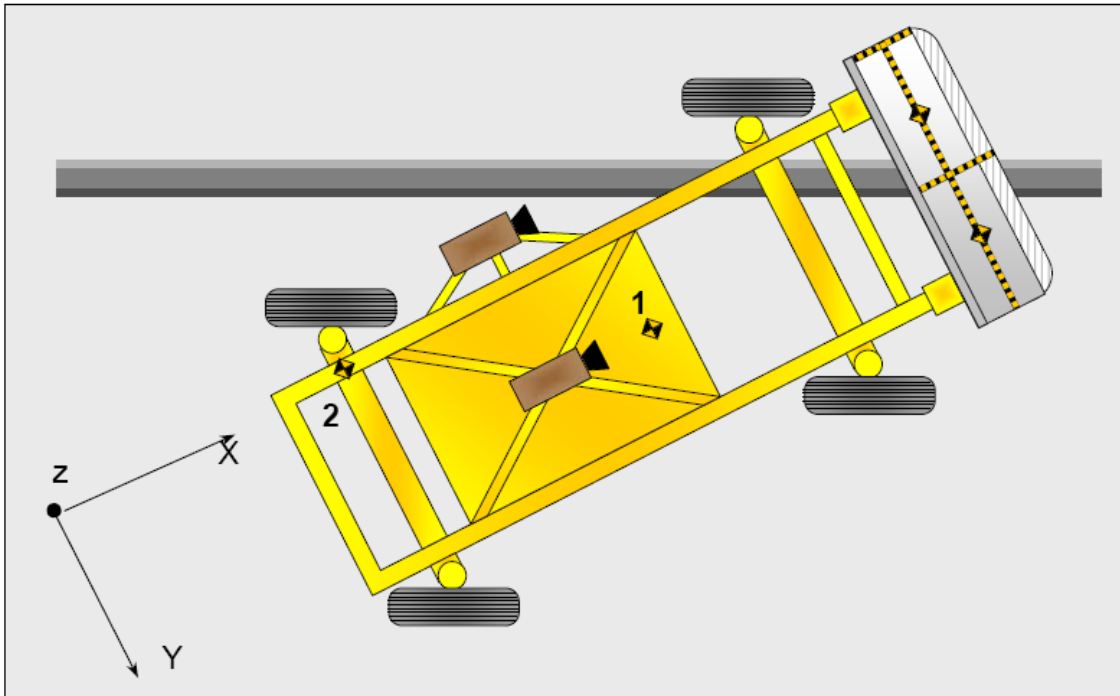
Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	1924	0	-232
2	Right Sill at Front Seat	2745	742	-355
3	Right Sill at Rear Seat	1889	740	-358
4	Left Sill at Front Door	2710	-881	-193
5	Left Sill at Rear Door	1612	-880	-190
6	A-Pillar Lower	3332	-830	-554
7	A-Pillar Middle	3332	-830	-874
8	B-Pillar Lower	2180	-772	-564
9	B-Pillar Middle	2180	-772	-861
10	Front Seat Track	2340	-221	-273
11	Rear Seat Structure			
12	Right Rear Occupant Compartment	2070	493	-257
13	Engine Block	4175	170	-783
14	Rear Floorpan Above Axle	893	-20	-340

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: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**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: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**TEST DUMMY INFORMATION AND CONTACT POINTS**

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Curtain Airbag	Curtain Airbag
Top of Head	Side Header	Side Header
Left Side of Head	Curtain Airbag	Curtain Airbag
Back of Head	Side Header, Headrest	Headrest, Center Seatback
Left Shoulder	Torso/Pelvis Airbag, Door Panel	Torso/Pelvis Airbag
Upper Torso	Seat, Torso/Pelvis Airbag	Torso/Pelvis Airbag, Seat
Lower Torso	Seat, Torso/Pelvis Airbag	Torso/Pelvis Airbag, Seat
Left Hip	Seat, Torso/Pelvis Airbag, Door Panel	Torso/Pelvis Airbag, Seat
Left Knee	Door Panel	Door Panel

**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	No
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	Yes
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: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**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	Front Window Broken
Other Notable Effects	Parking brake became disengaged and the rear bumper hit a wall

**DATA SHEET NO. 8 ... (CONTINUED)**

**POST-TEST OBSERVATIONS**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No	No	
Knee Airbag	No		No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis)	Yes	Yes	Yes	Yes
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		2812
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		466
Actual Impact Point (Aft of Front Axle)	mm		474
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	-8
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	7

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

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**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	62.06
Trap No. 2 Velocity (Redundant)	km/h	61.1 to 62.7	61.95
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	90.1
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	62.5
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	27.6

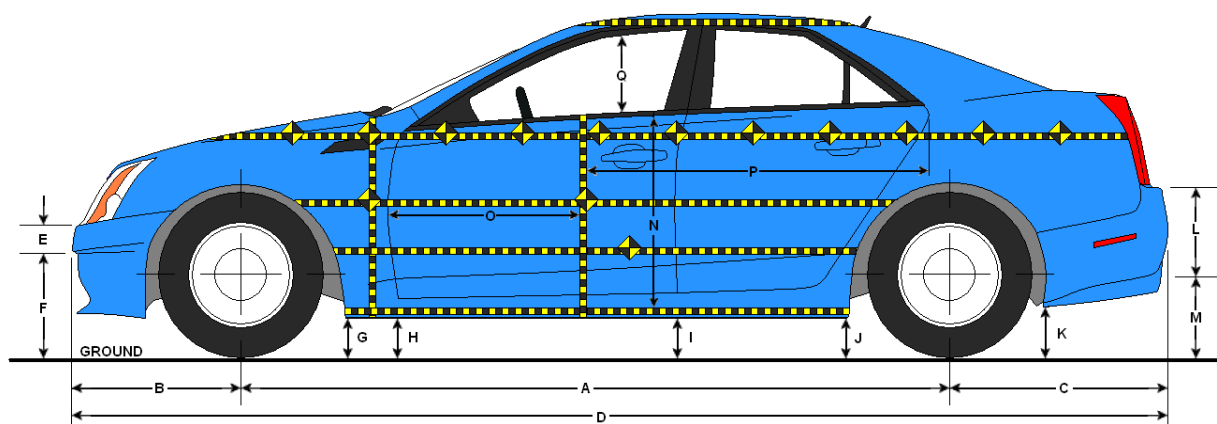
**MAXIMUM STATIC CRUSH OF HONEYCOMB FACE**

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Right	264
B	Top of Bumper	533	800	Right	184
C	Mid Level	686	800	Left	127
D	Top of Stack	813	800	Left	146

## DATA SHEET NO. 10

### TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**LEFT SIDE VIEW**

#### VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION

Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	2812	2819	7
B	Front Axle to FSOV	1001	994	-7
C	Rear Axle to RSOV	1082	1116	34
D	Total Length at Centerline	4895	4929	34
E	Front Bumper Thickness	379	373	-6
F	Front Bumper Bottom to Ground	208	212	4
G	Sill Height at Front Wheel Well	171	176	5
H	Sill Height at Front Door Leading Edge	178	181	3
I	Sill Height at B-Pillar	229	228	-1
J1	Sill Height at Rear Wheel Well	206	196	-10
J2	Pinch Weld Height at Rear Wheel Well	222	197	-25
K	Sill Height Aft of Rear Wheel Well	255	263	8
L	Rear Bumper Thickness	243	242	-1
M	Rear Bumper Bottom to Ground	428	371	-57
N	Sill Height to Bottom of Front Window Sill	672	633	-39
O	Front Door Leading Edge to Impact CL	830	797	-33
P	Rear Door Trailing Edge to Impact CL	1477	1462	-15
Q	Front Window Opening	388	380	-8
R	Right Side Length	3303	3383	80
S	Left Side Length	3296	3416	120
T	Vehicle Width at B-Pillar	1797	1725	-72

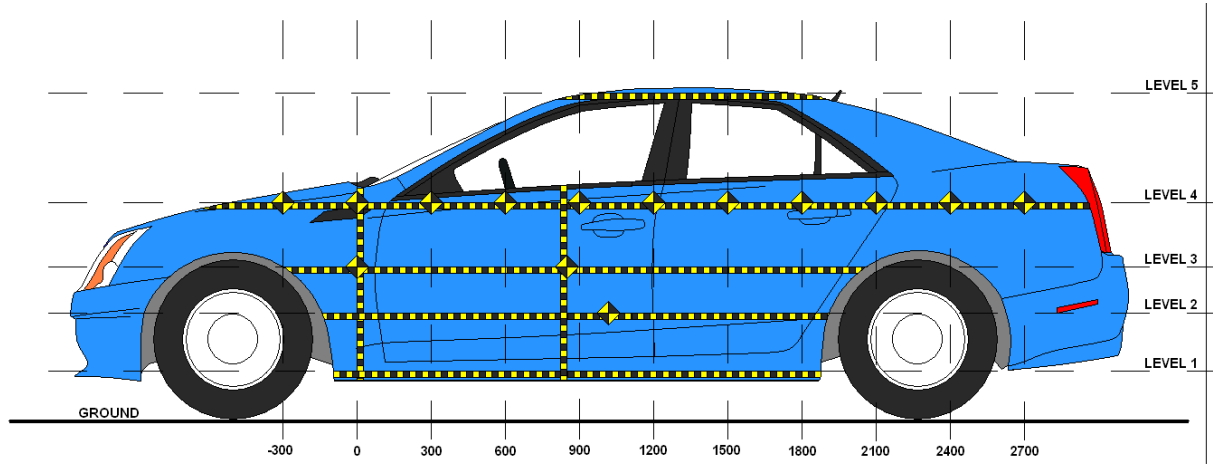
All measurements in mm with tolerance of  $\pm 3$ mm

**DATA SHEET NO. 11**

**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102

Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**LEFT SIDE VIEW**

**MAXIMUM EXTERIOR CRUSH MEASUREMENTS**

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	220	1	300
2	Occupant H-Point	509	174	450
3	Mid-Door	648	192	600
4	Window Sill	890	119	450
5	Window Top	1393	-11	600

**DATA SHEET NO. 11 ... (CONTINUED)**

**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102

Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15

**EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL**

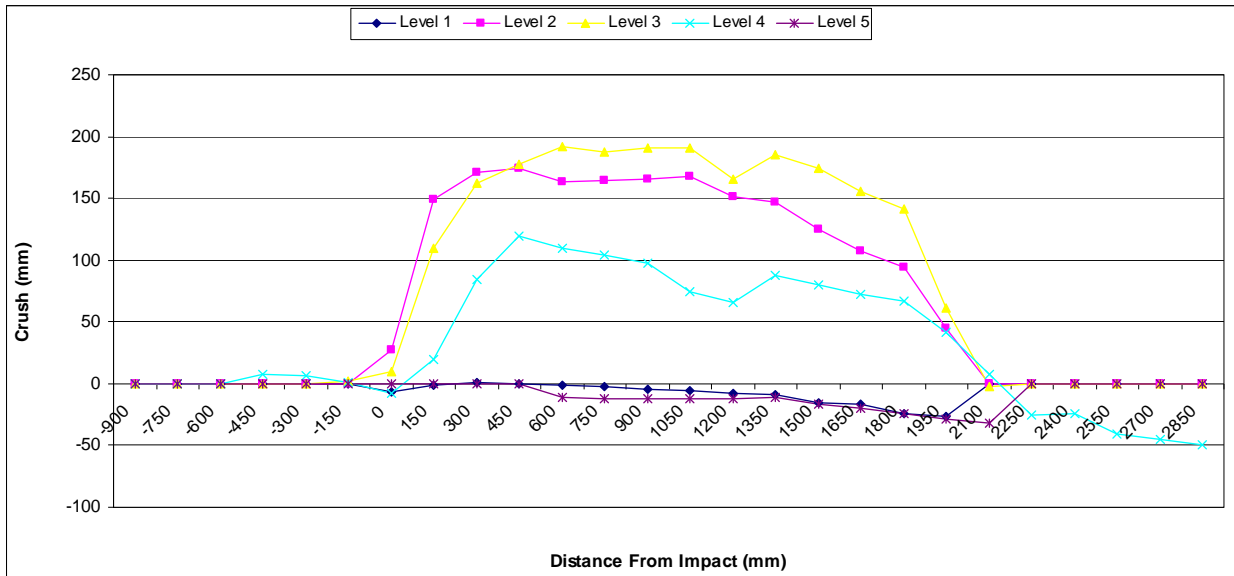
	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450				667					675					8	
-300				653					659					6	
-150			587	643				589	644				2	1	
0	623	590	591	637		616	617	601	629		-7	27	10	-8	
150	627	594	592	632		626	743	702	652		-1	149	110	20	
300	629	596	592	614		630	767	754	698		1	171	162	84	
450	630	599	593	626		630	773	771	745		0	174	178	119	
600	630	601	594	625	869	629	764	786	735	858	-1	163	192	110	-11
750	629	603	595	624	866	627	767	783	728	854	-2	164	188	104	-12
900	629	605	597	623	870	625	770	788	720	858	-4	165	191	97	-12
1050	629	607	599	638	874	623	775	790	713	862	-6	168	191	75	-12
1200	629	610	602	627	876	621	761	767	693	864	-8	151	165	66	-12
1350	628	614	605	629	878	619	761	790	717	867	-9	147	185	88	-11
1500	629	617	609	632	879	614	742	783	712	862	-15	125	174	80	-17
1650	627	620	612	635	878	610	727	768	707	858	-17	107	156	72	-20
1800	630	618	615	638	879	606	712	756	705	855	-24	94	141	67	-24
1950	619	595	606	644	886	592	640	667	685	857	-27	45	61	41	-29
2100			593	628	901			591	635	869			-2	7	-32
2250				651					626						-25
2400				657					633						-24
2550				667					626						-41
2700				677					632						-45
2850				690					640						-50

DATA SHEET NO. 11 ... (CONTINUED)

TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102

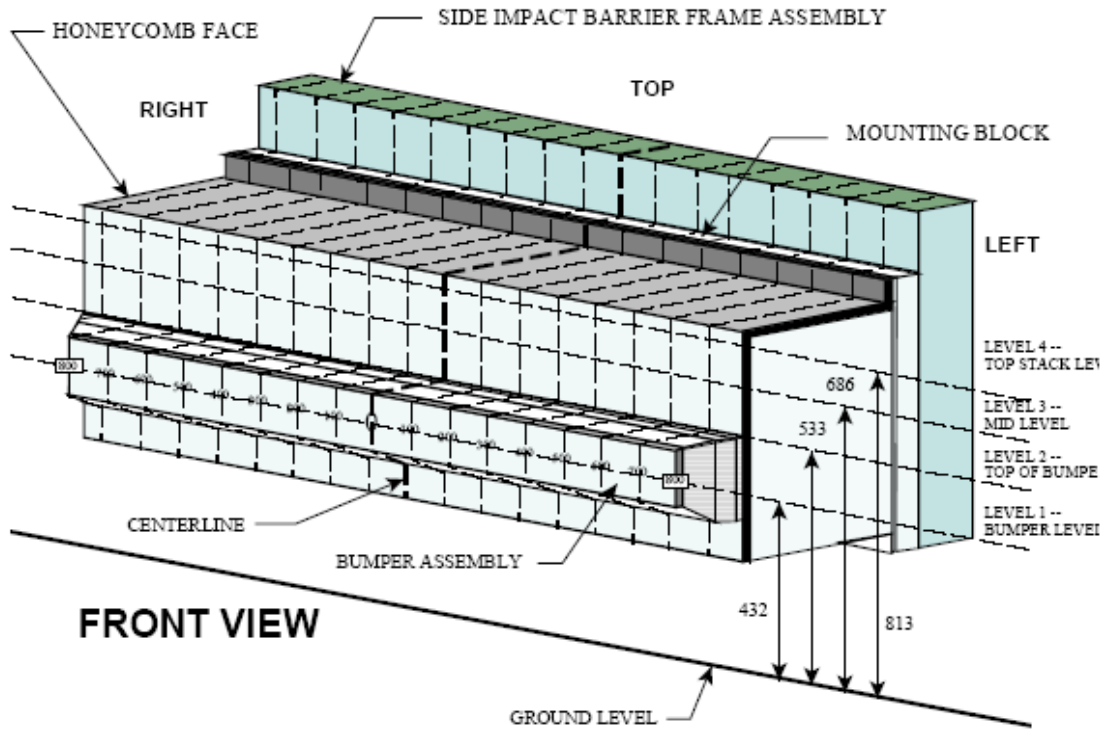
Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**DATA SHEET NO. 12**

**MDB EXTERIOR STATIC CRUSH MEASUREMENTS**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



NOTE: Dimensions are shown in millimeters, mm

**DEFORMABLE BARRIER STATIC CRUSH**

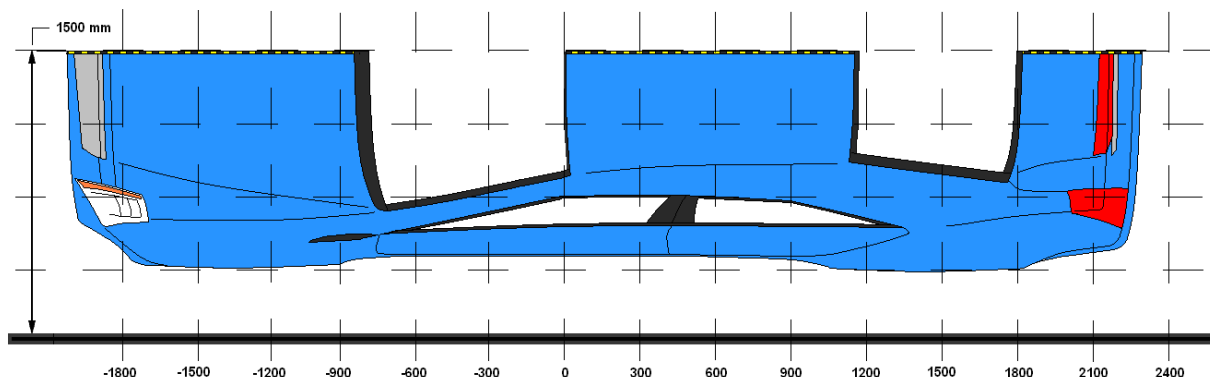
Stack Level	Distance Right of Center								C/L	Distance Left of Center							
	800	700	600	500	400	300	200	100		100	200	300	400	500	600	700	800
1	264	248	231	219	214	209	202	197	185	189	180	176	171	164	169	173	179
2	184	175	147	129	112	101	95	91	90	89	85	-12	93	95	92	105	108
3	123	75	61	51	48	47	67	61	48	37	31	31	31	42	57	78	127
4	67	50	46	36	49	72	102	107	68	44	34	39	40	52	71	100	146

All dimensions in millimeters.

### DATA SHEET NO. 13

#### VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



#### VEHICLE DAMAGE PROFILE DISTANCES

DPD	Distance From Impact Point (mm)	Level	Pre-Test (mm)	Post-Test (mm)	Crush (mm)
1	2850	4	690	640	-50
2	2250	4	651	626	-25
3	1500	3	609	783	174
4	900	3	597	788	191
5	150	2	594	743	149
6	-450	4	667	675	8

#### MDB DAMAGE PROFILE DISTANCES

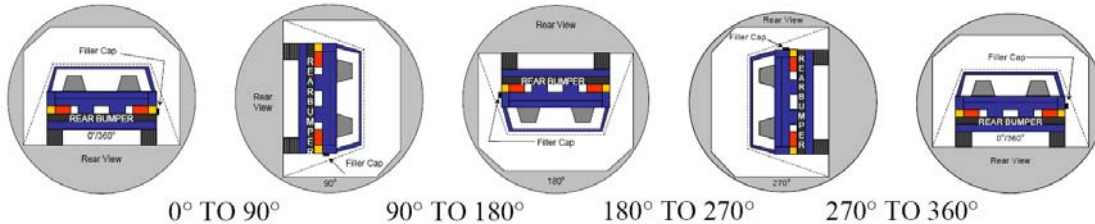
DPD	From MDB Centerline		Level	Crush (mm)
	Distance (mm)	Direction		
1	800	Left	1	179
2	500	Left	1	164
3	200	Left	1	180
4	200	Right	1	202
5	500	Right	1	219
6	800	Right	1	264

**DATA SHEET NO. 14**

**FMVSS NO. 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102  
 Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15  
 Temperature at Time of Impact: 12.2 °C Test Time: 12:48 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°	87	304	391
90° To 180°	81	301	382
180° To 270°	87	310	397
270° To 360°	82	300	382

**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**

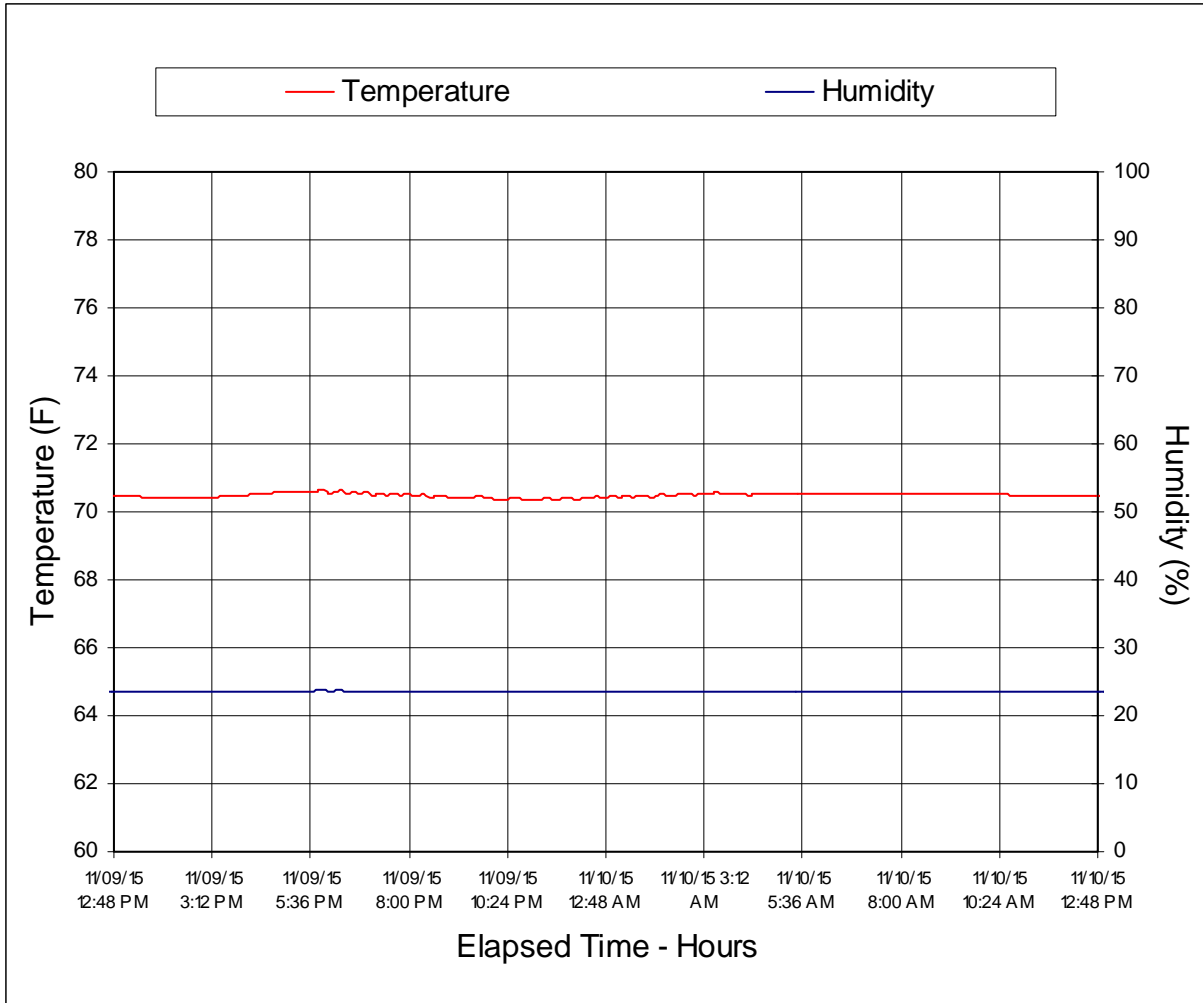
Test Phase	Spillage Location
0° To 90°	N/A
90° To 180°	N/A
180° To 270°	N/A
270° To 360°	N/A

DATA SHEET NO. 15

DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan NHTSA No. M20165102

Test Program: NCAP MDB Side Impact Test Test Date: 11/10/15



**APPENDIX A  
PHOTOGRAPHS**

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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

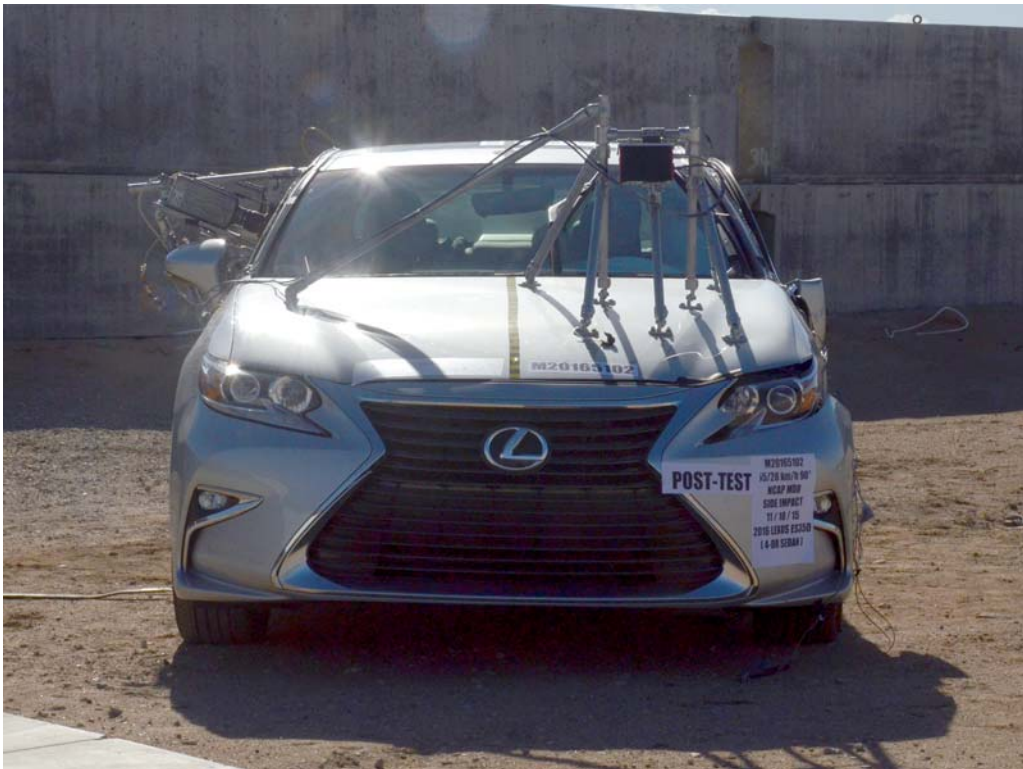


FIGURE 4. Post-Test Frontal View of Test Vehicle



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

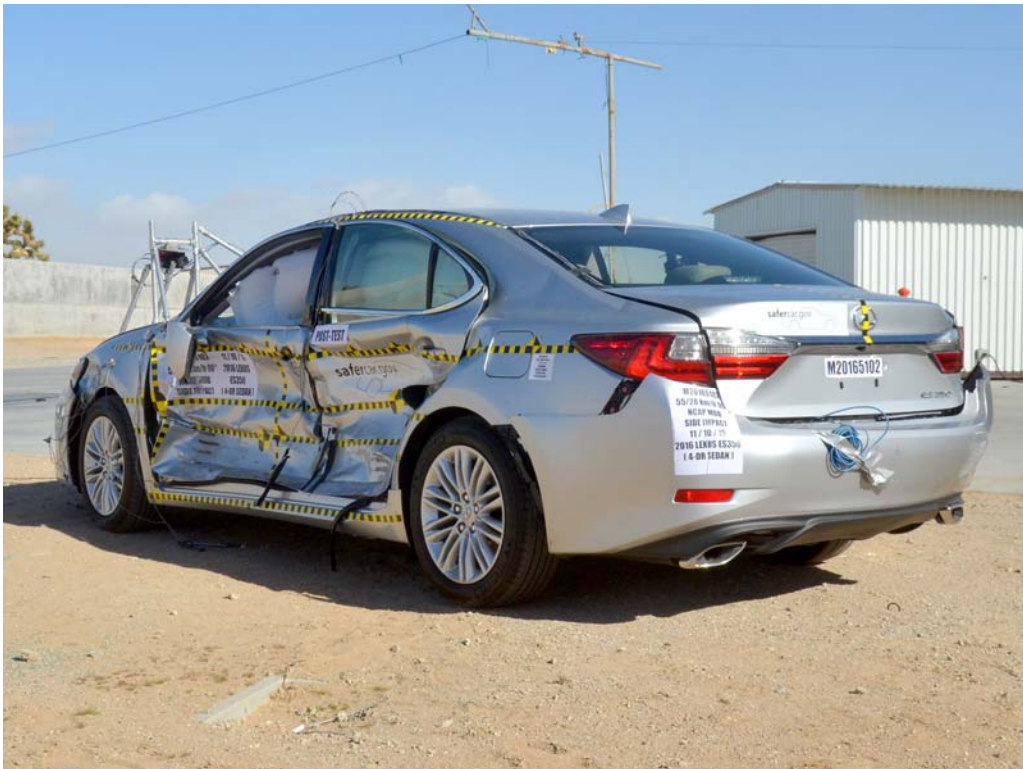


FIGURE 10. Post-Test Left Rear  $\frac{3}{4}$  View of Test Vehicle



FIGURE 11. Pre-Test Rear View of Test Vehicle



FIGURE 12. Post-Test Rear View of Test Vehicle





FIGURE 15. Pre-Test Overhead View of Test Area

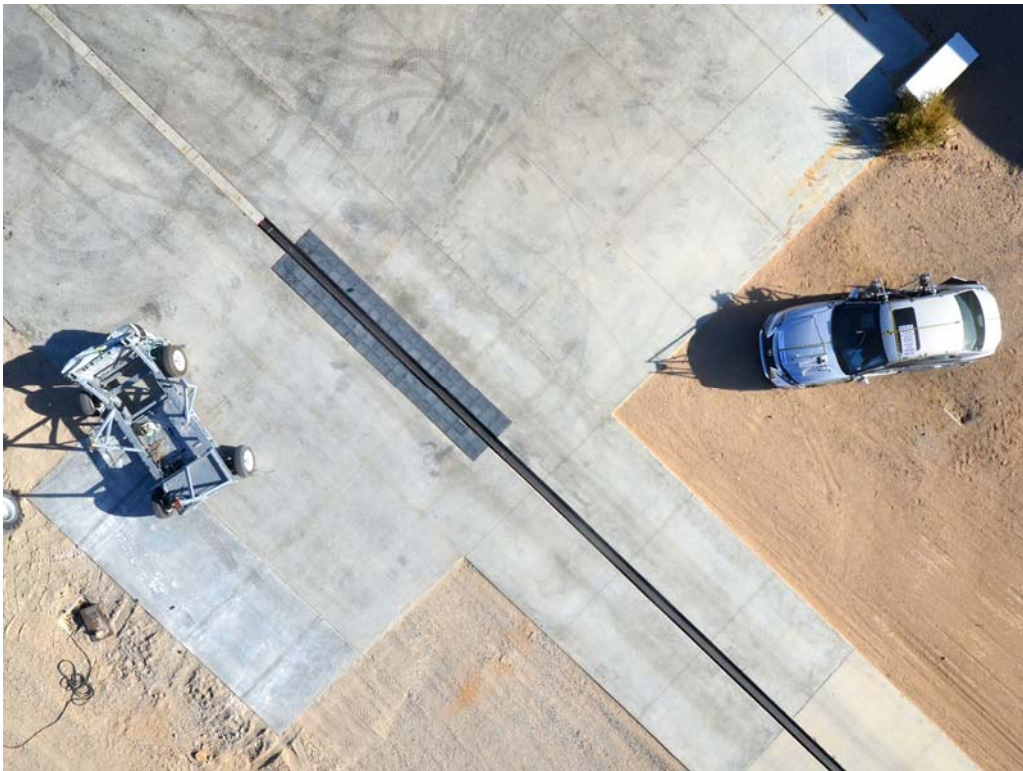


FIGURE 16. Post-Test Overhead View of Test Area



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

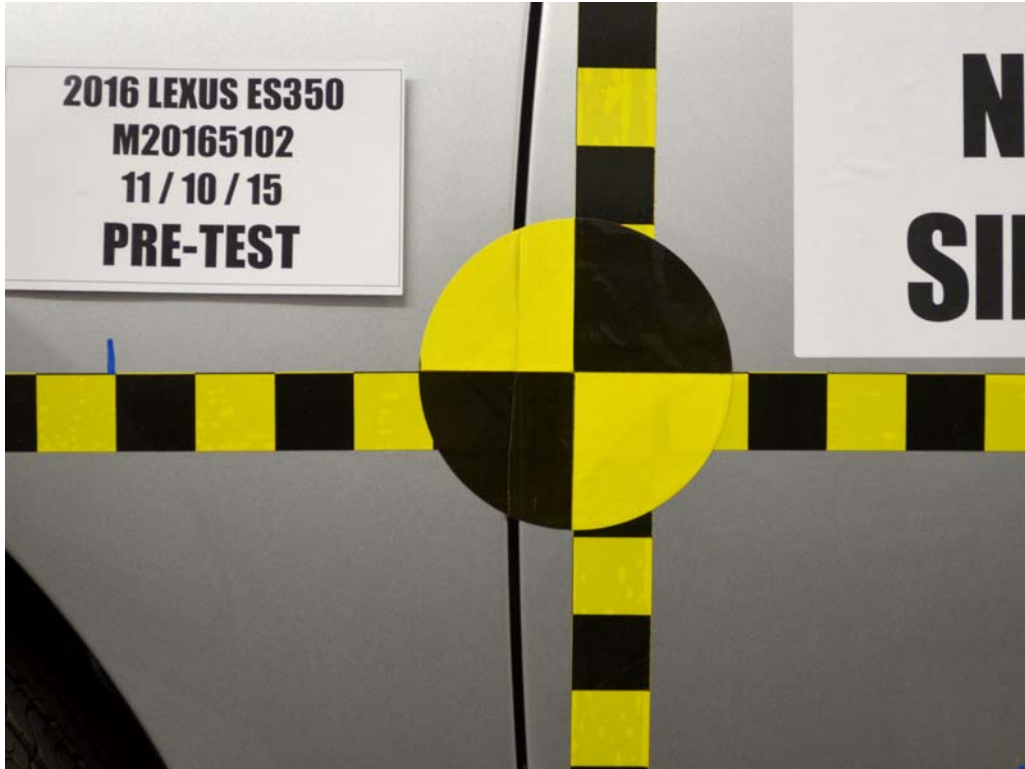


FIGURE 19. Pre-Test Close-Up View of Impact Point Target



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

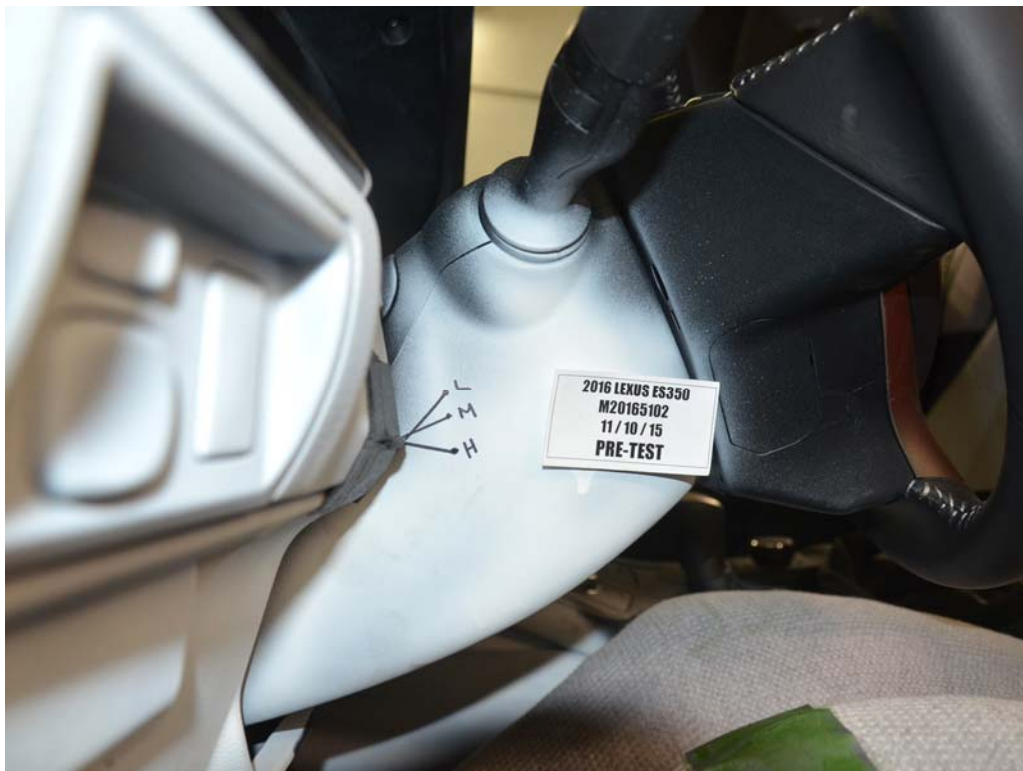


FIGURE 36. Pre-Test Left Side View of Steering Wheel



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

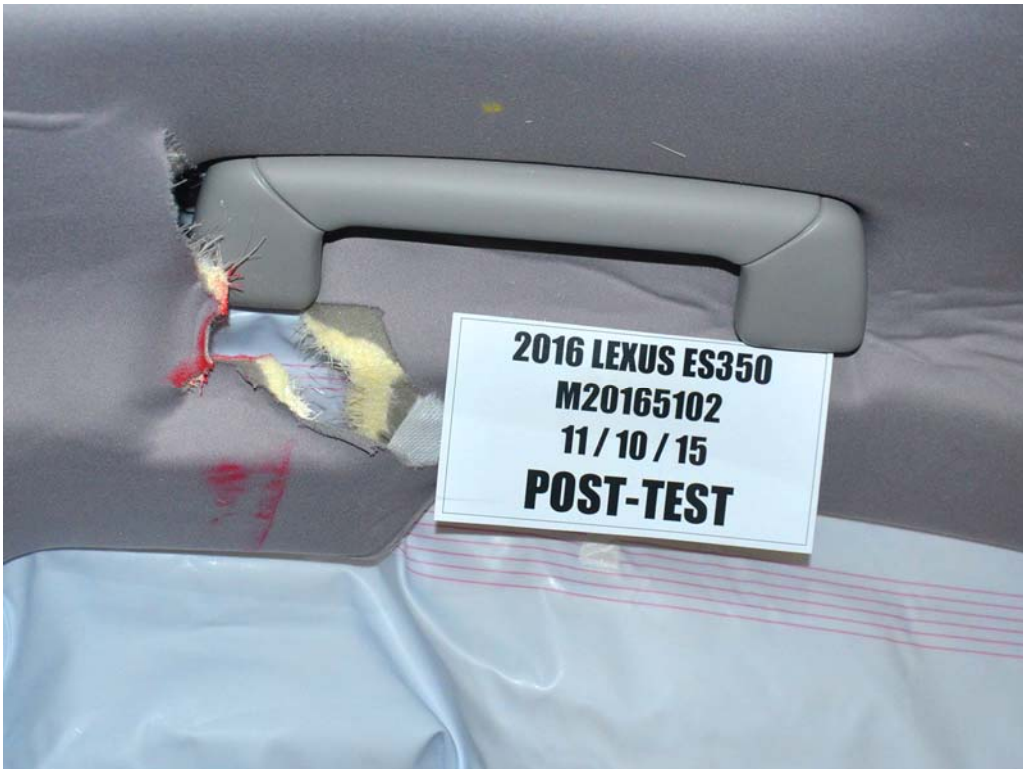


FIGURE 48. Post-Test Driver Dummy Close-Up Head Contact  
with Vehicle Interior View

# Photograph Not Available

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

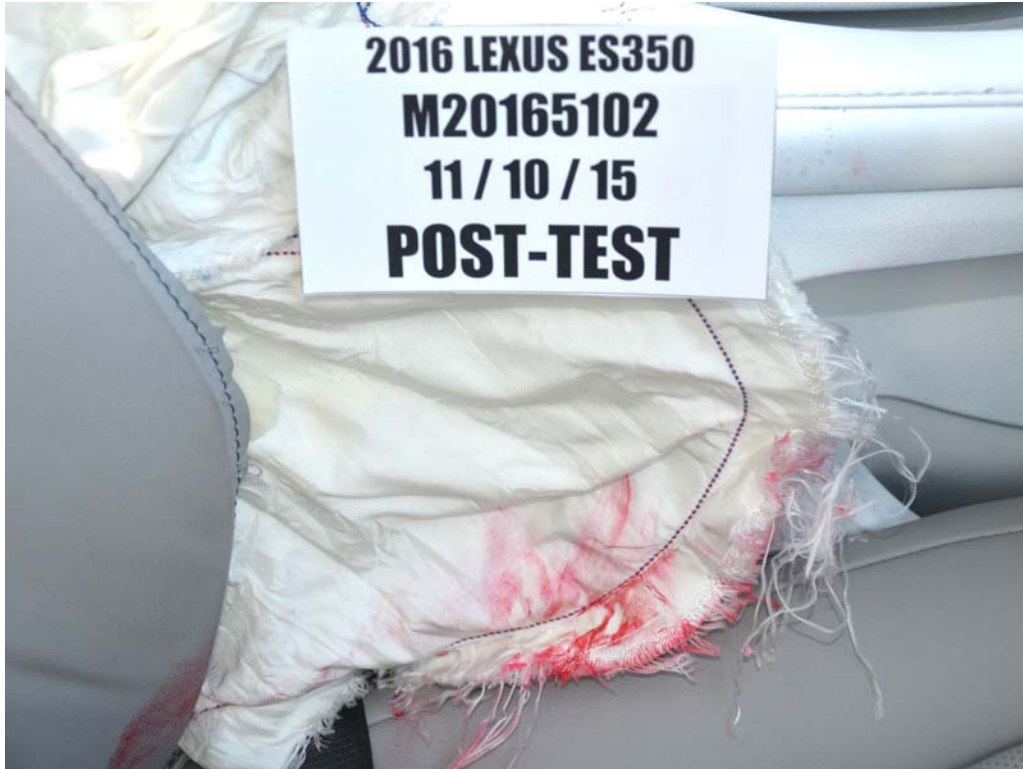


FIGURE 53. Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View

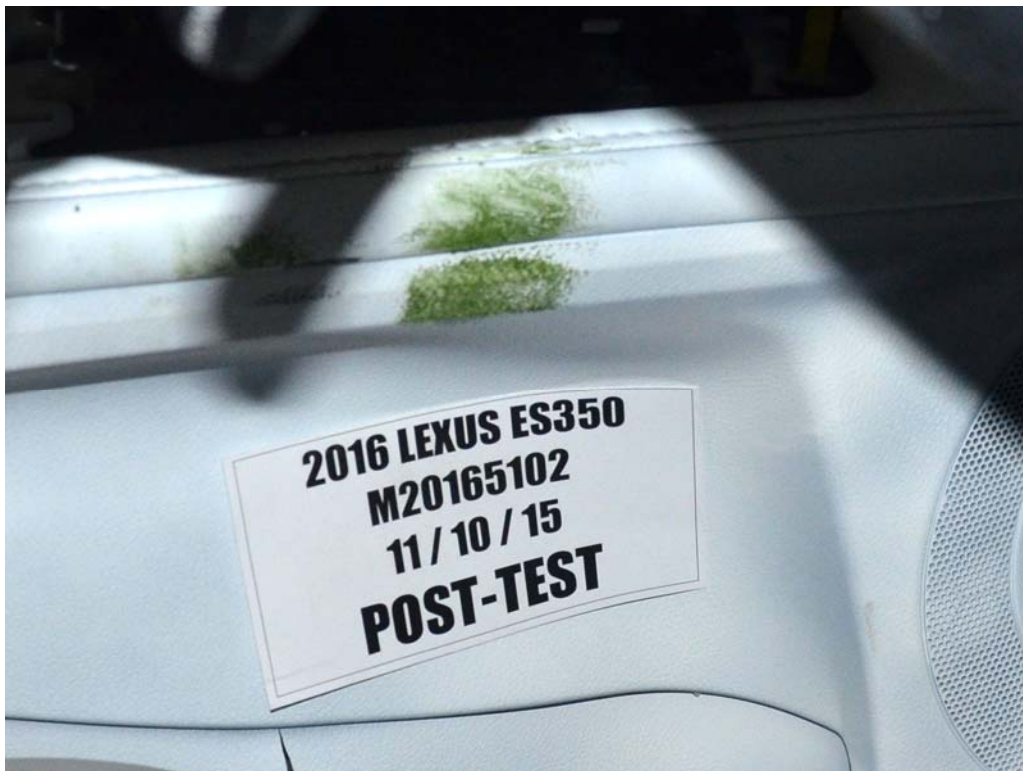


FIGURE 54. Post-Test Driver Dummy Close-Up Knee Contact View



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

**Photograph Not Available**

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



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

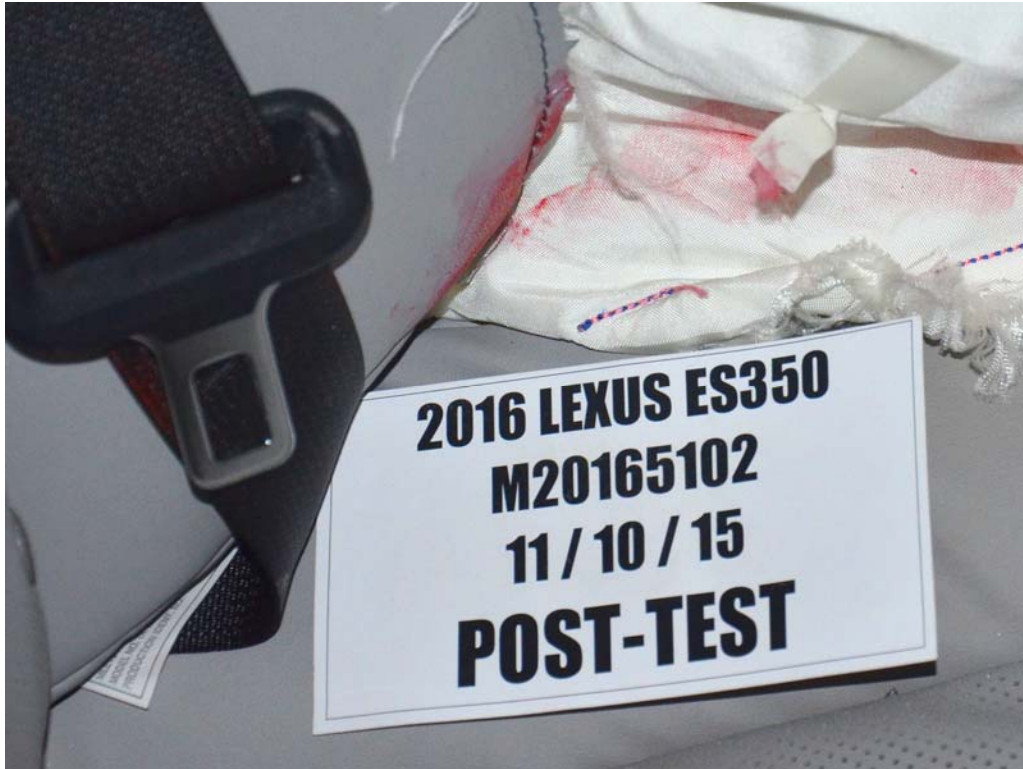


FIGURE 79. Post-Test Rear Passenger Dummy Close-Up  
Pelvis Contact with Vehicle Interior View

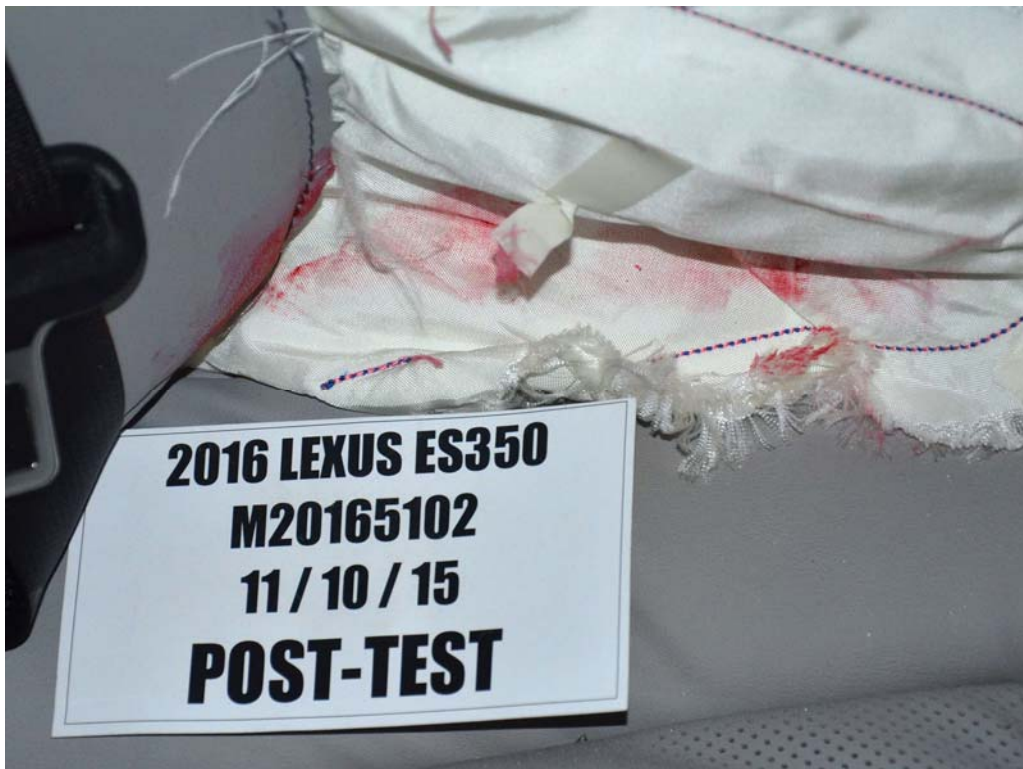


FIGURE 80. Post-Test Rear Passenger Dummy Close-Up  
Pelvis Contact with Side Airbag View



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

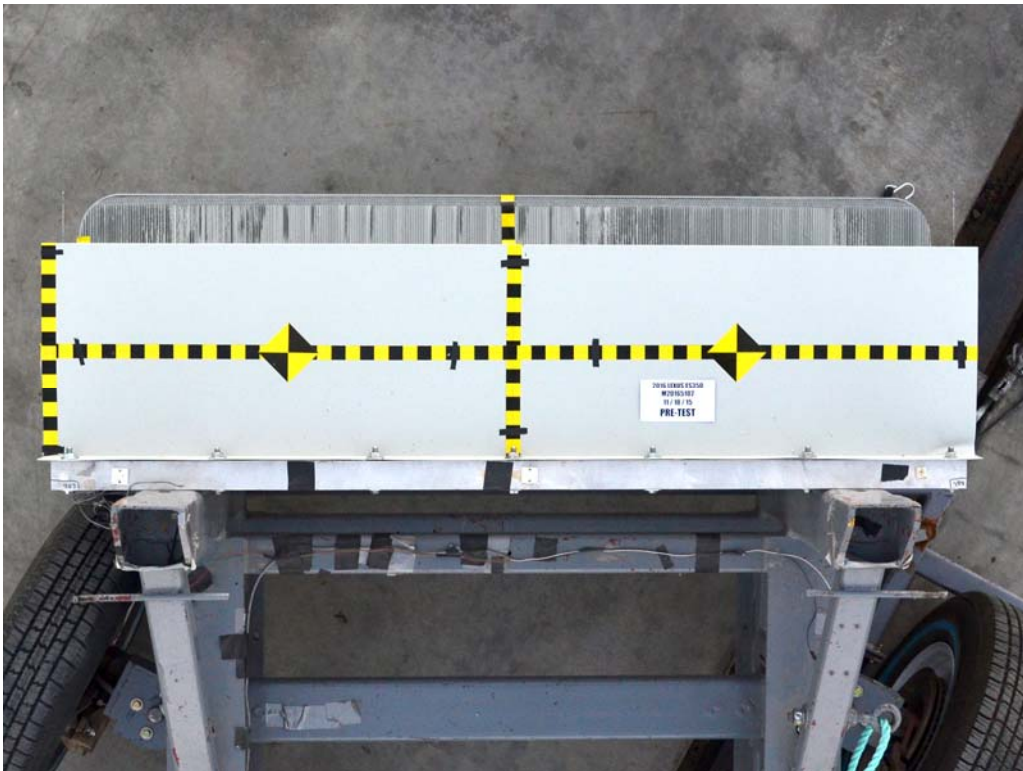


FIGURE 86. Pre-Test Top View of MDB Impactor Face



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 92a. Close-Up View of Vehicle's Load Reduction label

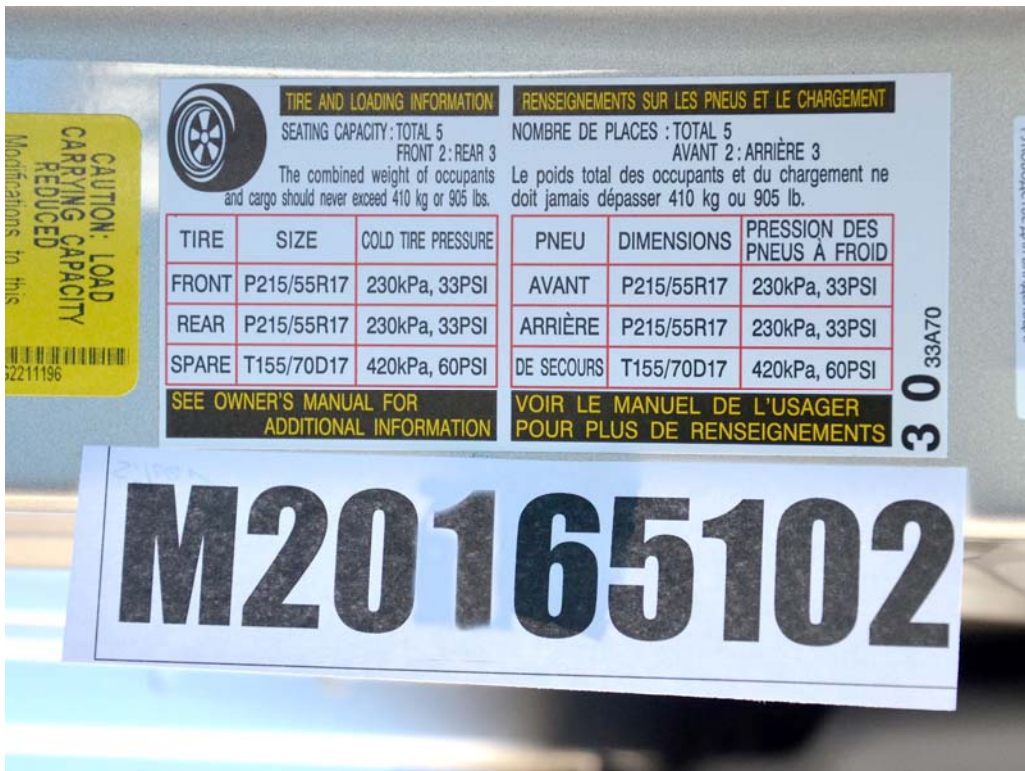


FIGURE 93. Close-Up View of Vehicle's Tire Information Placard or Label

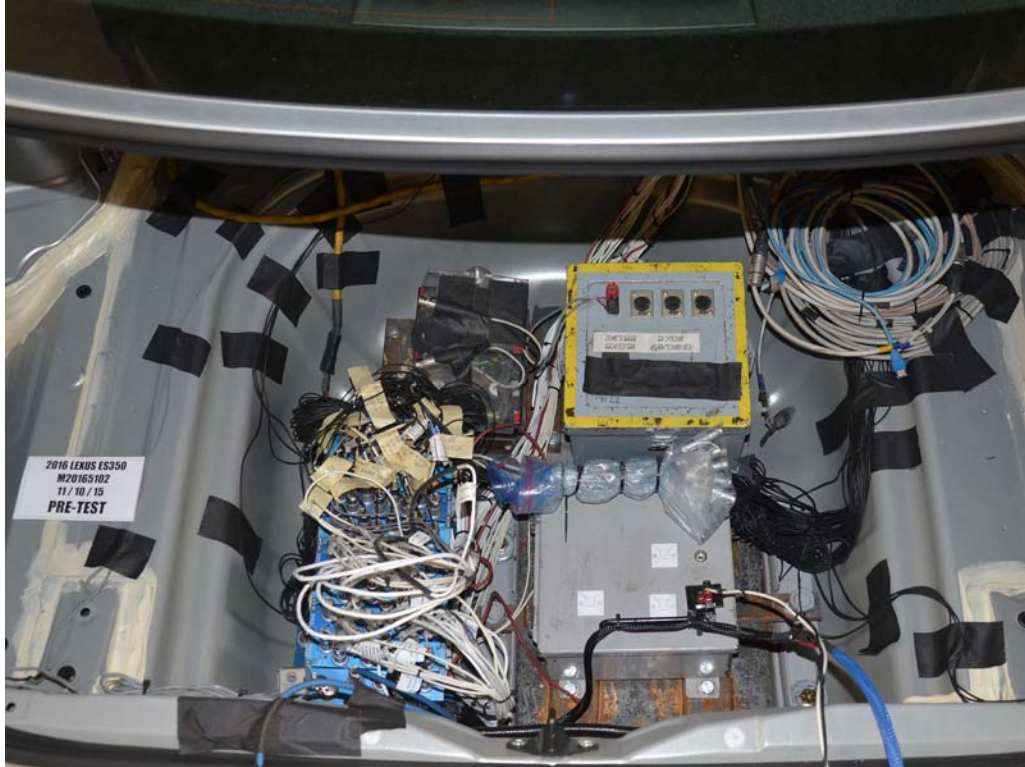


FIGURE 94. Pre-Test Ballast View



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

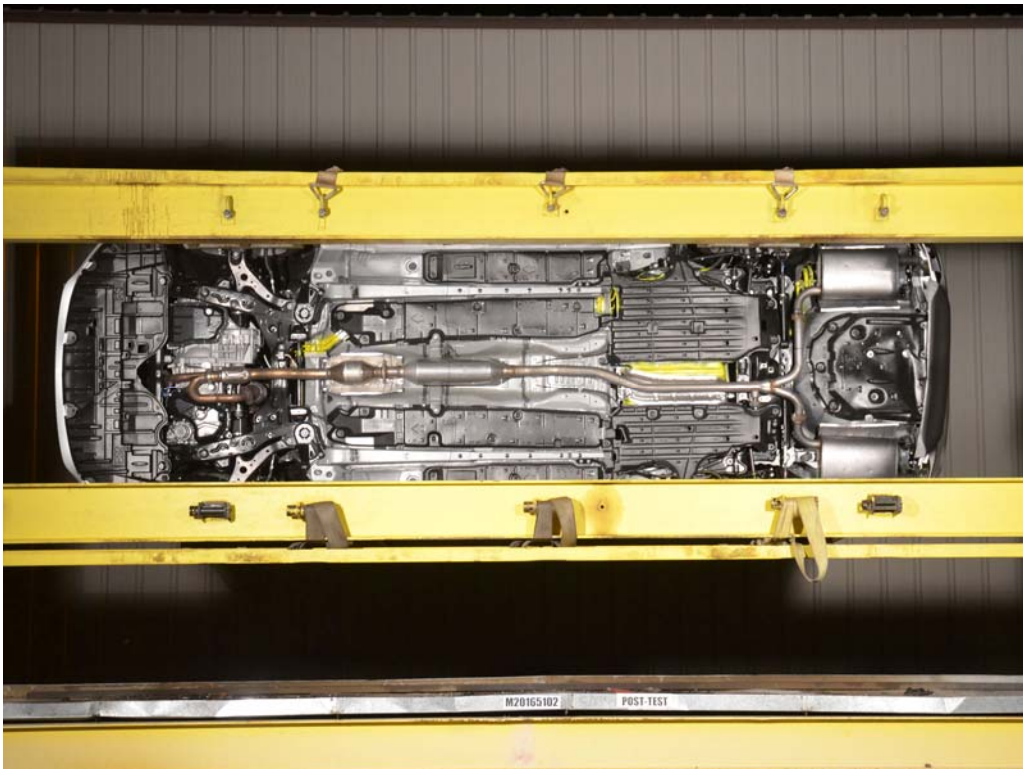


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees



FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees



FIGURE 101. Impact Event

**LEXUS**  
The Pursuit of Perfection

DESCRIPTION: 2016 / 9000A ES350 4-DR SEDAN  
 COLOR: SILVER LINING MET  
 VIN: JTHBK1GGXG2211196  
 PORT/PLANT: Long Beach, CA

Dealer Name / Address:  
 LEXUS SAN DIEGO  
 4970 KEARNEY MESA ROAD  
 SAN DIEGO CA 92111

Ship to (Dealer, unless otherwise indicated)

**STANDARD EQUIPMENT & INSTALLED OPTIONS**

MANUFACTURER'S SUGGESTED RETAIL PRICE: **\$38,000.00**

**STANDARD FEATURES**

- 3.5 Liter 288HP Four Cam 24-Valve V8 Engine
- All-Aluminum Engine Construction & Dual VVT-i
- 4-Wheel Independent MacPherson Strut-Type Suspension with Gas Pressurized Shock Absorbers
- Front and Rear Stabilizer Bars
- 17" Aluminum Alloy Split 10-Spoke Wheels
- 215/55R17 All-Season Tires
- Dual Fr Airbags, Dual Fr Knee Airbags, Fr & Rr Seat-Mounted Side Impact Airbags, Fr & Rr Side Curtain Airbags, Supplemental Restraint Sys (SRS)
- 3-Point Safety Belts for All Seating Positions
- Fr & Rr Outboard Seatbelt Pretensioners with Force Limiters / Energy Managing Crumple Zones, Side Door Beams
- Theft-Deterrent System w/ Engine Immobilizer
- Vehicle Stability Control (VSC) with TRAC
- 4-Wheel Anti-Lock Braking System (ABS) with Electronic Brakeforce Distribution (EBD), and Brake Assist (BA)
- Smart Stop Technology
- SmartAccess with Push Button Start/Stop Drive Mode Select (Eco, Normal, Sport)
- LEXUS Enform Safety Connect: Automatic Collision Notification, Stolen Vehicle Location, Emergency Assist Button (SOS), and Roadside Assistance
- LEXUS Enform Service Connect (1-year trial subscription included)
- Automatic On/Off LED Low Beam and Halogen High Beam Headlamps w/ Integrated Foglamps/LED Daytime Running Lights (DRL) / Intermittent Wipers w/ Mist Cycle
- 10-Way Driver's & Passenger's (including Lumbar) Power Seats
- Electrochromic Heated Outside Mirrors
- Automatic Dual Zone Climate Control
- One-Touch Open/Close Per Tire-and-Slide Moonroof
- LEXUS Premium Audio System with Automatic Sound Levelizer (ASL) & MP3 Player Connectivity (mini-plug) and 8-Speakers, Bluetooth Technology, USB Audio Plug, SiriusXM Satellite Radio (3-month All Access trial subscription)
- LEXUS Personalized Settings / Carpeted Floor Mats

**Fuel Economy and Environment**

**24** MPG  
 combined city/hwy

**21** MPG  
 city

**31** MPG  
 highway

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

**Annual fuel cost \$1,900**

**GOVERNMENT 5-STAR SAFETY RATINGS**

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

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

**Side Crash Not Rated**  
 Based on the risk of injury in a side impact.

**Rollover Not Rated**  
 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

APPLICABLE FEDERAL TAXES NOT INCLUDED

MANUFACTURER'S SUGGESTED RETAIL PRICE INCLUDES MANUFACTURER'S RECOMMENDED PRE-DELIVERY SERVICE

LICENSE AND TITLE FEES, SALES TAX AND APPLICABLE IN-STATE SALES AND EXCISE TAXES ARE NOT INCLUDED IN THE MANUFACTURER'S SUGGESTED RETAIL PRICE

**LEXUS NEW VEHICLE LIMITED WARRANTY**  
 Limited warranty coverage highlights include:  
 \* 4-year / 50,000-mile basic coverage  
 \* 4-year / 70,000-mile powertrain coverage  
 \* 8-year / unlimited-mile corrosion performance warranty

See your Warranty and Service Guide for details

**LEXUS IS PLEASED TO OFFER YOU FOLLOWING OWNER SUPPORT PACKAGE WITH EACH NEW LEXUS**  
 \* 24-hour, 24-hour roadside assistance plan  
 \* Complimentary 1st and 2nd scheduled maintenance services  
 \* Lodging for emergency breakdown 100 miles from home

See extended service contract for details

21BC16 540 L006

FIGURE 102. Monroney Label

3-3. Adjusting the seats 119

**Head restraints**

Head restraints are provided for all seats.

**Front seats**

**Vertical adjustment**

- Up: Pull the head-restraints up. Push the head restraint down while pressing the lock release button.
- Down: Push the head restraint down while pressing the lock release button.

**Horizontal adjustment**

The position of the head restraint can be adjusted forward in 4 stages. If the head restraint is pulled forward from the foremost position, it will return to the rearmost position.

3-3. Adjusting the seats 120

**Rear seats**

**Outboard**

- Up: Pull the head-restraints up. Push the head restraint down while pressing the lock release button.
- Down: Push the head restraint down while pressing the lock release button.

**Center**

- Up: Pull the head-restraints up. Push the head restraint down while pressing the lock release button.
- Down: Push the head restraint down while pressing the lock release button.

**Removing the head restraints**

1. Pull the head restraint up while pressing the lock release button.

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

3-3. Adjusting the seats 121

**Installing the head restraints**

**Front seats**

Align the head restraint with the installation holes and push it down to the lock position. Press and hold the lock release button when lowering the head restraint.

**Rear seats**

Align the head restraint with the installation holes and push it down to the lowest lock position while pressing the lock release button.

**Adjusting the height of the head restraints**

Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top of your ears.

**Adjusting the rear seat head restraint**

Always raise the head restraint one level from the stowed position when using.

**WARNING**

**Head restraint precautions**

- Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.
- Use the head restraints designed for each respective seat.
- Adjust the head restraints to the correct position at all times.
- After adjusting the head restraints, push down on them and make sure they are locked in position.
- Do not drive with the head restraints removed.

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

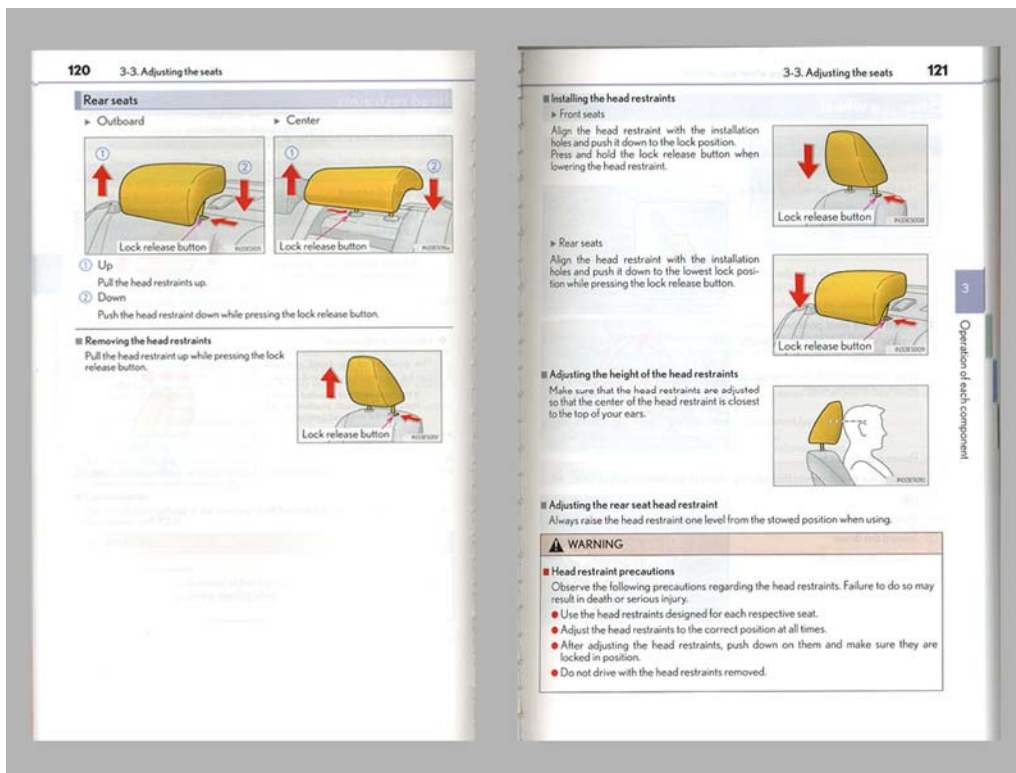


FIGURE 104. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

**APPENDIX B**  
**DUMMY RESPONSE DATA**

## TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary	B-1
2	Driver Head Acceleration (Y) Primary	B-1
3	Driver Head Acceleration (Z) Primary	B-1
4	Driver Head Resultant Acceleration Primary	B-1
5	Driver Upper Thorax Rib Deflection (Y)	B-2
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7	Driver Lower Thorax Rib Deflection (Y)	B-2
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13	Driver Pubic Symphysis Force (Y)	B-4
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17	Passenger Head Acceleration Resultant Primary	B-5
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19	Passenger Lower Spine T12 Acceleration (Y)	B-6
20	Passenger Lower Spine T12 Acceleration (Z)	B-6
21	Passenger Lower Spine T12 Acceleration Resultant	B-6
22	Passenger Iliac Force on Impact Side (Y)	B-7
23	Passenger Acetabulum Force on Impact Side (Y)	B-7
24	Passenger Total Pelvic Force on Impact Side (Y)	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](http://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)

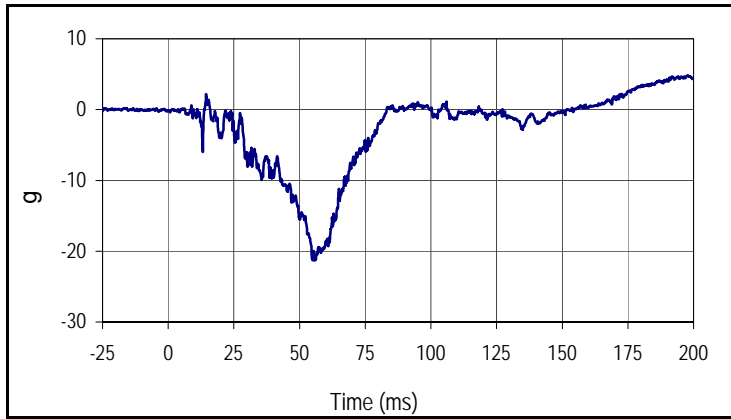
MDB Rear Acceleration (Y)

Left MDB Contact Switch

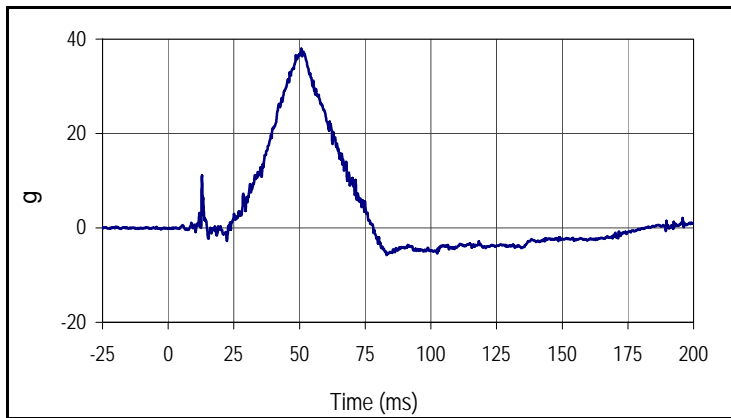
Right MDB Contact Switch

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan  
 Test Program: NCAP MDB Side Impact Test

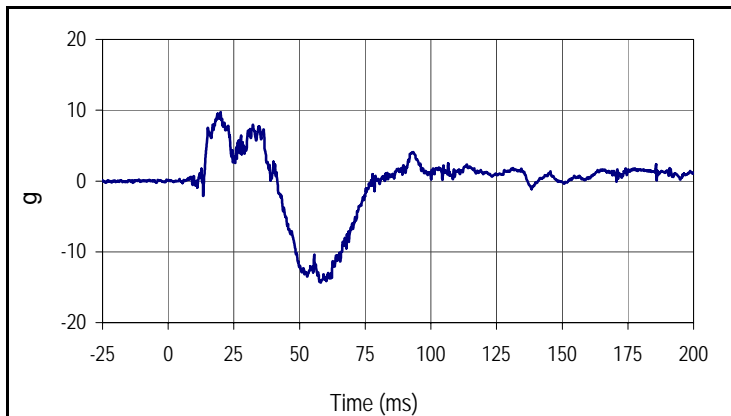
NHTSA No.: M20165102  
 Test Date: 11/10/15



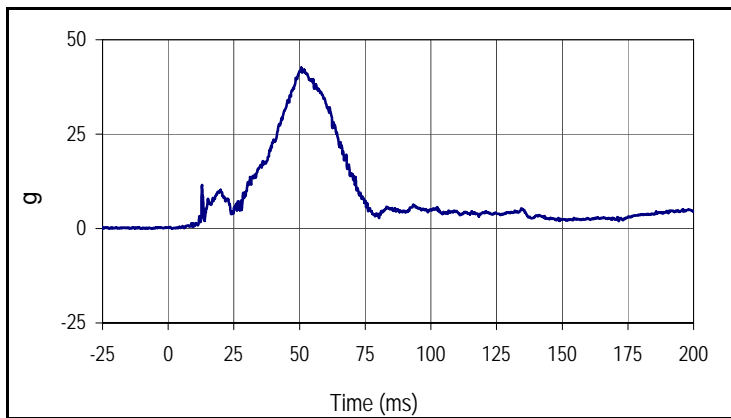
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Driver Head Acceleration X Primary			
Plot No.		SAE Class	Units
001		1000	g
Max	Time	Min	Time
4.8	197.8	-21.3	55.8



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.		SAE Class	Units
002		1000	g
Max	Time	Min	Time
38.0	50.7	-5.8	83.2



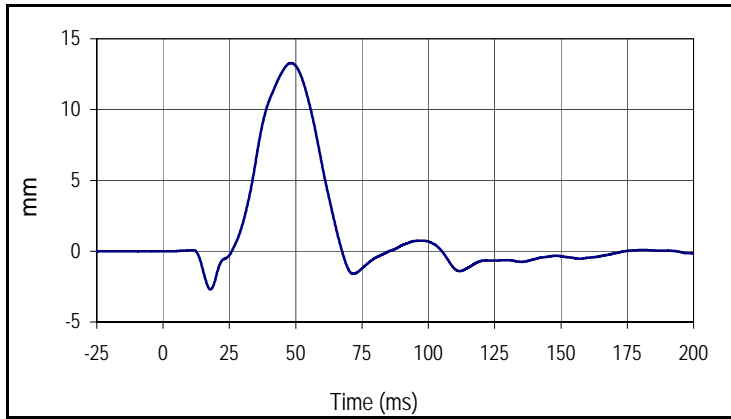
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.		SAE Class	Units
003		1000	g
Max	Time	Min	Time
9.7	19.9	-14.4	58.1



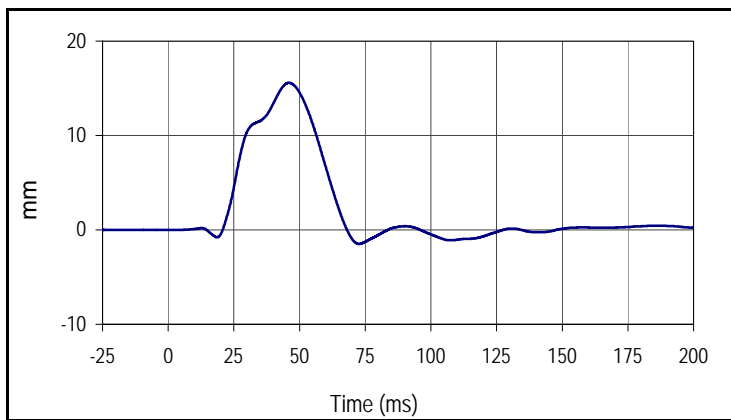
Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.		SAE Class	Units
004		1000	g
Max	Time	Min	Time
42.6	50.7	0.0	1.7

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan  
 Test Program: NCAP MDB Side Impact Test

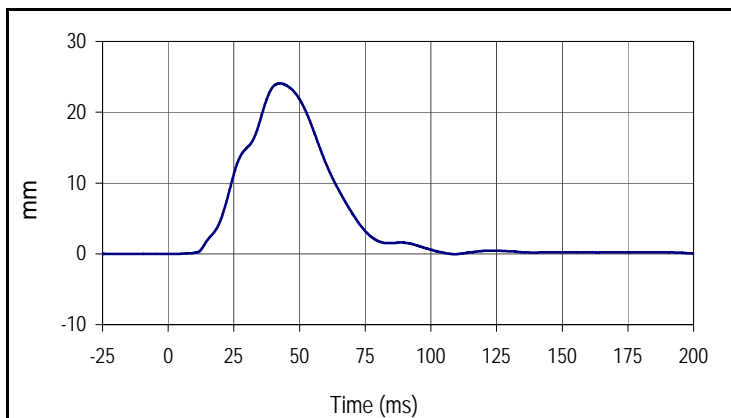
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 Test Date: 11/10/15



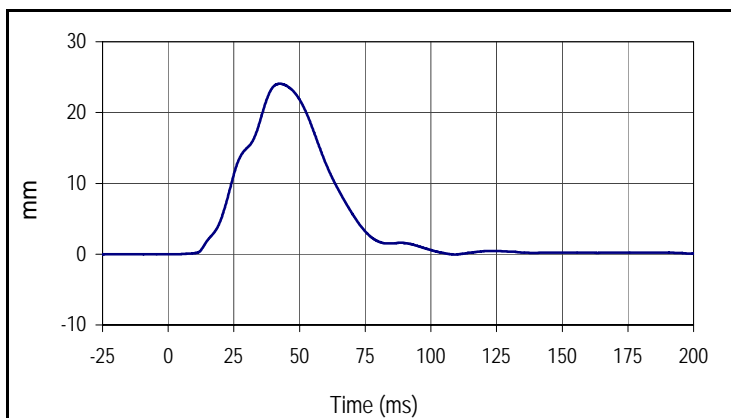
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Driver Upper Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
005		180	mm
Max	Time	Min	Time
13.3	48.2	-2.7	17.8



Curve Description			
Driver Middle Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
006		180	mm
Max	Time	Min	Time
15.6	46.0	-1.5	72.7



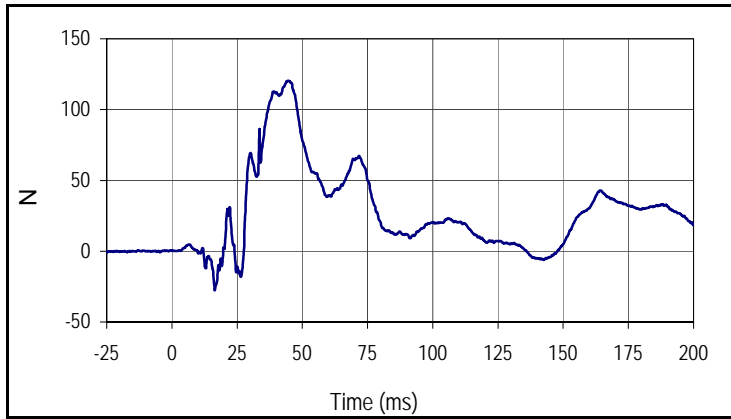
Curve Description			
Driver Lower Thorax Rib Deflection Y			
Plot No.		SAE Class	Units
007		180	mm
Max	Time	Min	Time
24.1	42.6	-0.1	109.1



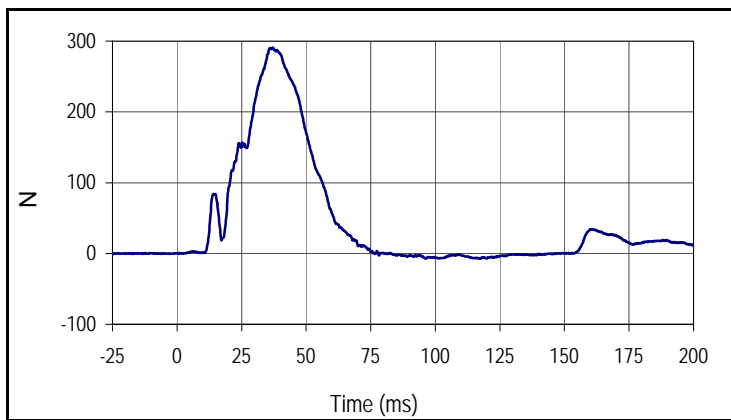
Curve Description			
Driver Thorax Rib Deflection Maximum Y			
Plot No.		SAE Class	Units
008		180	mm
Max	Time	Min	Time
24.1	42.6	-0.1	109.1

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan  
 Test Program: NCAP MDB Side Impact Test

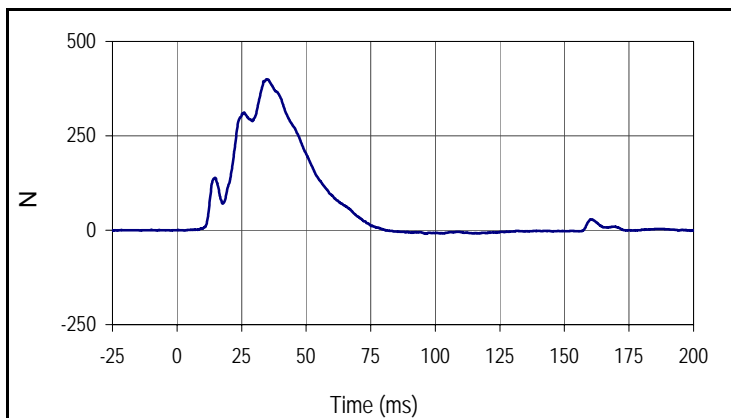
NHTSA No.: M20165102  
 Test Date: 11/10/15



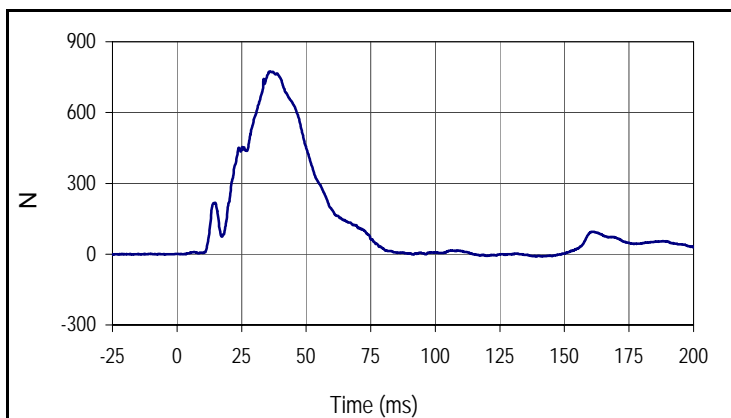
Curve Description			
Driver Anterior Abdominal Force Y			
Plot No.		SAE Class	Units
009		600	N
Max	Time	Min	Time
120.3	44.6	-27.6	16.5



Curve Description			
Driver Middle Abdominal Force Y			
Plot No.		SAE Class	Units
010		600	N
Max	Time	Min	Time
290.9	37.1	-7.2	117.4



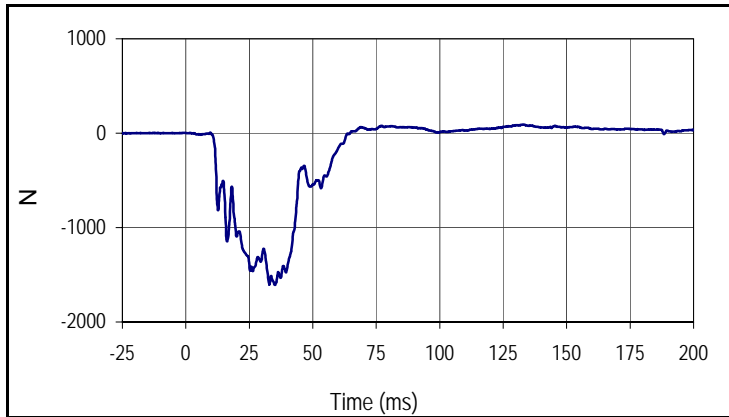
Curve Description			
Driver Posterior Abdominal Force Y			
Plot No.		SAE Class	Units
011		600	N
Max	Time	Min	Time
399.7	34.9	-9.5	96.3



Curve Description			
Driver Total Abdominal Force			
Plot No.		SAE Class	Units
012		600	N
Max	Time	Min	Time
773.3	35.8	-9.6	141.1

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan  
 Test Program: NCAP MDB Side Impact Test

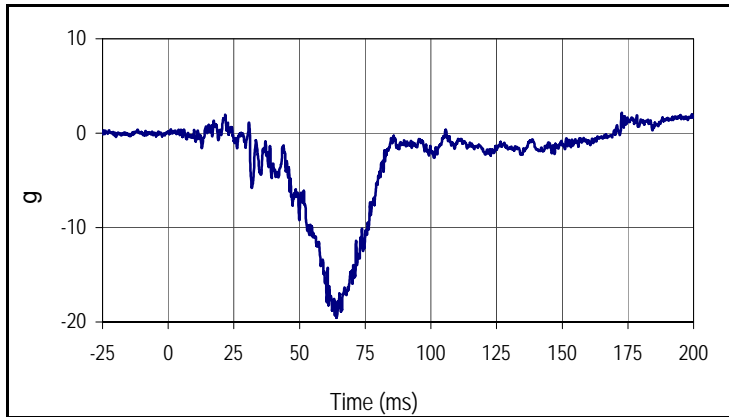
NHTSA No.: M20165102  
 Test Date: 11/10/15



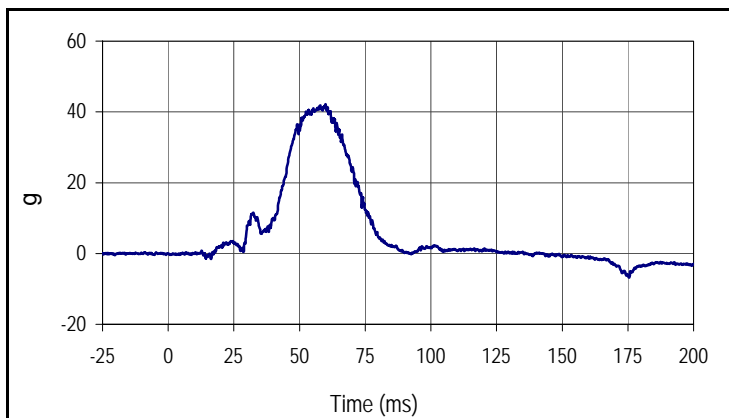
Curve Description			
Driver Pubic Symphysis Force Y			
Plot No.		SAE Class	Units
013		600	N
Max	Time	Min	Time
92.3	132.7	-1607.6	35.1

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan  
 Test Program: NCAP MDB Side Impact Test

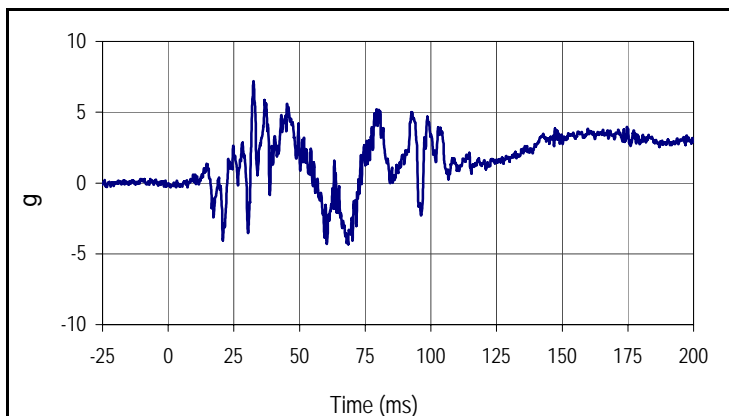
NHTSA No.: M20165102  
 Test Date: 11/10/15



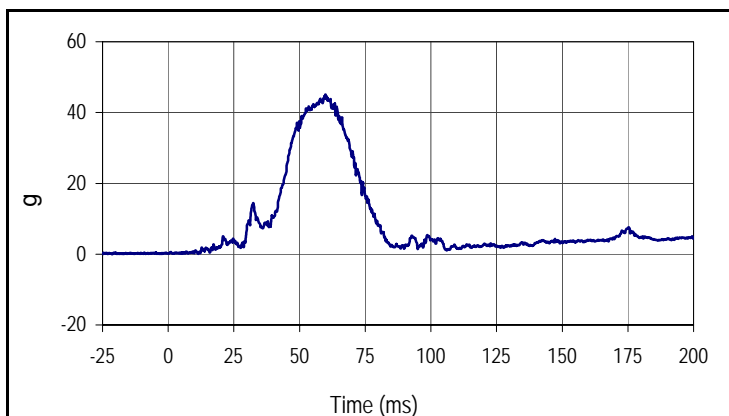
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.		SAE Class	Units
014		1000	g
Max	Time	Min	Time
2.2	172.7	-19.6	64.1



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.		SAE Class	Units
015		1000	g
Max	Time	Min	Time
42.2	59.9	-6.8	175.4



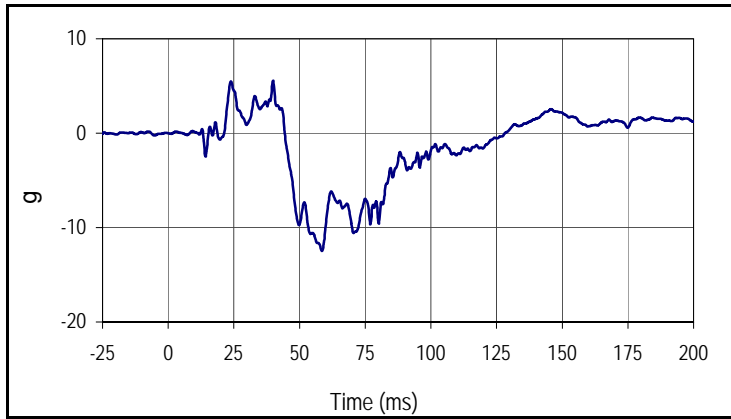
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.		SAE Class	Units
016		1000	g
Max	Time	Min	Time
7.2	32.5	-4.3	68.5



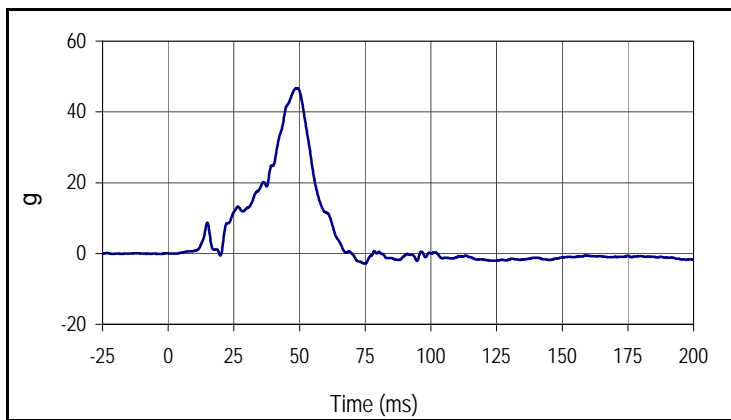
Curve Description			
Passenger Head Acceleration Resultant Primary			
Plot No.		SAE Class	Units
017		1000	g
Max	Time	Min	Time
45.1	59.9	0.1	11.4

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan  
 Test Program: NCAP MDB Side Impact Test

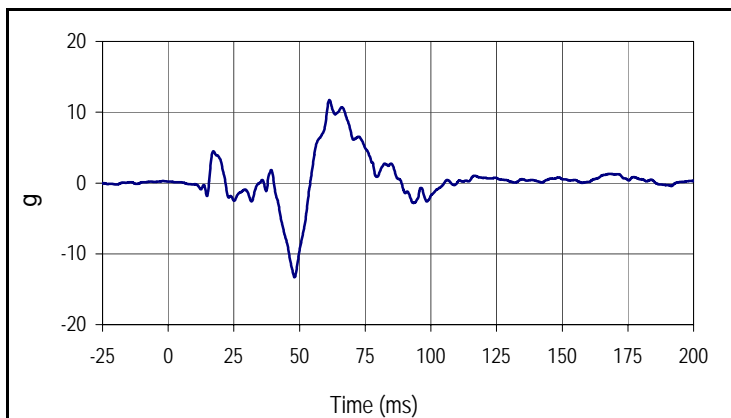
NHTSA No.: M20165102  
 Test Date: 11/10/15



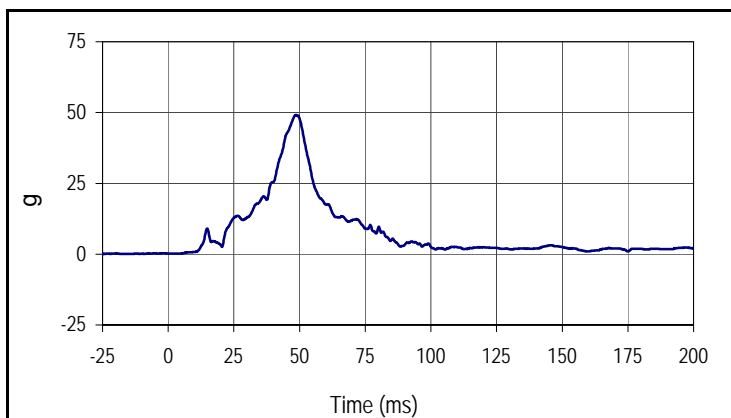
Curve Description			
Passenger Lower Spine T12 Acceleration X			
Plot No.		SAE Class	Units
018		180	g
Max	Time	Min	Time
5.5	39.9	-12.5	58.5



Curve Description			
Passenger Lower Spine T12 Acceleration Y			
Plot No.		SAE Class	Units
019		180	g
Max	Time	Min	Time
46.7	49.0	-2.9	75.0



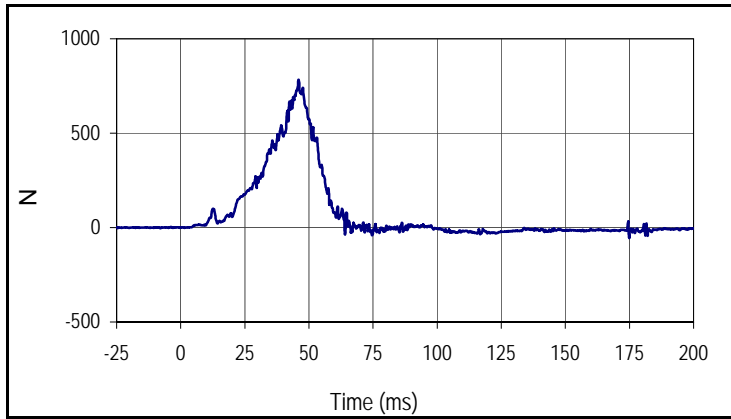
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
Plot No.		SAE Class	Units
020		180	g
Max	Time	Min	Time
11.7	61.4	-13.3	48.1



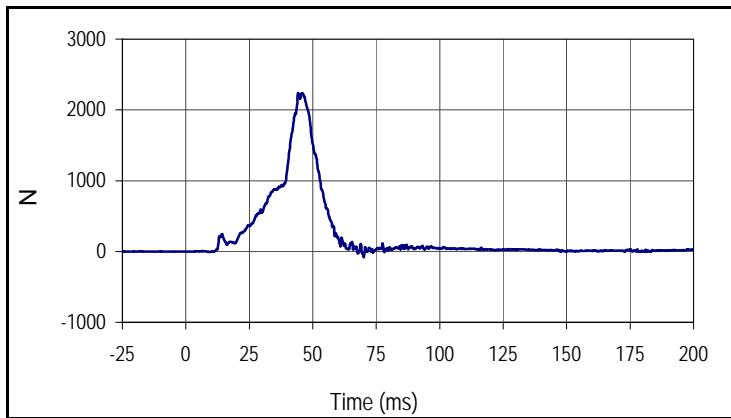
Curve Description			
Passenger Lower Spine T12 Acceleration Res.			
Plot No.		SAE Class	Units
021		180	g
Max	Time	Min	Time
49.1	48.7	0.1	4.0

Test Vehicle: 2016 Lexus ES 350 4-Door Sedan  
 Test Program: NCAP MDB Side Impact Test

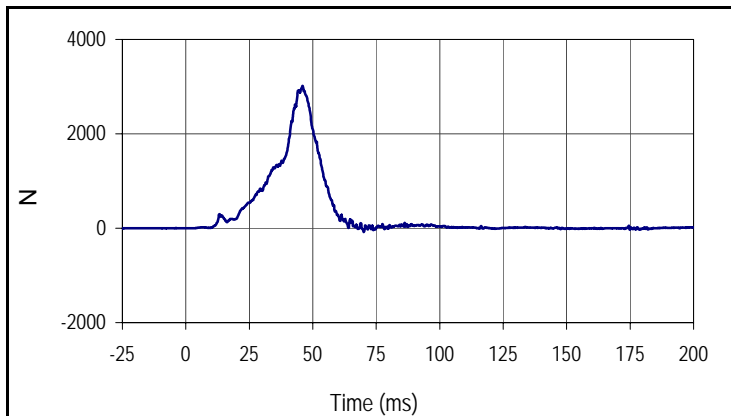
NHTSA No.: M20165102  
 Test Date: 11/10/15



Curve Description			
Passenger Iliac Force on Impact Side Y			
Plot No.		SAE Class	Units
022		600	N
Max	Time	Min	Time
783.2	46.0	-55.3	174.9



Curve Description			
Passenger Acetabulum Force on Impact Side Y			
Plot No.		SAE Class	Units
023		600	N
Max	Time	Min	Time
2238.9	44.2	-82.4	70.1



Curve Description			
Passenger Total Pelvic Force			
Plot No.		SAE Class	Units
024		600	N
Max	Time	Min	Time
3017.2	46.0	-80.6	70.1

**APPENDIX C**  
**DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

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

Test Program: ES2re External Measurements

Test Date: 10/9/15

ATD Serial No.: F037

Test I.D.: N/A



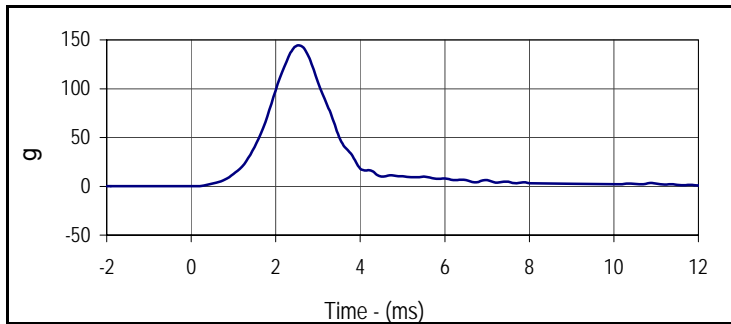
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	30.0	Pass
1 Sitting Height	mm	900 - 918	909	Pass
2 Seat to Shoulder Joint	mm	558 - 572	564	Pass
3 Seat to Lower Face of Thoracic Spine Box	mm	346 - 356	350	Pass
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

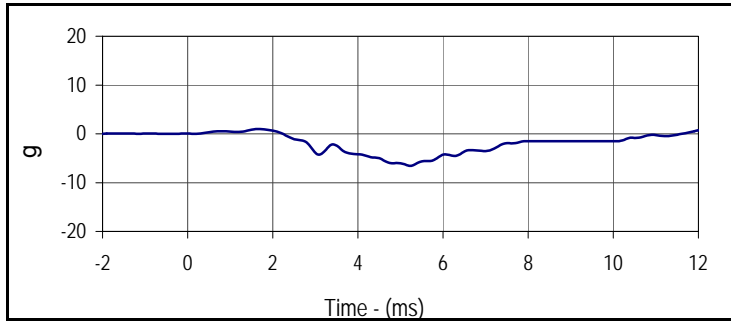
Test Date: 10/9/15  
 Test I.D.: F037HD077



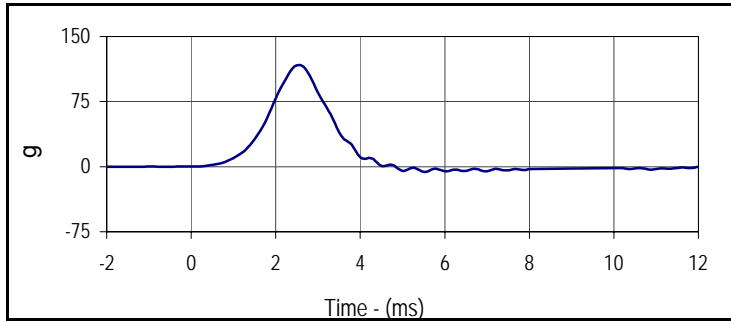
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	371	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.2	Pass
Peak Head Resultant Acceleration	g	125 to 155	146.0	Pass
Peak Head X Acceleration	g	≤15	5.7	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	6.0	Pass
Overall Test Results				Pass



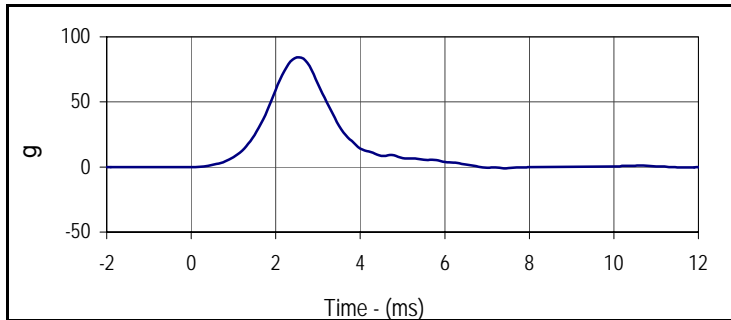
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
146.0	2.3	0.1	-1.9



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
4.5	4.6	-5.7	2.1



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
116.4	2.3	-3.6	6.6



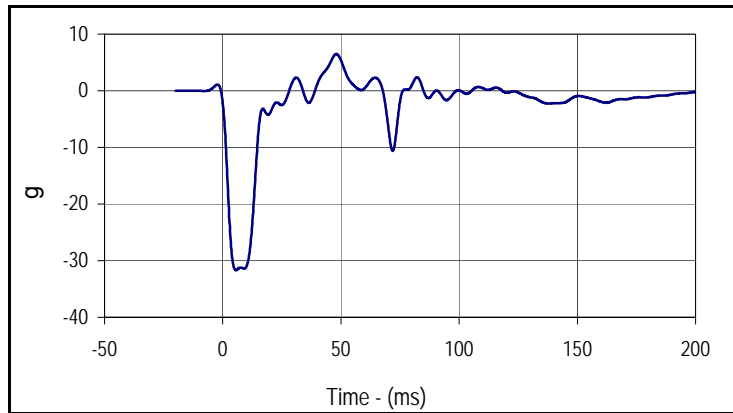
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
87.9	2.3	-0.2	-0.9

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

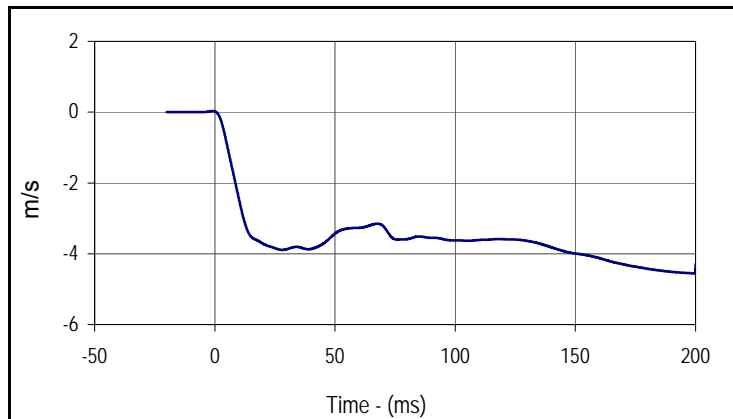
Test Date: 10/9/15  
 Test I.D.: F037NB077



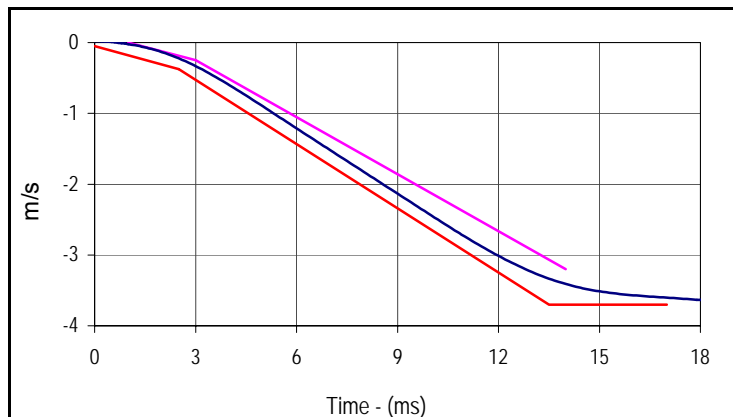
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	406	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass	
	Min		21.4	Pass	
Humidity During Soak	Max	10.0 to 70.0	34.2	Pass	
	Min		33.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.6	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	34.2	Pass	
Pendulum Velocity	m/s	3.3 to 3.5	3.36	Pass	
Headform Flexion	Max	Degrees	49 to 59	57.3	Pass
	Time	msec	54 to 66	56.9	Pass
Headform Flexion Decay (Peak to Zero)	msec	53 to 88	61.9	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
6.5	48.1	-31.7	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	-4.6	199.9



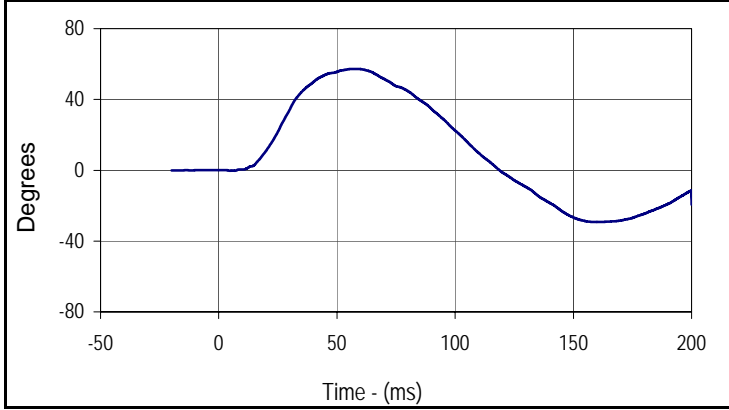
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.8	-4.6	199.9

Velocity Corridors

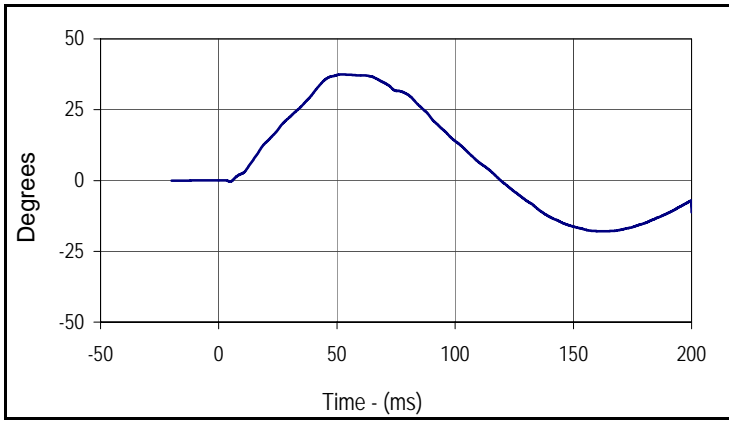
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.03	2.5	-0.375
14.0	-3.20	13.5	-3.70
		17.0	-3.70

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

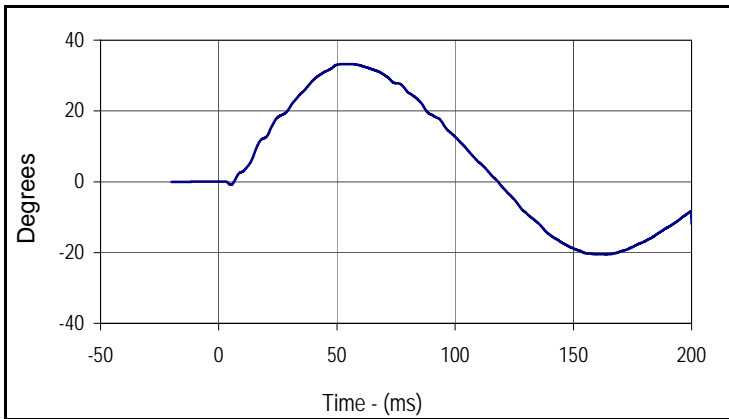
Test Date: 10/9/15  
 Test I.D.: F037NB077



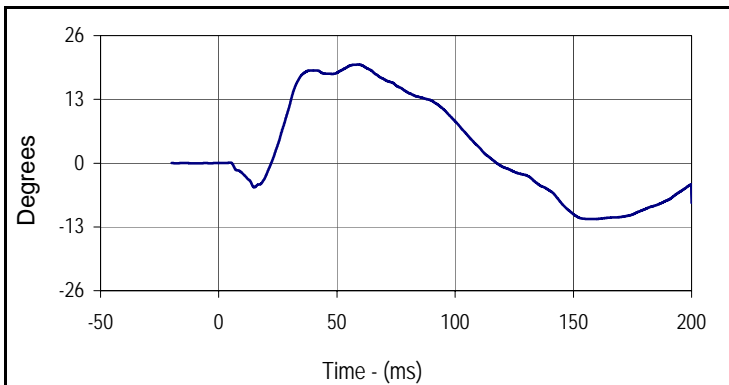
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
57.3	56.9	-29.3	160.4



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



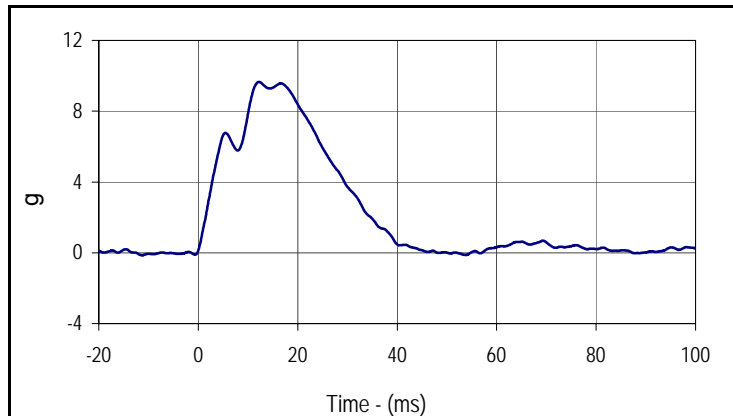
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
20.1	59.0	-11.4	158.5

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

Test Date: 10/9/15  
 Test I.D.: F037SH077



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	471	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	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.1	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.33	Pass
Peak Impactor Acceleration	g	7.5 to 10.5	9.7	Pass
Overall Test Results				Pass



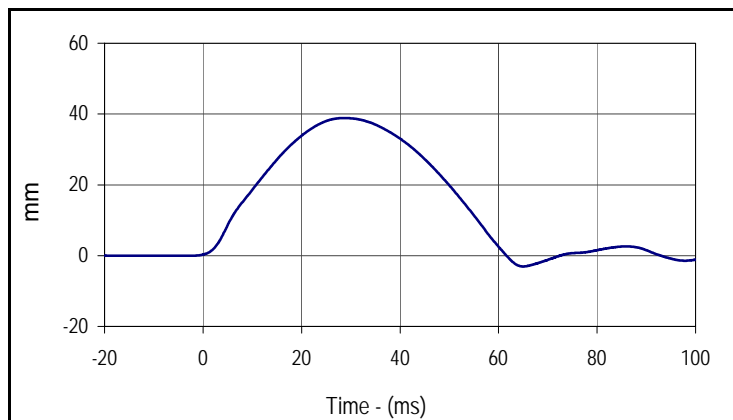
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	g
Max	Time	Min	Time
9.7	12.2	-0.1	-11.3

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

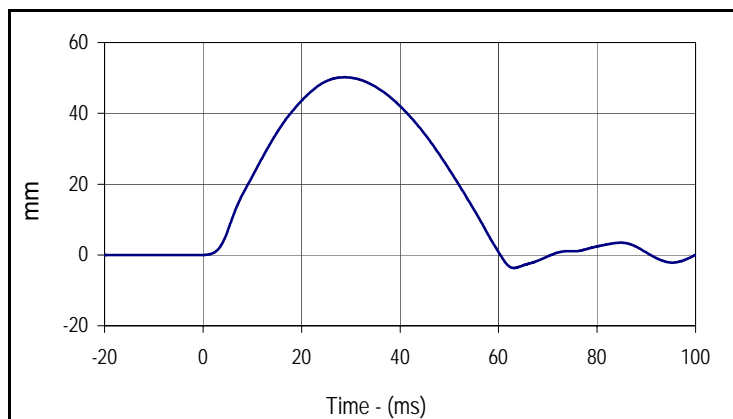
Test Date: 10/9/15  
 Test I.D.: F037RB1077



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	526	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	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.1	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	38.9	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	50.2	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
38.9	28.6	-3.1	65.0



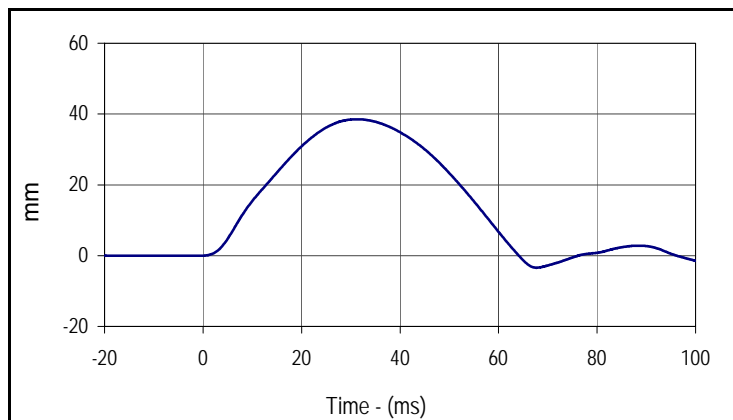
Curve Description			
Upper Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max	Time	Min	Time
50.2	28.8	-3.7	63.1

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

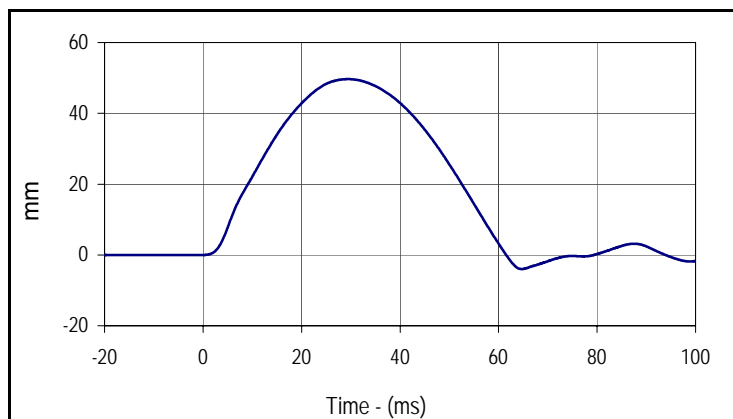
Test Date: 10/9/15  
 Test I.D.: F037RB2077



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	571	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	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.0	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	38.5	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	49.7	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
38.5	31.3	-3.4	67.7



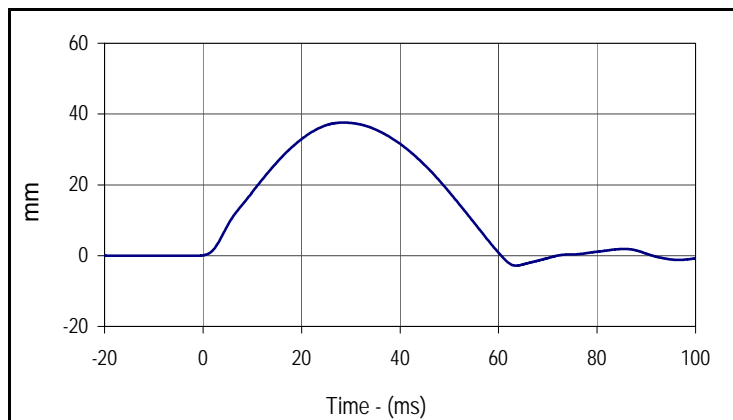
Curve Description			
Middle Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max	Time	Min	Time
49.7	29.4	-4.0	64.7

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

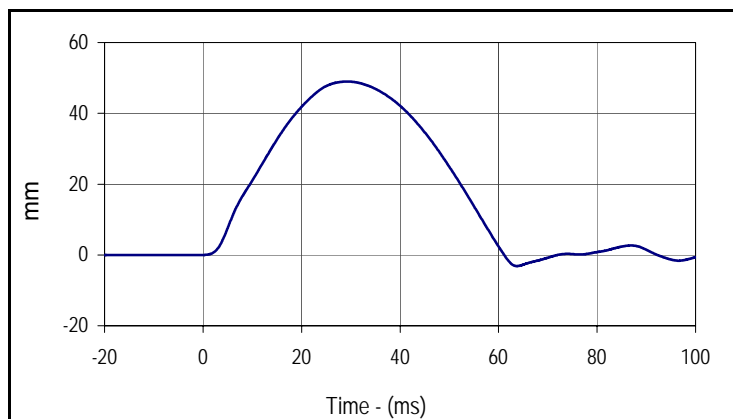
Test Date: 10/9/15  
 Test I.D.: F037RB3077



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	616	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	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.0	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	37.6	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
37.6	28.5	-2.8	63.6



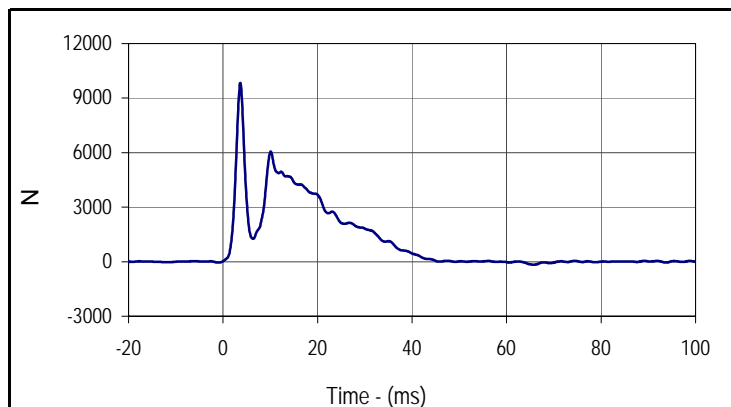
Curve Description			
Lower Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max	Time	Min	Time
49.0	29.2	-3.1	63.7

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

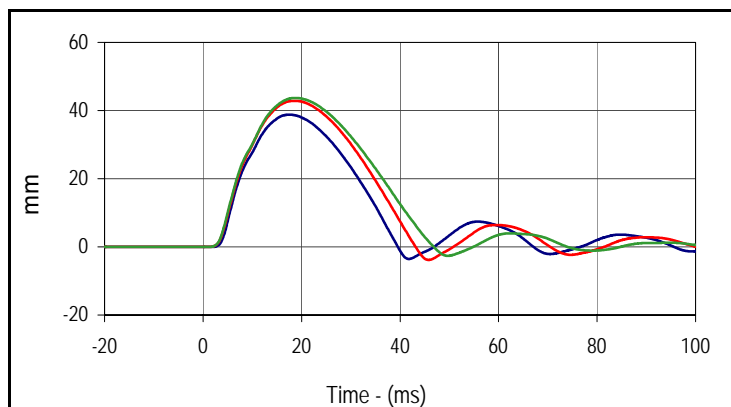
Test Date: 10/9/15  
 Test I.D.: F037TH077



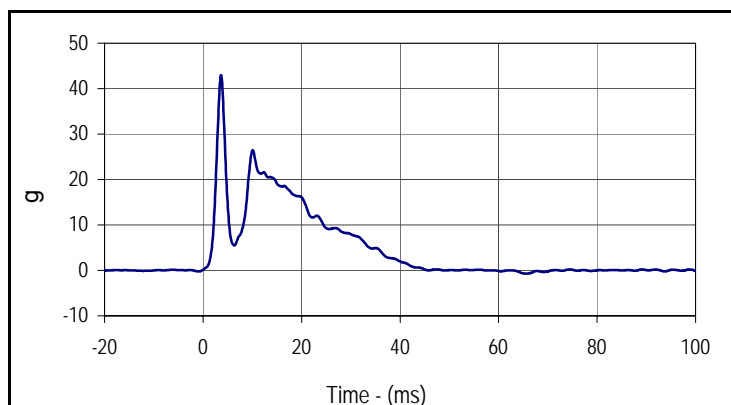
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	661	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.0	Pass
Peak Impactor Velocity	m/s	5.4 to 5.6	5.58	Pass
Peak Impactor Force	N	5100 to 6200	6064.0	Pass
	msec	> 6.0 msec	10.1	Pass
Peak Upper Rib Deflection	mm	34 to 41	38.8	Pass
Peak Middle Rib Deflection	mm	37 to 45	42.9	Pass
Peak Lower Rib Deflection	mm	37 to 44	43.7	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	N
Max	Time	Min	Time
9838.9	3.7	-168.4	65.7



Curve Description			
Upper, Middle, Lower Rib Deflections			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max (Upper)	Time	Min (Upper)	Time
38.8	17.6	-3.6	41.8
Max (Middle)	Time	Min (Middle)	Time
42.9	18.6	-3.9	45.8
Max (Lower)	Time	Min (Lower)	Time
43.7	18.7	-2.6	49.7



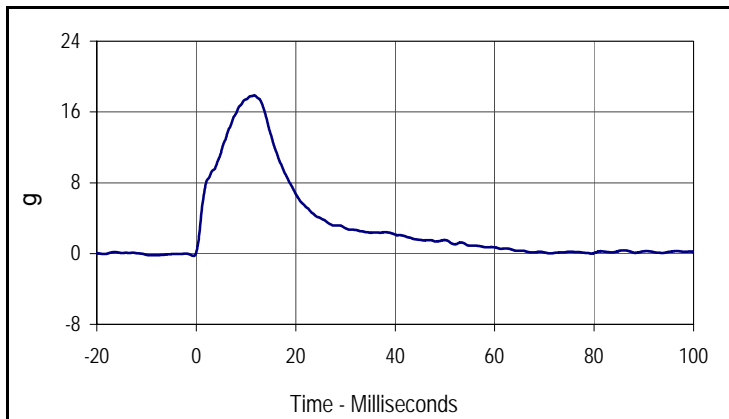
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
43.0	3.7	-0.7	65.7

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

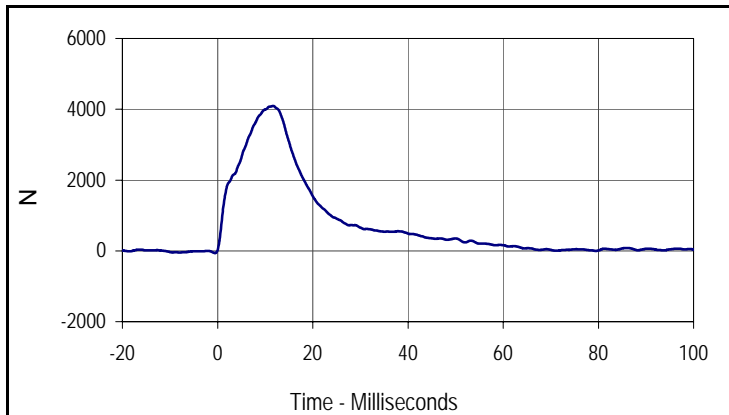
Test Date: 10/9/15  
 Test I.D.: F037ABD077



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	731	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	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.0	Pass
Probe Velocity	m/s	3.9 to 4.1	4.03	Pass
Peak Impactor Force	N	4000 to 4800	4095.0	Pass
	msec	10.6 to 13.0	11.7	Pass
Sum of Abdominal Forces	N	2200 to 2700	2483.6	Pass
	msec	10.0 to 12.3	11.0	Pass
Overall Test Results				Pass



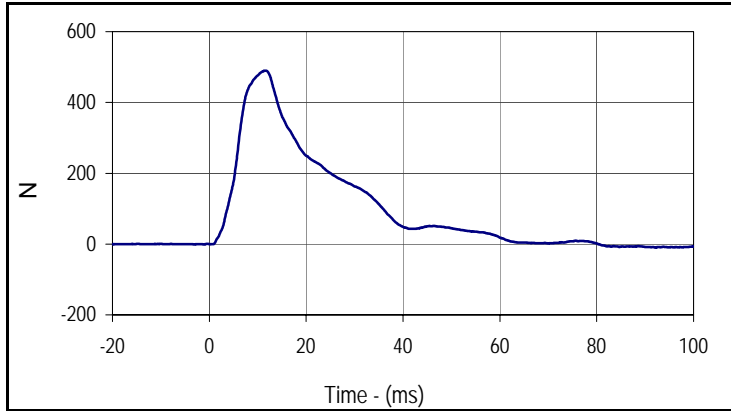
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	g
Max	Time	Min	Time
17.9	11.7	-0.3	-0.5



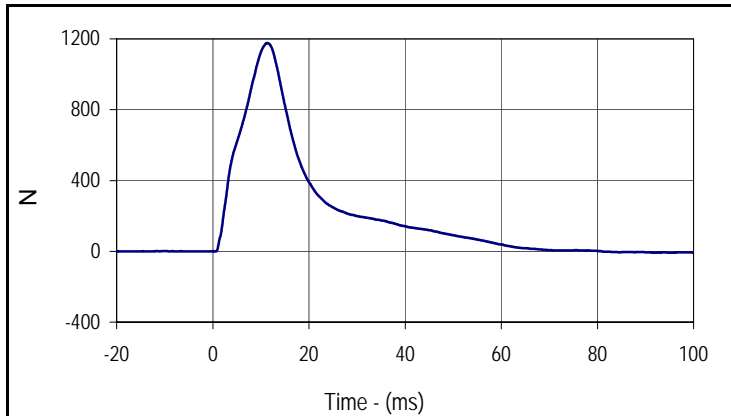
Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	N
Max	Time	Min	Time
4095.0	11.7	-62.8	-0.5

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

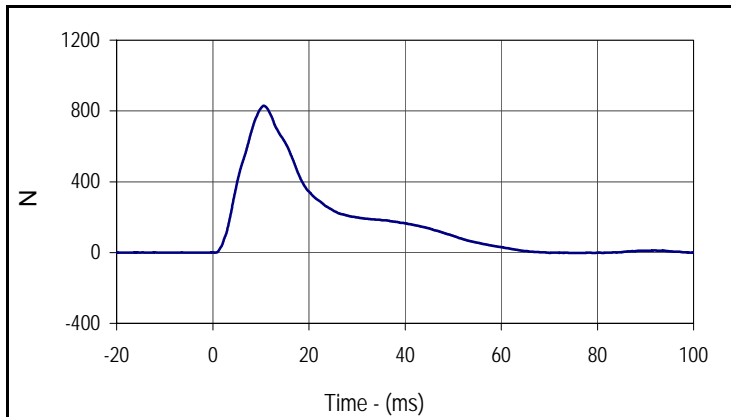
Test Date: 10/9/15  
 Test I.D.: F037ABD077



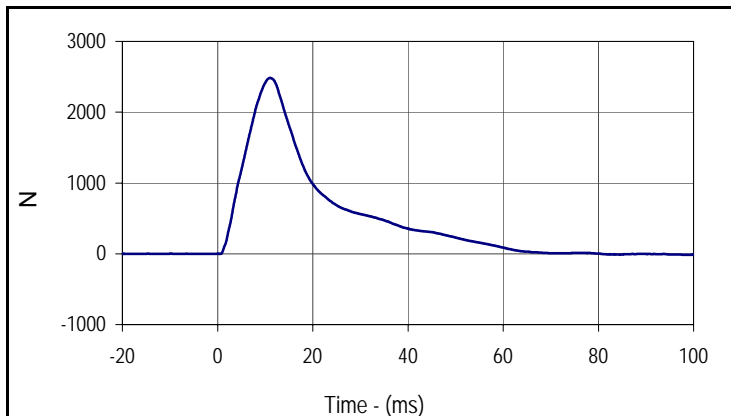
Curve Description			
Front Abdomen Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	N
Max	Time	Min	Time
490.0	11.7	-9.8	92.2



Curve Description			
Middle Abdomen Force			
Plot No.	Type	SAE Class	Units
004	FIL	600	N
Max	Time	Min	Time
1176.7	11.4	-7.8	94.8



Curve Description			
Rear Abdomen Force			
Plot No.	Type	SAE Class	Units
005	FIL	600	N
Max	Time	Min	Time
829.7	10.6	-2.4	74.3



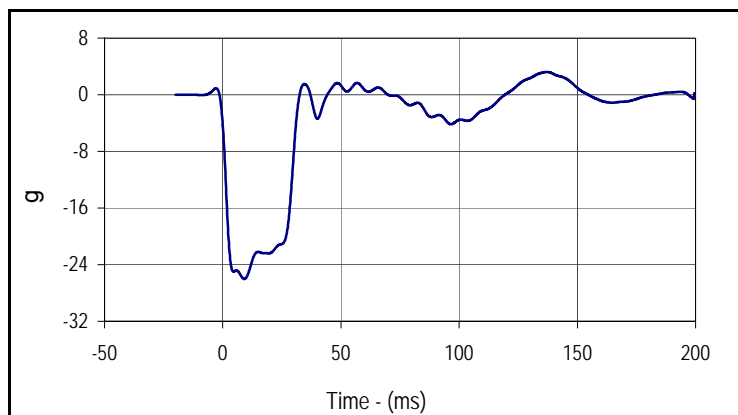
Curve Description			
Abdomen Sum Resultant			
Plot No.	Type	SAE Class	Units
006	RES	600	N
Max	Time	Min	Time
2483.6	11.0	-14.6	98.7

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

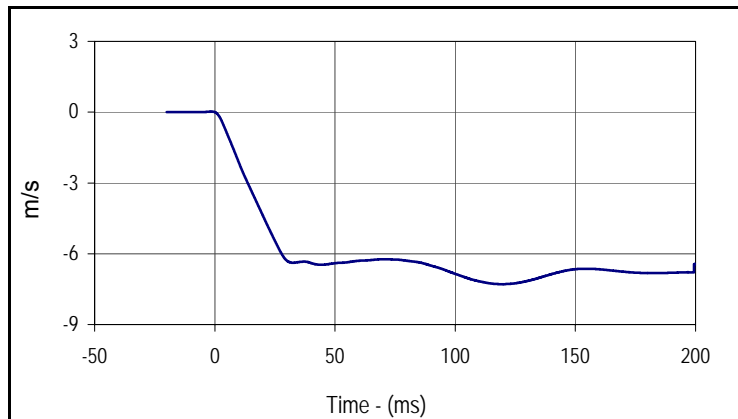
Test Date: 10/9/15  
 Test I.D.: F037LB077



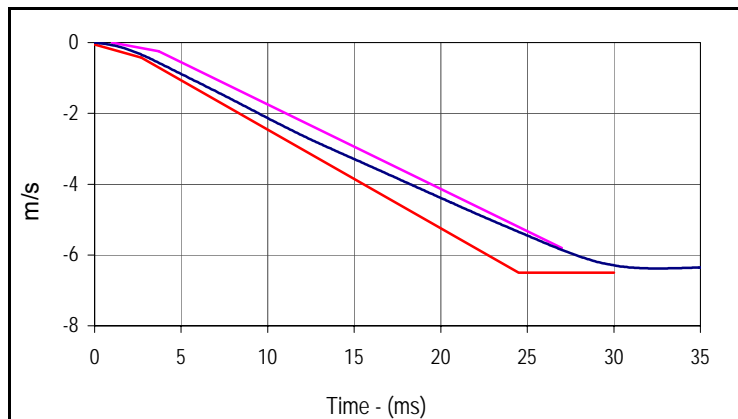
Tested Parameter	Units	Specification	Result	Pass/Fail	
Lumbar Spine Assembly Soak Time	Minutes	≥240	806	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass	
	Min		21.4	Pass	
Humidity During Soak	Max	10.0 to 70.0	34.2	Pass	
	Min		33.9	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	33.9	Pass	
Pendulum Velocity	m/s	5.95 to 6.15	5.99	Pass	
Headform Rotation	Max	Degrees	45 to 55	48.1	Pass
	Time	msec	39 to 53	40.4	Pass
Time of Decay to Zero Angle from Peak	msec	37 to 57	45.9	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
3.2	137.8	-26.0	9.7



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.8	-7.3	119.9



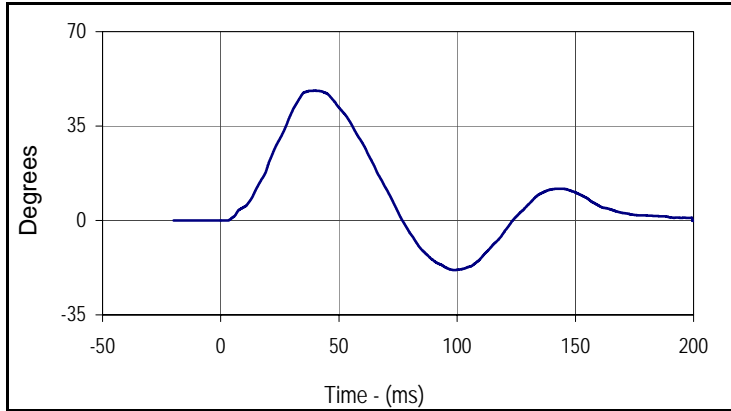
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.8	-7.3	119.9

Velocity Corridors

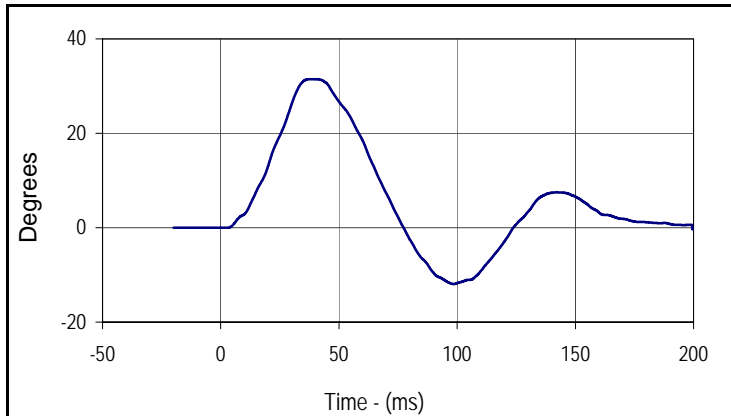
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.50
		30.0	-6.50

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

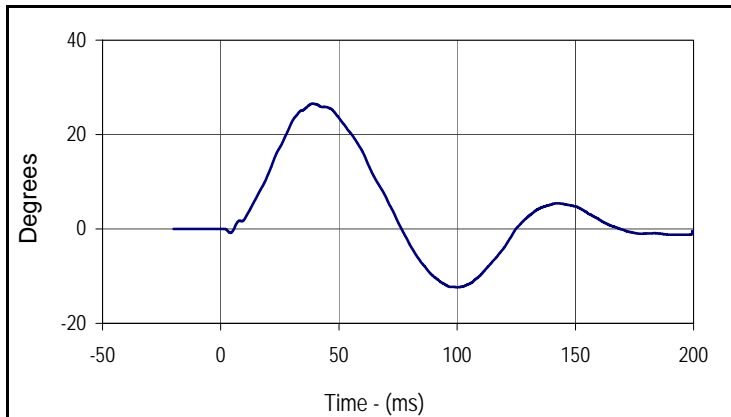
Test Date: 10/9/15  
 Test I.D.: F037LB077



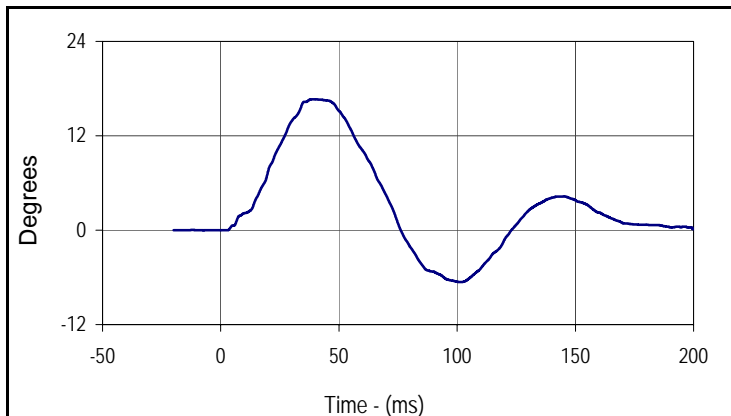
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
48.1	40.4	-18.4	99.5



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
31.5	40.5	-11.9	99.0



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
26.6	39.4	-12.4	100.8



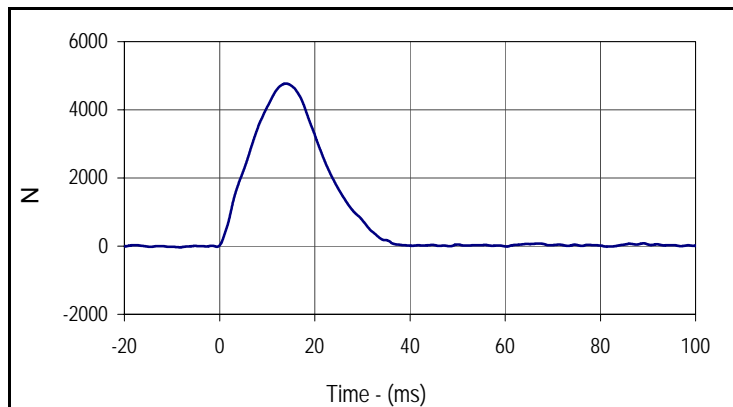
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
16.7	40.3	-6.6	102.3

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

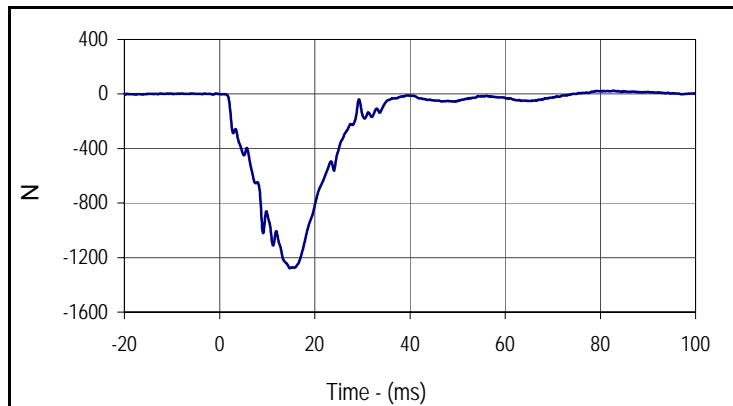
Test Date: 10/9/15  
 Test I.D.: F037PL077



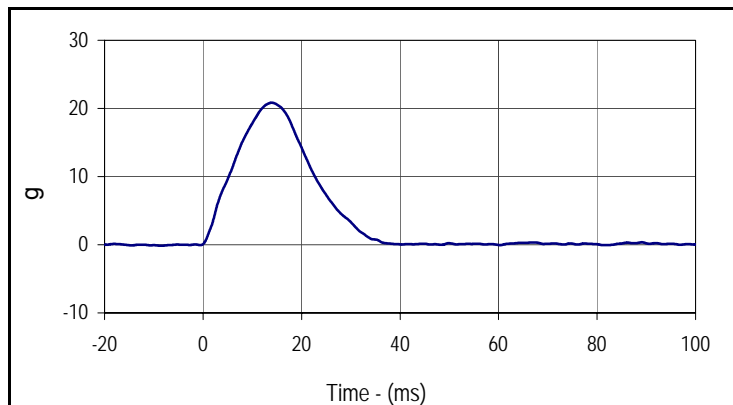
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	861	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.4	Pass
Humidity During Soak	Max	10.0 to 70.0	34.2	Pass
	Min		33.9	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.9	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.33	Pass
Peak Impactor Force	N	4700 to 5400	4772.8	Pass
	msec	11.8 to 16.1	13.9	Pass
Peak Pubic Symphysis Load	N	-1230 to -1590	-1278.2	Pass
	msec	12.2 to 17.0	14.8	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	N
Max	Time	Min	Time
4772.8	13.9	-33.8	-8.3



Curve Description			
Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
002	FIL	600	N
Max	Time	Min	Time
23.6	82.9	-1278.2	14.8



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
20.8	13.9	-0.1	-8.3

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

Test Date: 10/12/15  
 Test I.D.: N/A



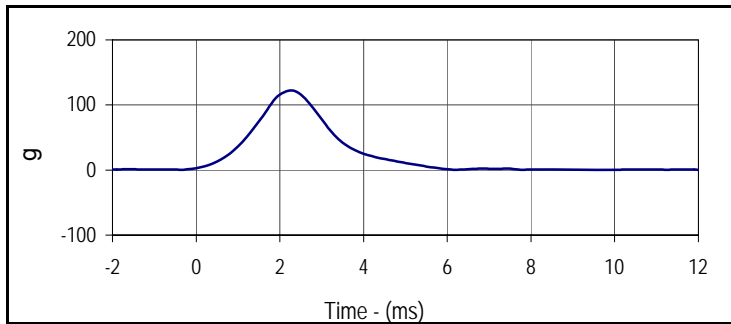
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.8	Pass
Laboratory Relative Humidity	%	10 to 70	35	Pass
A Sitting Height	mm	772 - 788	778	Pass
B Shoulder Pivot Height	mm	437 - 453	443	Pass
C H-Point Height	mm	79 - 89	85	Pass
D H-Point from Seatback	mm	141 - 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

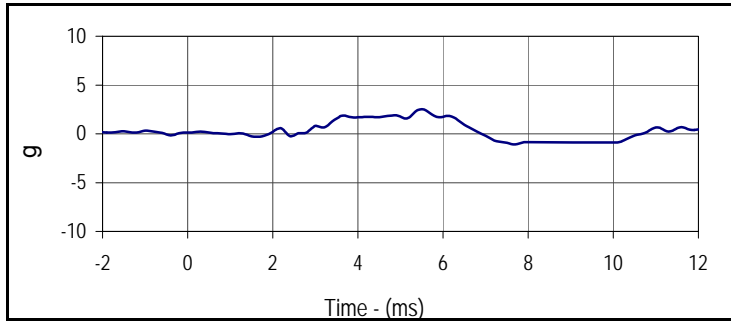
Test Date: 10/12/15  
 Test I.D.: 307HD086



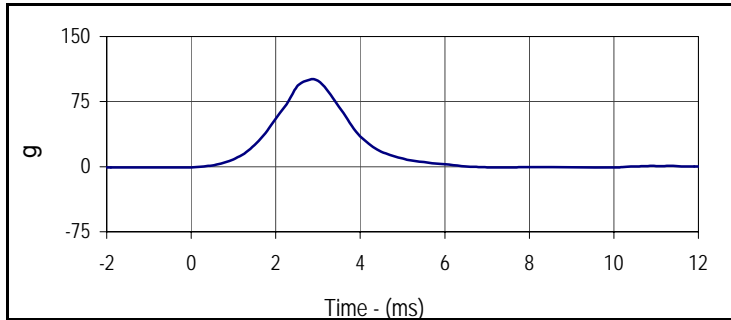
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	395	Pass
Temperature During Soak	Max	18.9 to 25.6	21.8	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass
	Min		34.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.9	Pass
Peak Head Resultant Acceleration	g	115 to 137	122.4	Pass
Peak Head X Acceleration	g	<15	2.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	1.0	Pass
Overall Test Results				Pass



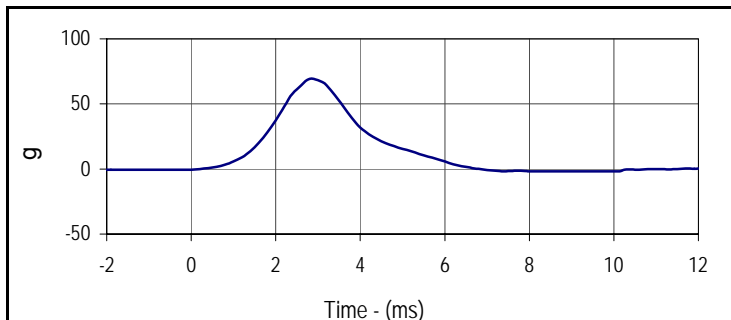
Curve Description			
200			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
122.4	2.3	0.2	-0.4



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
2.5	5.5	-1.1	7.7



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
100.9	2.9	-1.0	-3.1



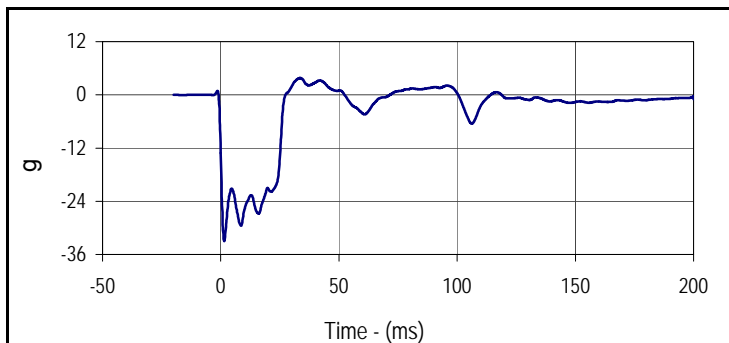
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
69.3	2.9	-1.9	8.0

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

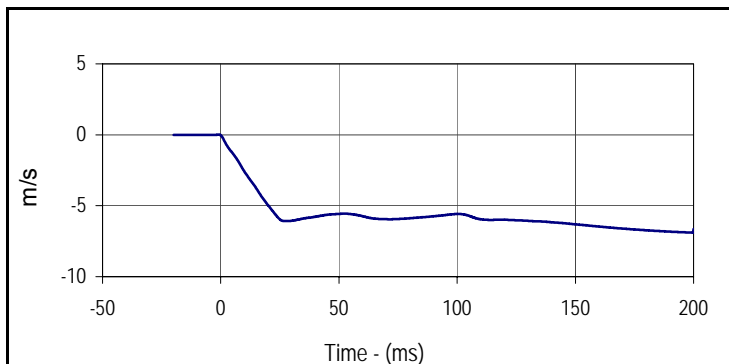
Test Date: 10/12/15  
 Test I.D.: 307NB086



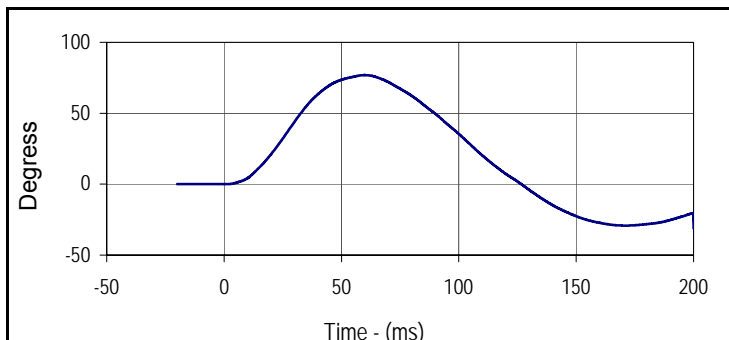
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	440	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.8	Pass	
	Min		21.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass	
	Min		34.4	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.8	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	34.8	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.54	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.59	Pass
	15 msec	m/s	-3.30 to -4.10	-3.77	Pass
	20 msec	m/s	-4.40 to -5.40	-4.96	Pass
	25 msec	m/s	-5.40 to -6.10	-5.96	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.08	Pass
D-Plane Rotation	Max	Degrees	71 to 81	76.9	Pass
	Time	msec	50 to 70	59.7	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-41.5	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	105.5	Pass	
Overall Test Results			Pass	Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	g
Max	Time	Min	Time
3.8	0.0	-32.9	0.0



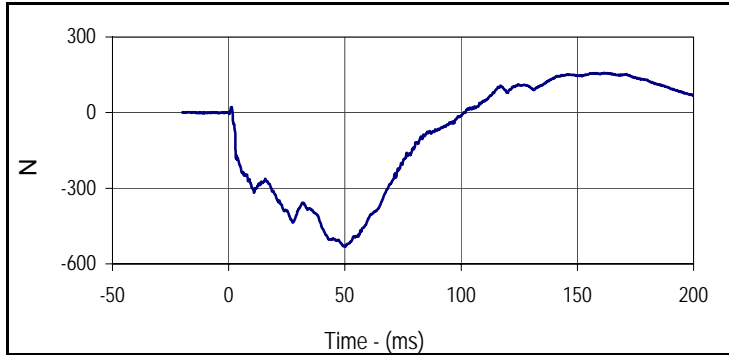
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.9	-6.9	199.9



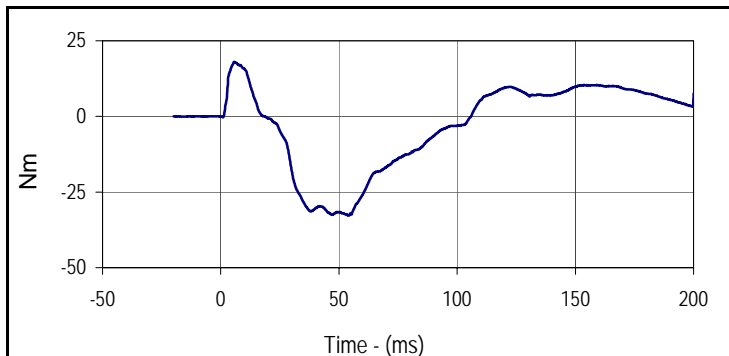
Curve Description			
D-Plane Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degree
Max	Time	Min	Time
76.9	59.7	-31.2	200.0

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

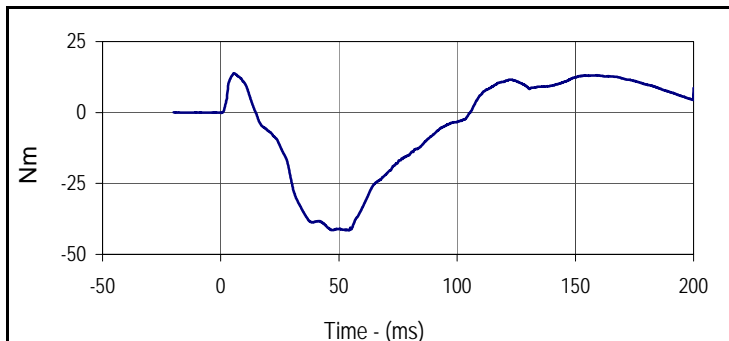
Test Date: 10/12/15  
 Test I.D.: 307NB086



Curve Description			
Neck Force Y			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
157.3	161.4	-531.1	49.9



Curve Description			
Neck Moment X			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
18.0	5.8	-32.8	54.2



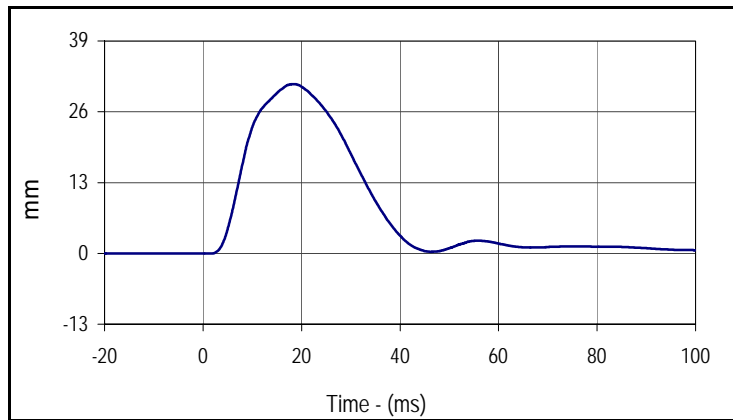
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
006	FIL	600	Nm
Max	Time	Min	Time
13.8	5.7	-41.5	54.3

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

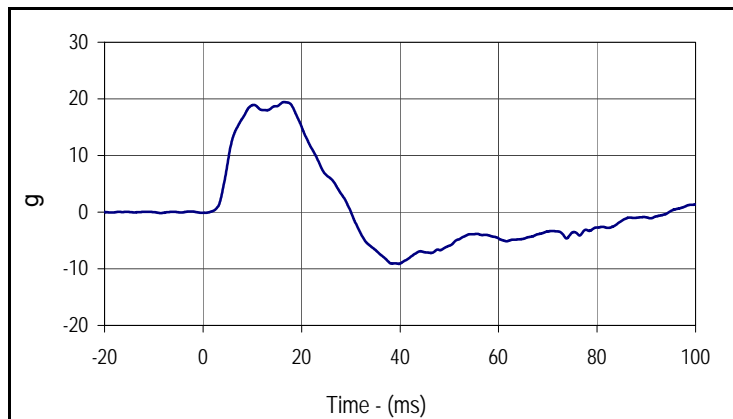
Test Date: 10/12/15  
 Test I.D.: 307SH086



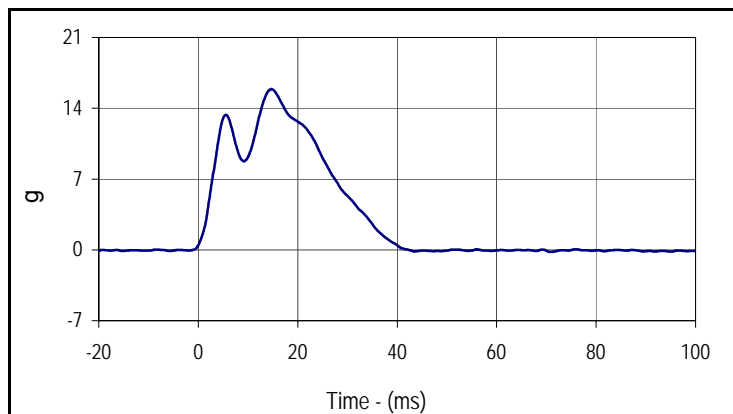
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	495	Pass
Temperature During Soak	Max	20.6 to 22.2	21.8	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass
	Min		34.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.8	Pass
Impactor Velocity	m/s	4.20 to 4.40	4.32	Pass
Peak Shoulder Deflection	mm	28 to 37	31.1	Pass
Peak Lateral Spine Acceleration Y	g	17 to 22	19.4	Pass
Peak Impactor Acceleration	g	13 to 18	15.9	Pass
Overall Test Results			Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	mm
Max	Time	Min	Time
31.1	18.4	0.0	-8.0



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	g
Max	Time	Min	Time
19.4	16.5	-9.1	39.8



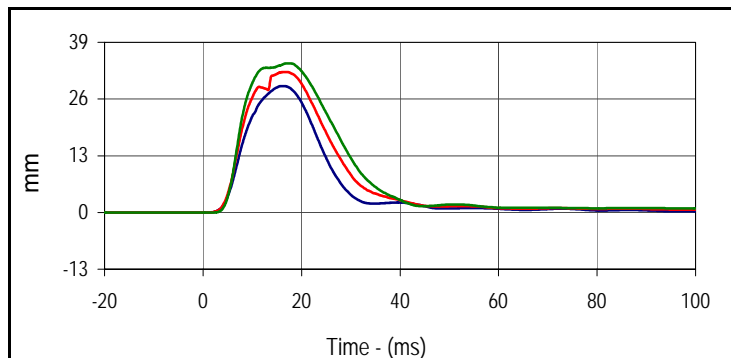
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
15.9	14.7	-0.2	70.8

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

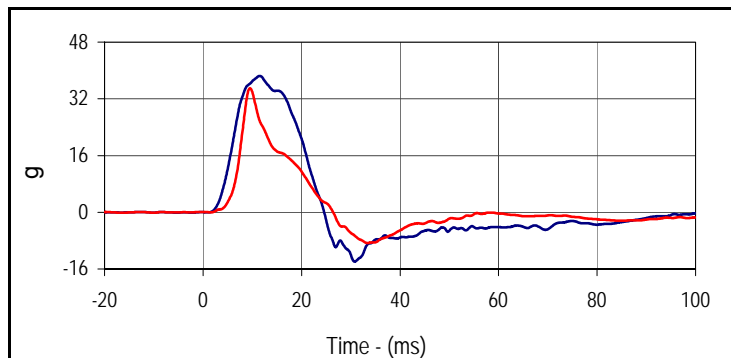
Test Date: 10/12/15  
 Test I.D.: 307TWA086



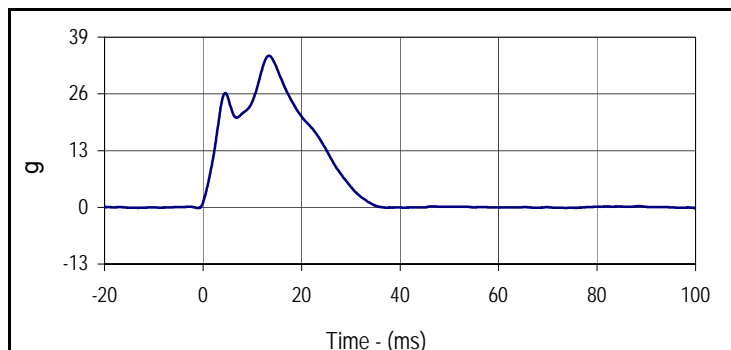
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	540	Pass
Temperature During Soak	Max	20.6 to 22.2	21.8	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass
	Min		34.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.7	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.7	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.69	Pass
Peak Shoulder Deflection	mm	31 to 40	36.8	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	29.0	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	32.2	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	34.2	Pass
Peak Upper Spine Y Acceleration	g	34 to 43	38.5	Pass
Peak Lower Spine Y Acceleration	g	29 to 37	35.0	Pass
Peak Impactor Acceleration	g	30 to 36	34.7	Pass
<b>Overall Test Results</b>				<b>Pass</b>



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	mm
Max	Time	Min	Time
29.0	16.2	0.0	-4.6
Middle Thorax Deflection			
Max	Time	Min	Time
32.2	16.4	0.0	-12.6
Lower Thorax Deflection			
Max	Time	Min	Time
34.2	17.2	0.0	-15.0



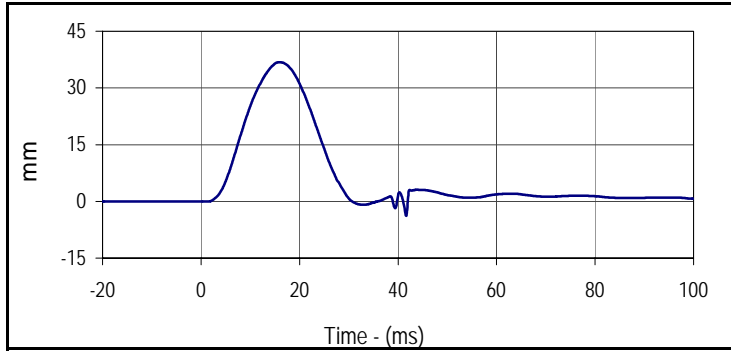
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
38.5	11.5	-13.9	30.8
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	g
Max	Time	Min	Time
35.0	9.5	-8.7	33.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	g
Max	Time	Min	Time
34.7	13.4	-0.2	-1.0

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

Test Date: 10/12/15  
 Test I.D.: 307TWA086



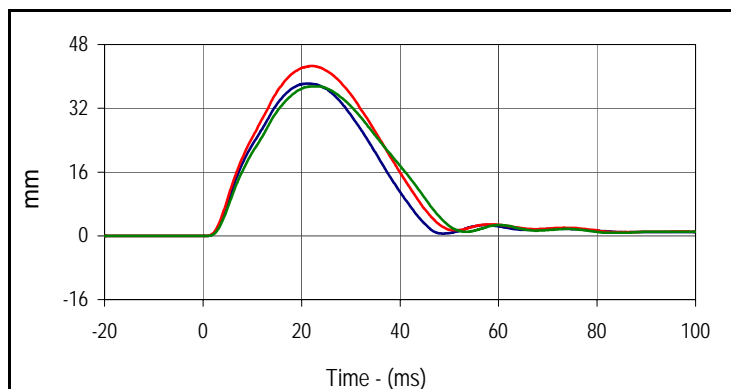
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	mm
Max	Time	Min	Time
36.8	16.0	-3.8	41.6

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

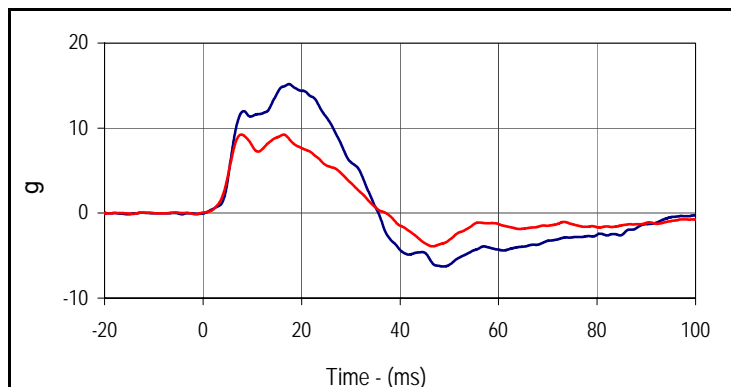
Test Date: 10/12/15  
 Test I.D.: 307TWOA086



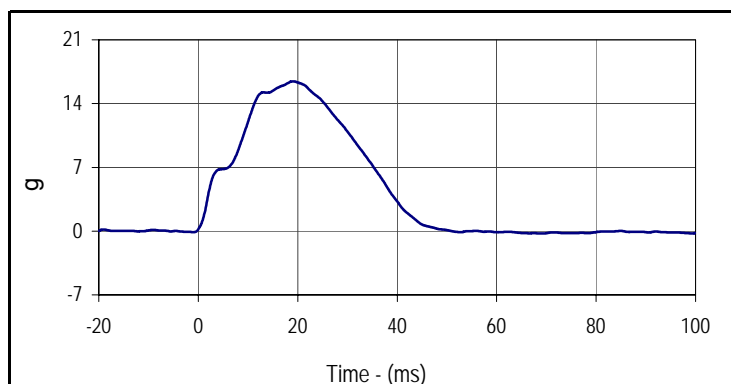
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	595	Pass
Temperature During Soak	Max	18.9 to 25.6	21.8	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass
	Min		34.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.7	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.6	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.32	Pass
Peak Upper Thorax Rib Deflection	mm	32 to 40	38.2	Pass
Peak Middle Thorax Rib Deflection	mm	39 to 45	42.6	Pass
Peak Lower Thorax Rib Deflection	mm	35 to 43	37.5	Pass
Peak Upper Spine Y Acceleration	g	13 to 17	15.2	Pass
Peak Lower Spine Y Acceleration	g	7 to 11	9.2	Pass
Peak Impactor Acceleration	g	14 to 18	16.4	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	mm
Max	Time	Min	Time
38.2	21.5	0.0	-0.4
Middle Thorax Deflection			
Max	Time	Min	Time
42.6	22.2	0.0	-2.3
Lower Thorax Deflection			
Max	Time	Min	Time
37.5	22.8	0.0	-0.4



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
15.2	17.4	-6.3	48.9
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	g
Max	Time	Min	Time
9.2	7.7	-3.9	46.6



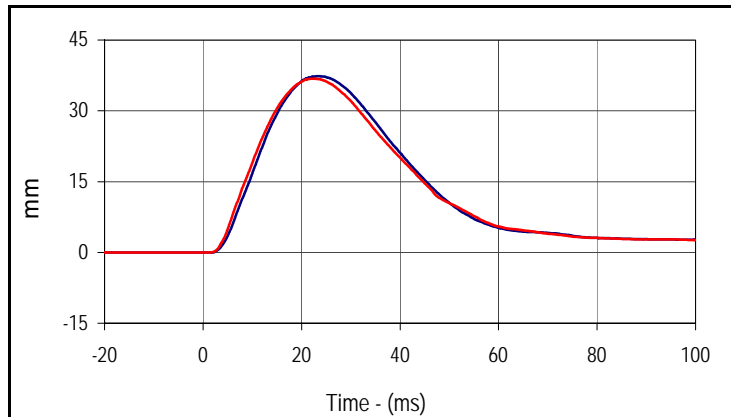
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	g
Max	Time	Min	Time
16.4	19.1	-0.3	68.6

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

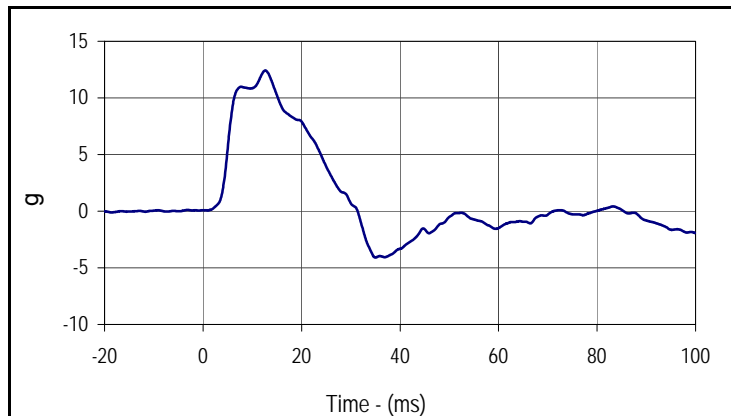
Test Date: 10/12/15  
 Test I.D.: 307ABD086



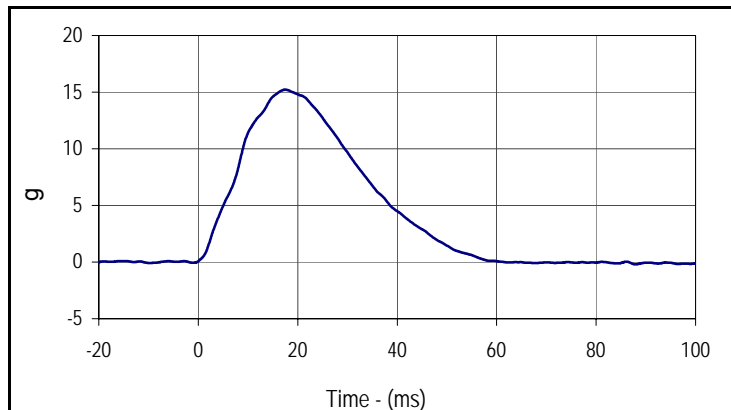
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	650	Pass
Temperature During Soak	Max	20.6 to 22.2	21.8	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass
	Min		34.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.7	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.6	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.33	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	37.3	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	36.8	Pass
Peak Lower Spine Y Acceleration	g	9 to 14	12.4	Pass
Peak Impactor Acceleration	g	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	23.4	0.0	-2.5
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	mm
Max	Time	Min	Time
36.8	22.3	0.0	-7.9

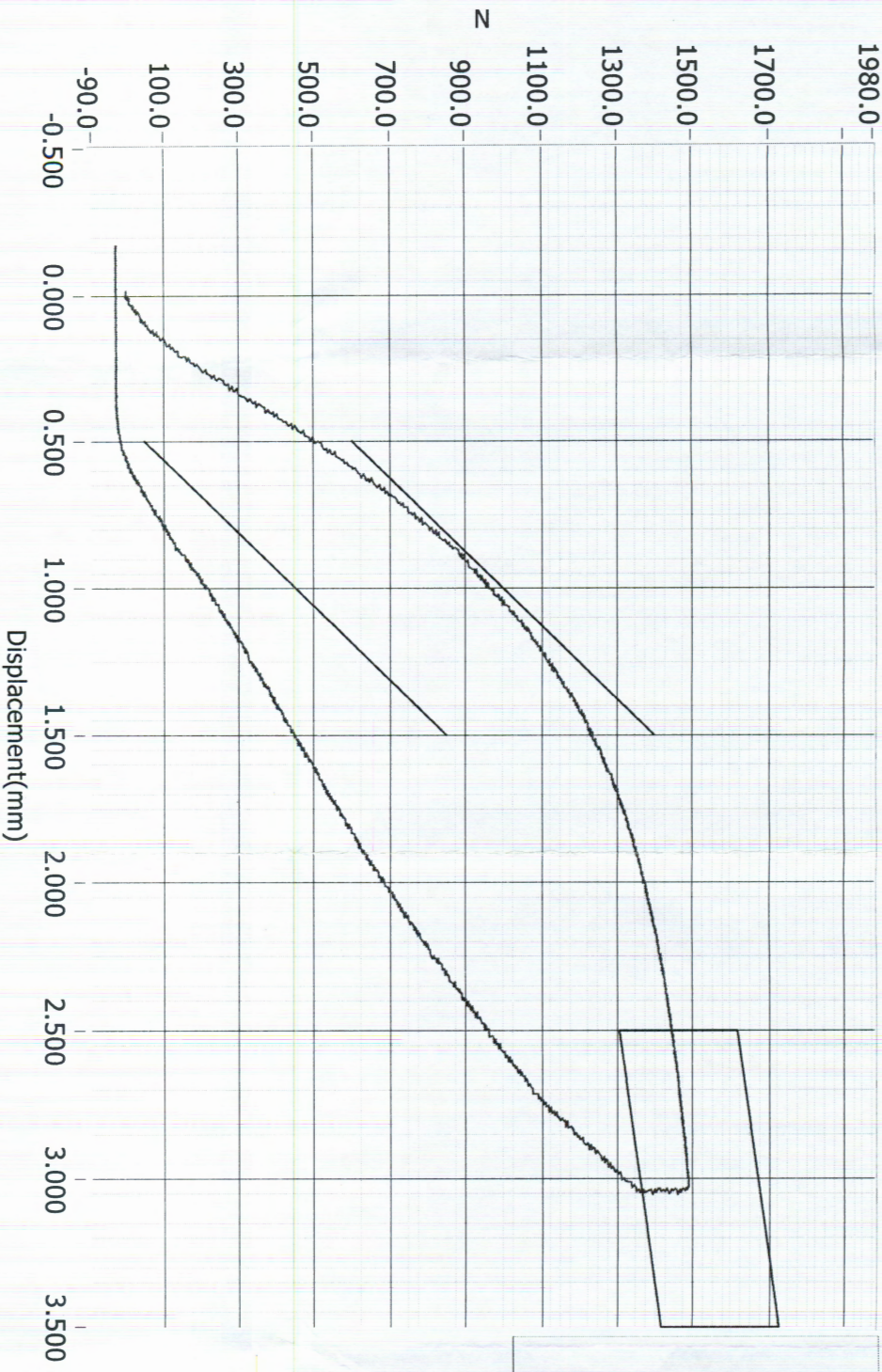


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
12.4	12.6	-4.1	35.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
15.2	17.5	-0.2	87.9

# Resultant Data - SIDIIS Plug Compression



1489N

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

## ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
<u>Cert ID</u>	70793	12/13/2013	4:18 PM
	ATD Serial Number	ATD Type	
	N/A	SIDIIS	

Current Date : 12/13/2013

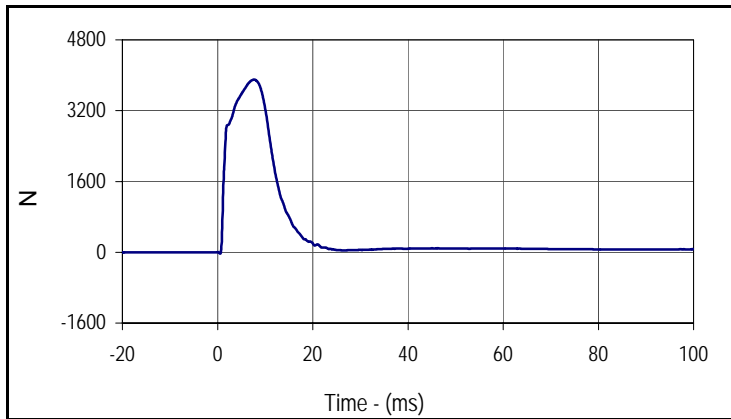
Current Time : 16:18:44

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

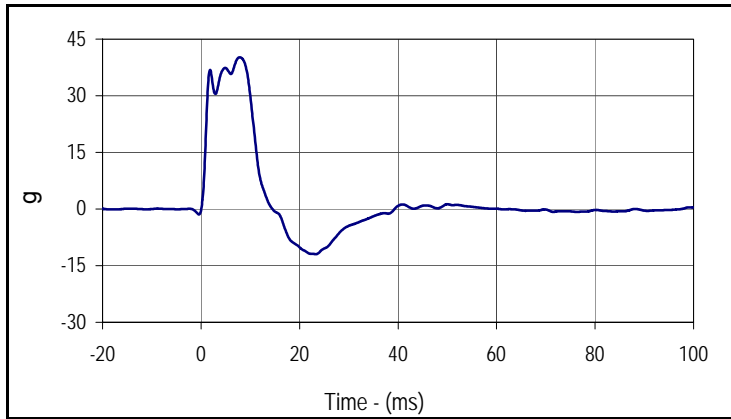
Test Date: 10/12/15  
 Test I.D.: 307ACET086



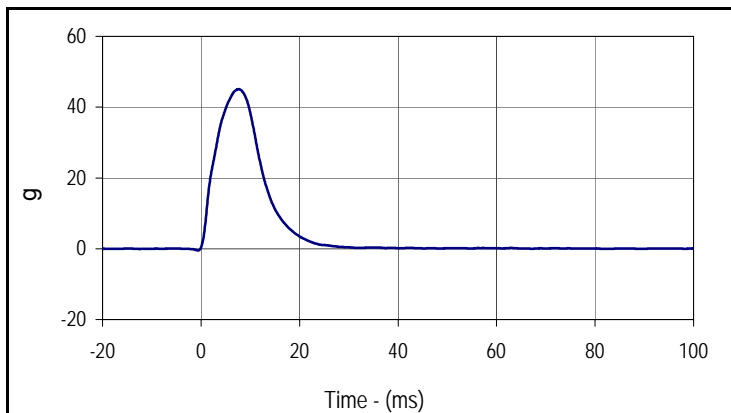
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	700	Pass
Temperature During Soak	Max	20.6 to 22.2	21.8	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass
	Min		34.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.7	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.67	Pass
Peak Acetabulum Force Y	N	3600 to 4300	3900.9	Pass
Peak Pelvis Y Acceleration After 6 msec.	g	34 to 42	40.2	Pass
Peak Impactor Acceleration	g	38 to 47	45.1	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
3900.9	7.6	-33.0	0.6



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	g
Max	Time	Min	Time
40.2	7.8	-11.9	23.3



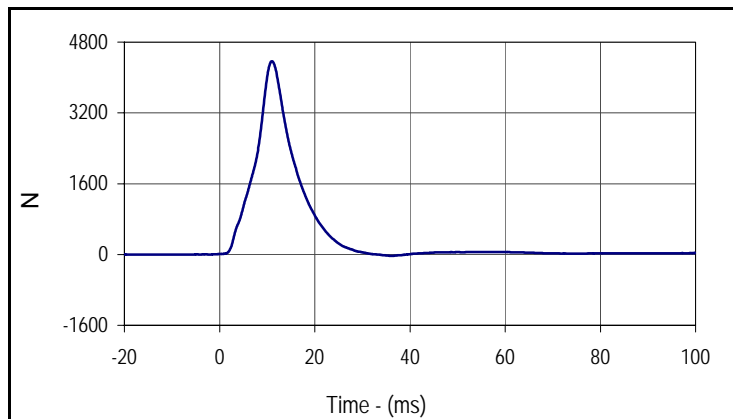
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
45.1	7.6	-0.5	-0.6

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

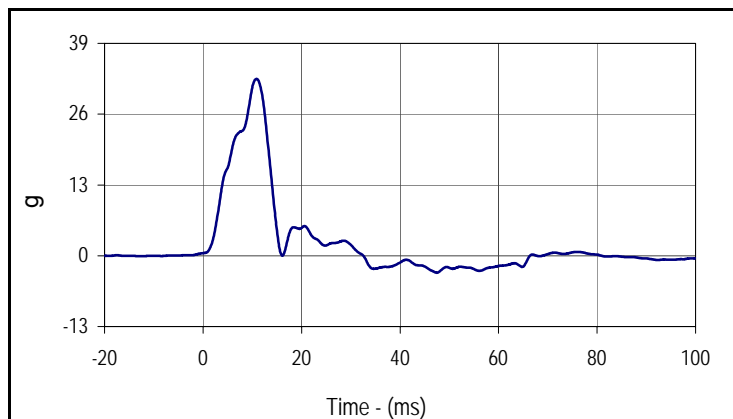
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 Test I.D.: 307PL086



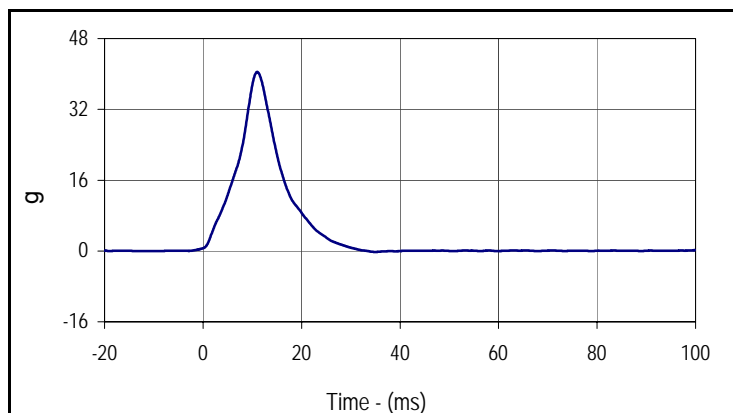
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	755	Pass
Temperature During Soak	Max	20.6 to 22.2	21.8	Pass
	Min		21.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.0	Pass
	Min		34.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.7	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.4	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.32	Pass
Peak Iliac Force	N	4100 to 5100	4367.3	Pass
Peak Pelvis Y Acceleration	g	28 to 39	32.5	Pass
Peak Impactor Acceleration	g	36 to 45	40.5	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
4367.3	11.0	-31.1	36.4



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	g
Max	Time	Min	Time
32.5	10.8	-3.1	47.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
40.5	11.0	-0.2	35.1

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

Test Program: ES2re External Measurements

Test Date: 11/12/15

ATD Serial No.: F037

Test I.D.: N/A



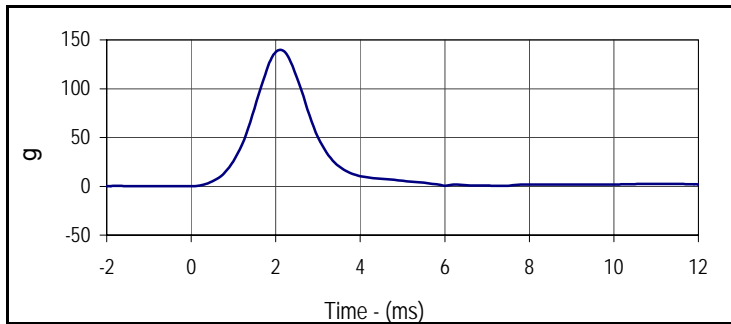
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	30.0	Pass
1 Sitting Height	mm	900 - 918	909	Pass
2 Seat to Shoulder Joint	mm	558 - 572	564	Pass
3 Seat to Lower Face of Thoracic Spine Box	mm	346 - 356	350	Pass
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

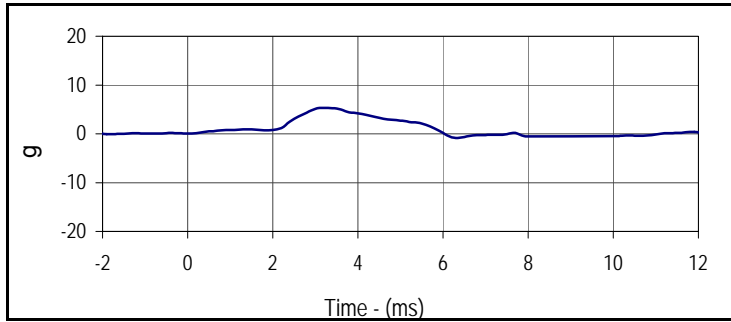
Test Date: 11/12/15  
 Test I.D.: F037HD078



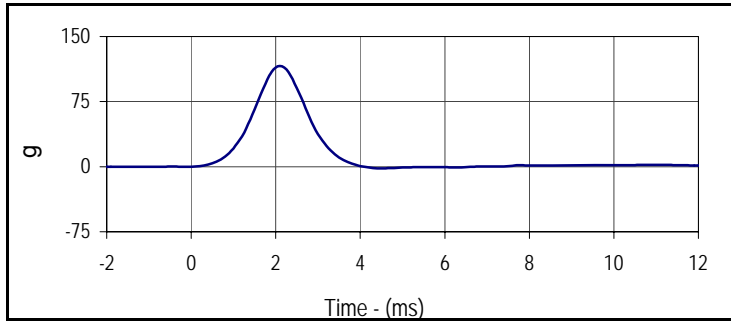
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	385	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.8	Pass
Peak Head Resultant Acceleration	g	125 to 155	140.0	Pass
Peak Head X Acceleration	g	≤15	5.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	0.3	Pass
Overall Test Results				Pass



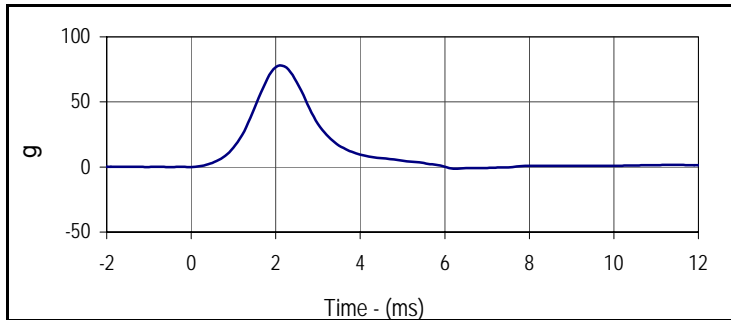
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
140.0	2.1	0.1	0.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
5.3	3.2	-0.8	6.3



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
116.1	2.1	-1.9	4.5



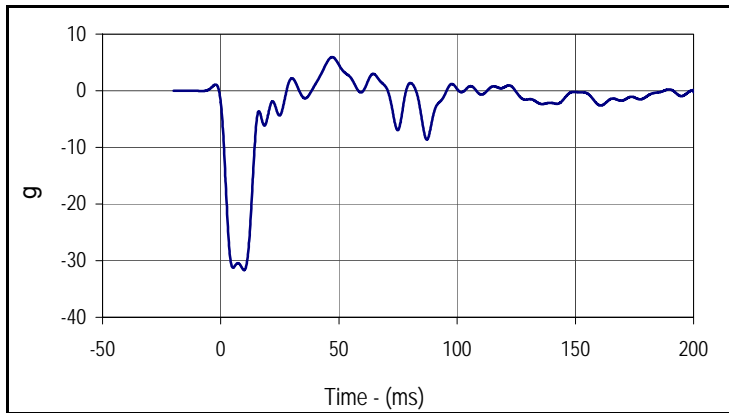
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
78.2	2.1	-1.3	6.2

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

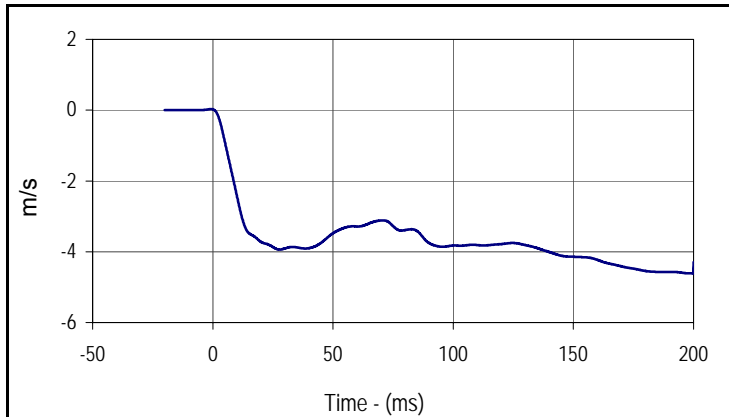
Test Date: 11/12/15  
 Test I.D.: F037NB078



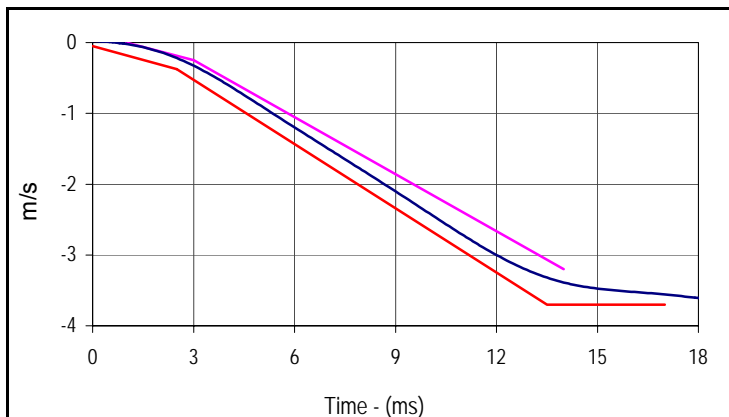
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	420	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass	
	Min		23.7	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	23.8	Pass	
Pendulum Velocity	m/s	3.3 to 3.5	3.35	Pass	
Headform Flexion	Max	Degrees	49 to 59	54.3	Pass
	Time	msec	54 to 66	54.6	Pass
Headform Flexion Decay (Peak to Zero)	msec	53 to 88	62.6	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
5.9	47.1	-31.7	9.9



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.7	-4.6	198.9



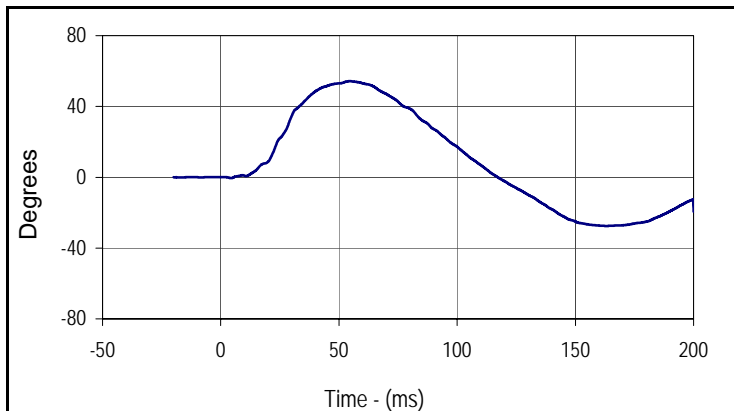
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.7	-4.6	198.9

Velocity Corridors

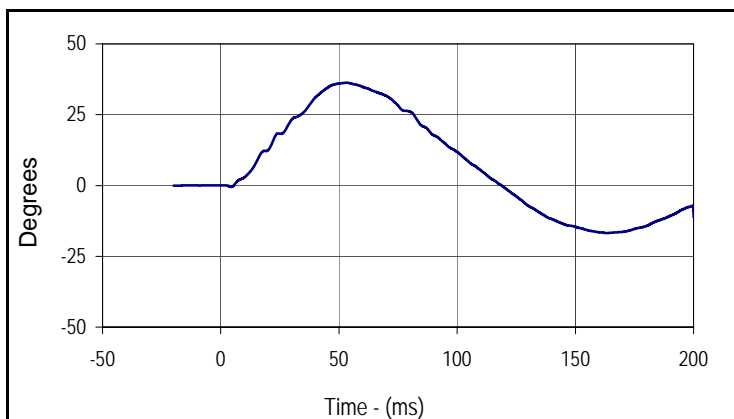
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.03	2.5	-0.375
14.0	-3.20	13.5	-3.70
		17.0	-3.70

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

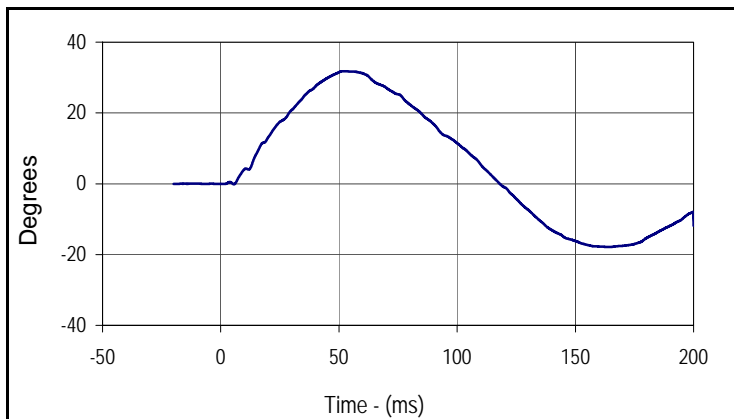
Test Date: 11/12/15  
 Test I.D.: F037NB078



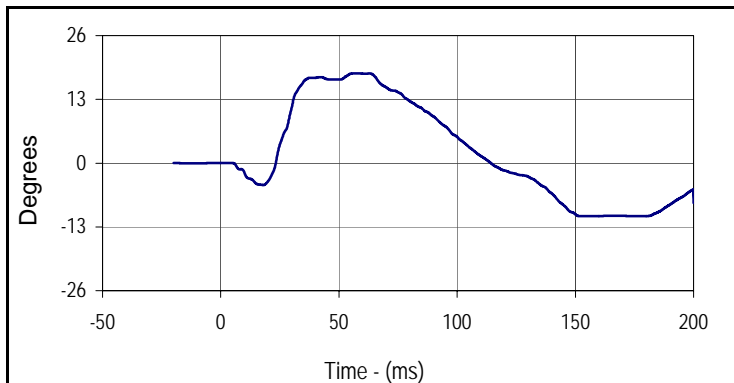
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
54.3	54.6	-27.5	163.1



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
36.3	53.2	-16.8	163.2



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
31.8	52.3	-17.9	164.8



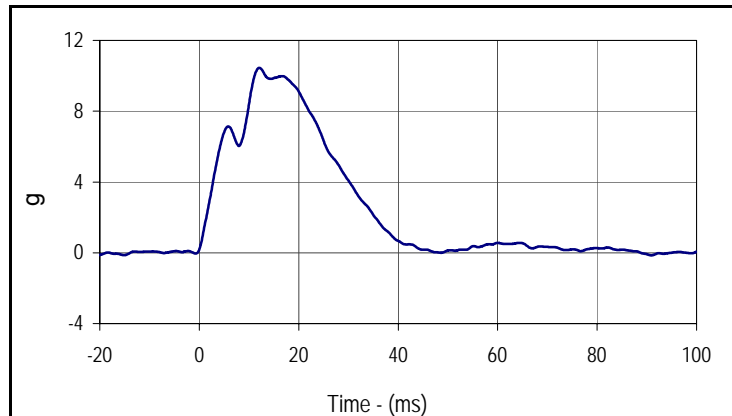
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
18.3	63.0	-10.8	152.3

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

Test Date: 11/12/15  
 Test I.D.: F037SH078



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	485	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.8	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.32	Pass
Peak Impactor Acceleration	g	7.5 to 10.5	10.4	Pass
Overall Test Results				Pass



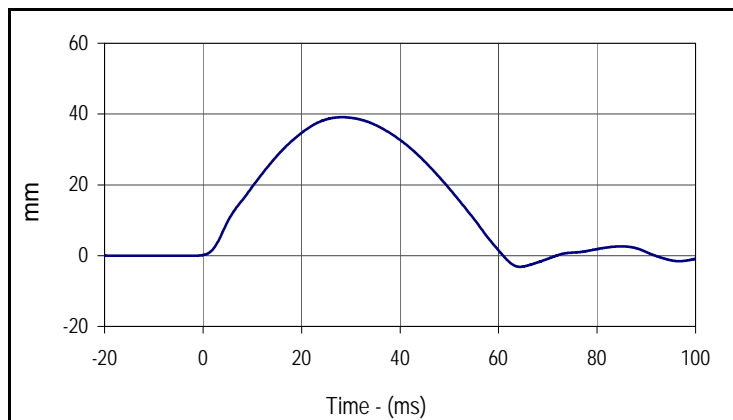
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	g
Max	Time	Min	Time
10.4	12.1	-0.1	90.9

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

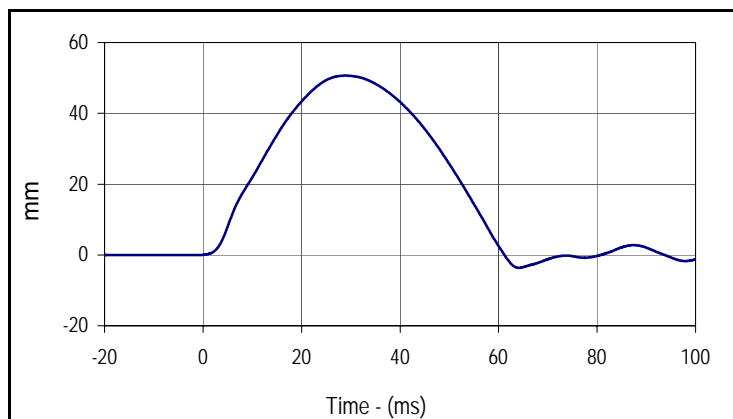
Test Date: 11/12/15  
 Test I.D.: F037RB1078



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	540	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.7	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	39.1	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	50.7	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
39.1	28.2	-3.2	64.3



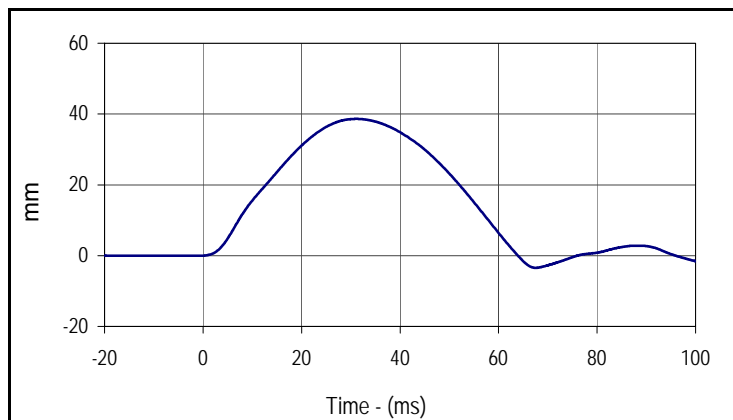
Curve Description			
Upper Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max	Time	Min	Time
50.7	29.0	-3.6	64.1

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

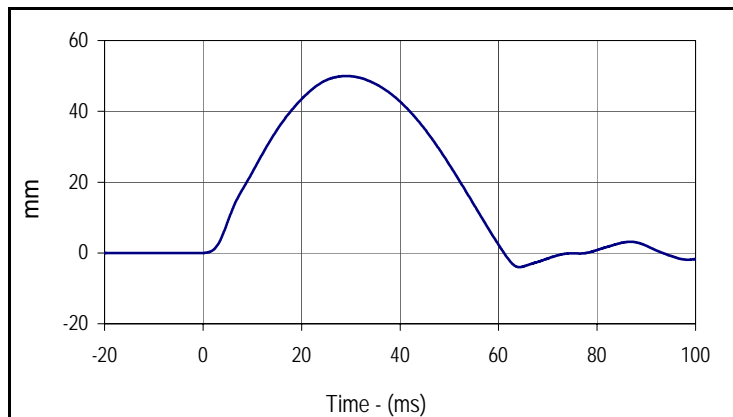
Test Date: 11/12/15  
 Test I.D.: F037RB2078



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	585	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.7	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	50.0	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
38.6	31.2	-3.5	67.5



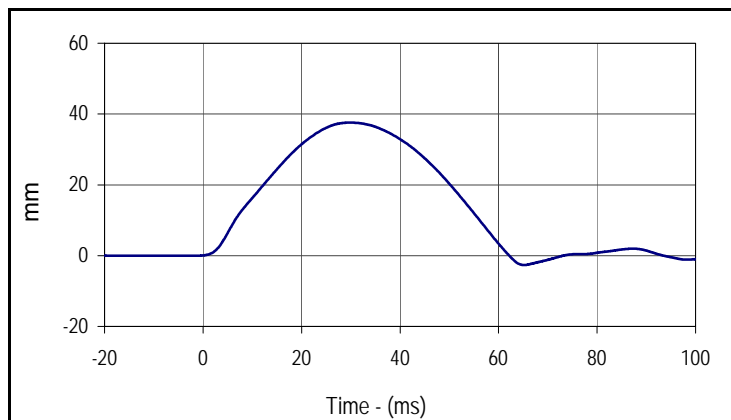
Curve Description			
Middle Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max	Time	Min	Time
50.0	29.1	-4.0	64.2

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

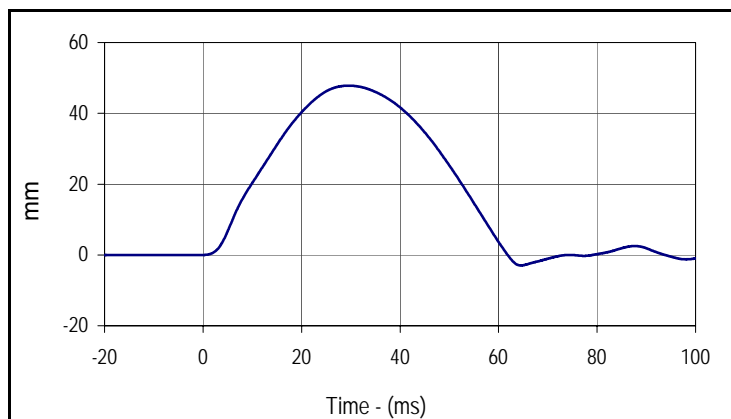
Test Date: 11/12/15  
 Test I.D.: F037RB3078



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	630	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.7	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	37.6	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	47.8	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
37.6	29.8	-2.7	65.2



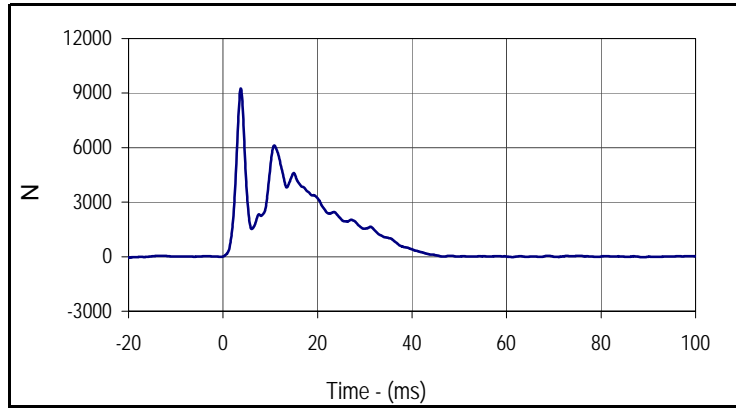
Curve Description			
Lower Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max	Time	Min	Time
47.8	29.6	-3.0	64.5

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

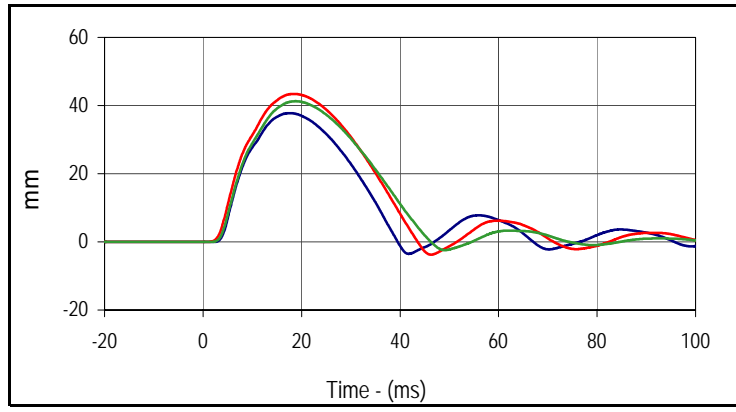
Test Date: 11/12/15  
 Test I.D.: F037TH078



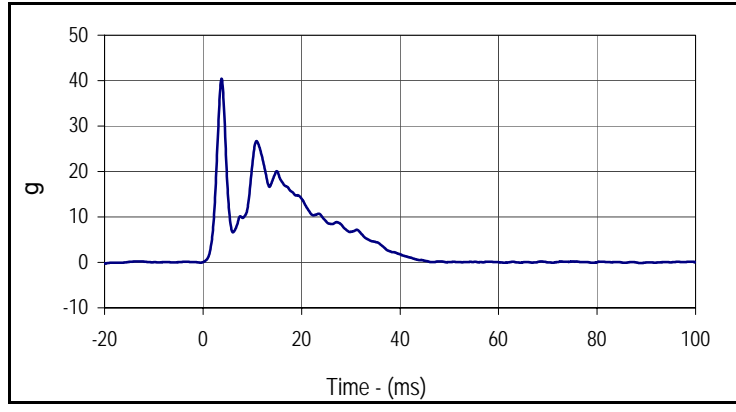
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	675	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.7	Pass
Peak Impactor Velocity	m/s	5.4 to 5.6	5.56	Pass
Peak Impactor Force	N	5100 to 6200	6113.4	Pass
	msec	> 6.0 msec	10.9	Pass
Peak Upper Rib Deflection	mm	34 to 41	37.8	Pass
Peak Middle Rib Deflection	mm	37 to 45	43.4	Pass
Peak Lower Rib Deflection	mm	37 to 44	41.3	Pass
<b>Overall Test Results</b>				<b>Pass</b>



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	N
Max	Time	Min	Time
9253.2	3.8	-52.2	-20.0



Curve Description			
Upper, Middle, Lower Rib Deflections			
Plot No.	Type	SAE Class	Units
002	FIL	180	mm
Max (Upper)	Time	Min (Upper)	Time
37.8	17.7	-3.5	41.8
Max (Middle)	Time	Min (Middle)	Time
43.4	18.4	-3.8	46.3
Max (Lower)	Time	Min (Lower)	Time
41.3	18.8	-2.4	49.1



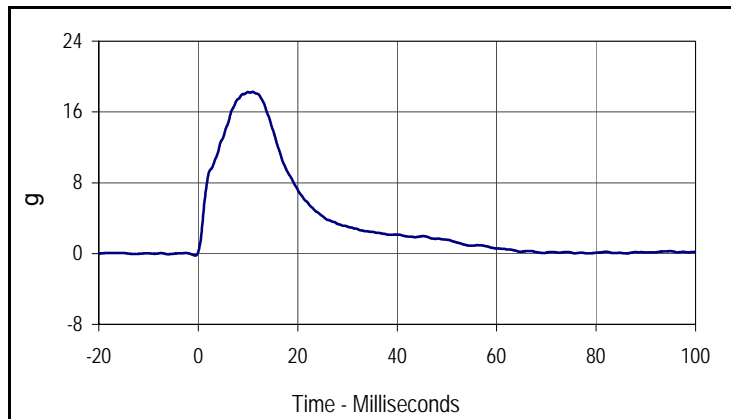
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
40.4	3.8	-0.2	-20.0

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

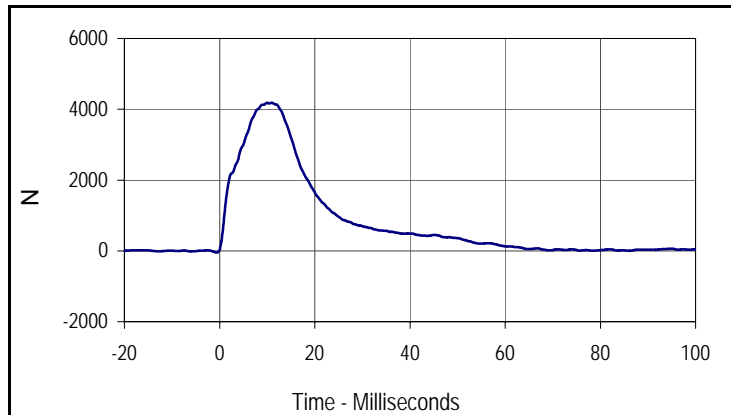
Test Date: 11/12/15  
 Test I.D.: F037ABD078



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	745	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.7	Pass
Probe Velocity	m/s	3.9 to 4.1	4.01	Pass
Peak Impactor Force	N	4000 to 4800	4186.7	Pass
	msec	10.6 to 13.0	11.0	Pass
Sum of Abdominal Forces	N	2200 to 2700	2464.5	Pass
	msec	10.0 to 12.3	11.3	Pass
Overall Test Results				Pass



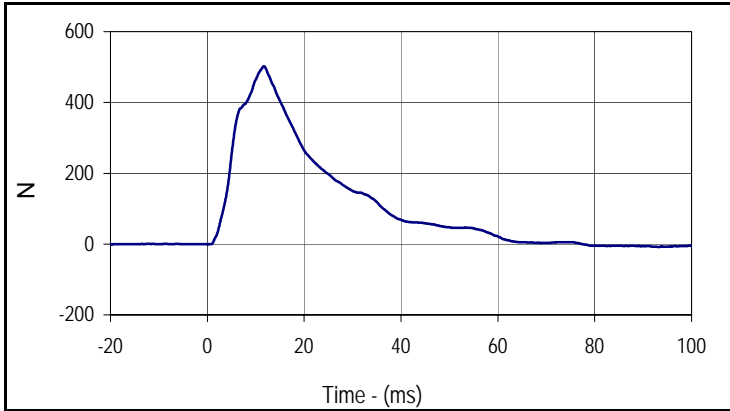
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	g
Max	Time	Min	Time
18.3	11.0	-0.2	-0.6



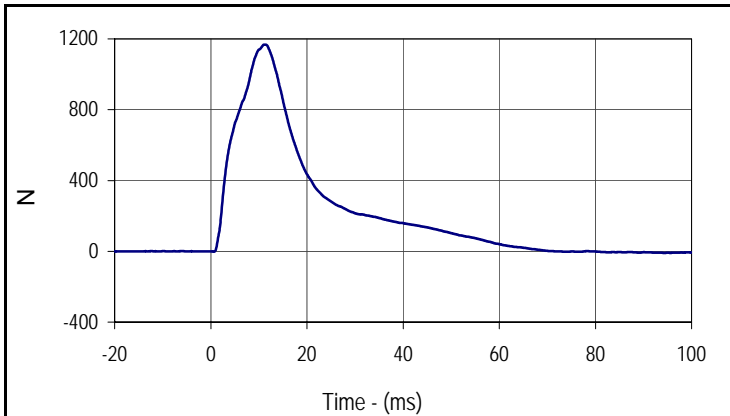
Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	N
Max	Time	Min	Time
4186.7	11.0	-48.6	-0.6

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

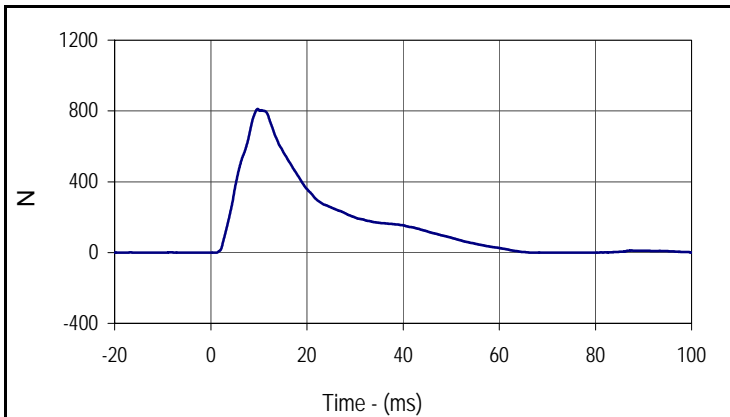
Test Date: 11/12/15  
 Test I.D.: F037ABD078



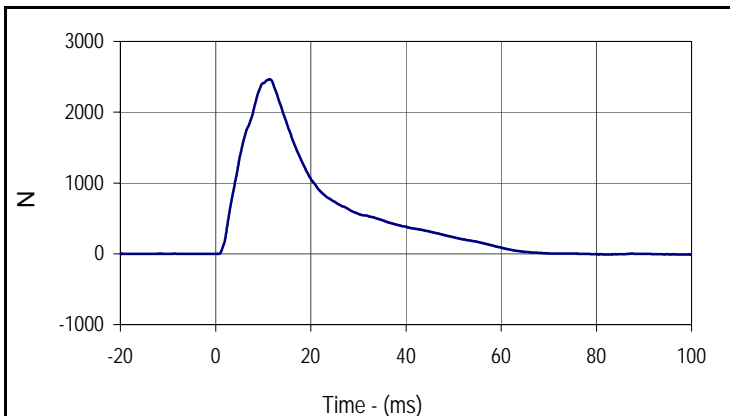
Curve Description			
Front Abdomen Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	N
Max	Time	Min	Time
502.4	11.7	-8.4	93.2



Curve Description			
Middle Abdomen Force			
Plot No.	Type	SAE Class	Units
004	FIL	600	N
Max	Time	Min	Time
1168.0	11.2	-9.3	94.3



Curve Description			
Rear Abdomen Force			
Plot No.	Type	SAE Class	Units
005	FIL	600	N
Max	Time	Min	Time
811.9	9.7	-1.4	149.7



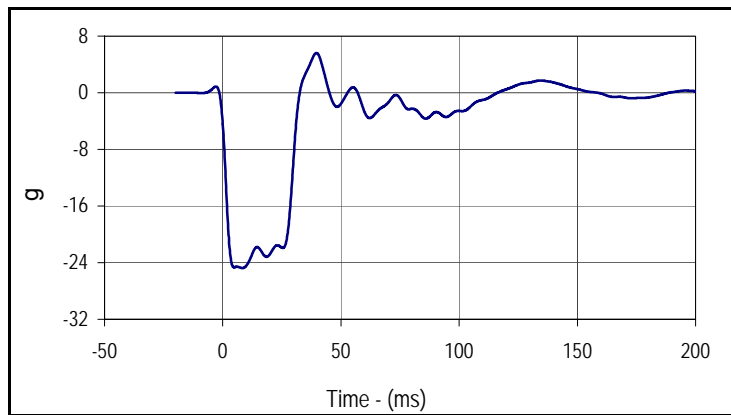
Curve Description			
Abdomen Sum Resultant			
Plot No.	Type	SAE Class	Units
006	RES	600	N
Max	Time	Min	Time
2464.5	11.3	-11.7	82.5

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

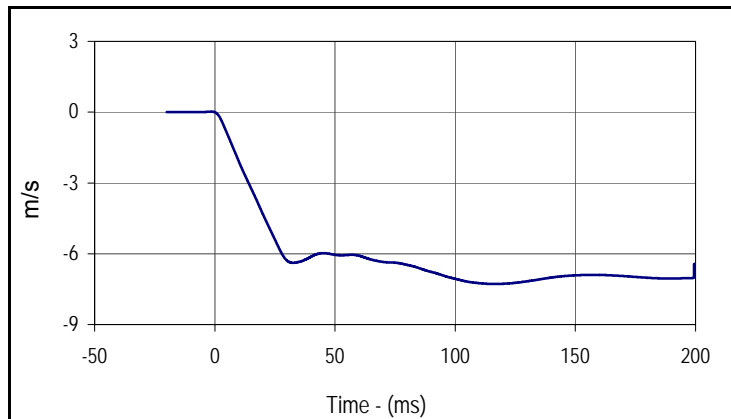
Test Date: 11/12/15  
 Test I.D.: F037LB078



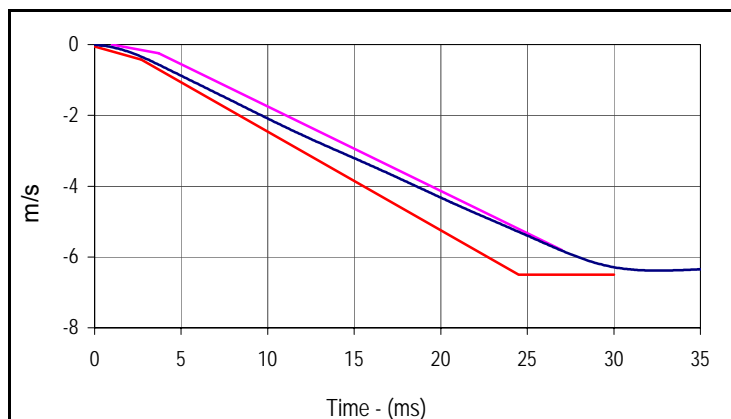
Tested Parameter	Units	Specification	Result	Pass/Fail	
Lumbar Spine Assembly Soak Time	Minutes	≥240	820	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass	
	Min		21.2	Pass	
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass	
	Min		23.7	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	23.7	Pass	
Pendulum Velocity	m/s	5.95 to 6.15	5.98	Pass	
Headform Rotation	Max	Degrees	45 to 55	48.9	Pass
	Time	msec	39 to 53	41.3	Pass
Time of Decay to Zero Angle from Peak	msec	37 to 57	45.0	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	g
Max	Time	Min	Time
5.6	40.2	-24.8	8.9



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.9	-7.3	116.8



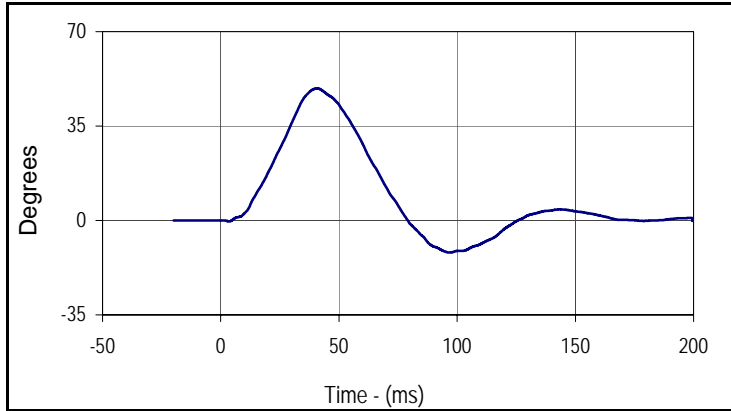
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	60	m/s
Max	Time	Min	Time
0.0	-0.9	-7.3	116.8

Velocity Corridors

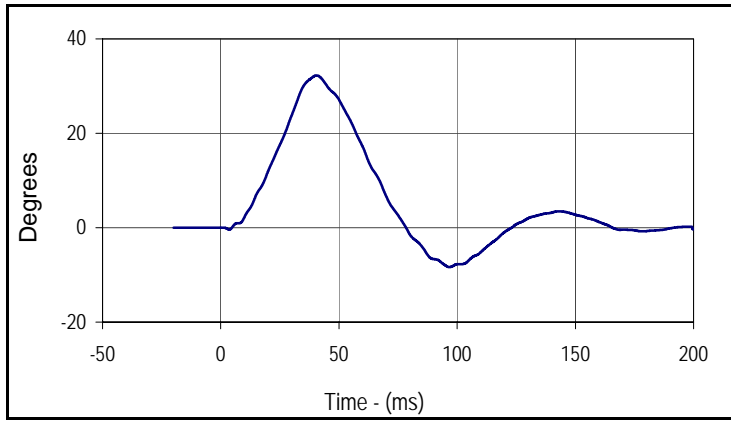
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.50
		30.0	-6.50

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

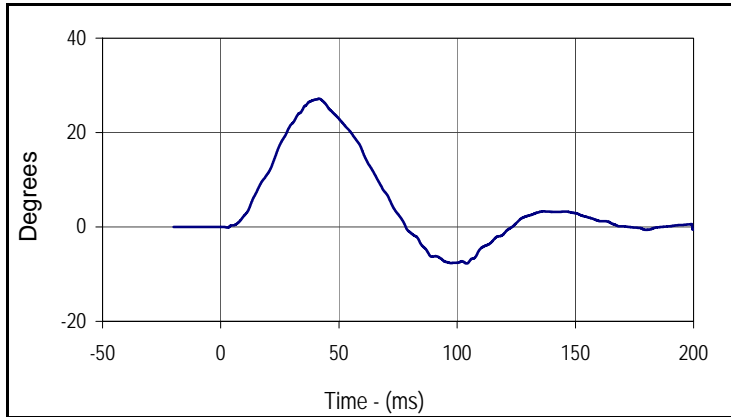
Test Date: 11/12/15  
 Test I.D.: F037LB078



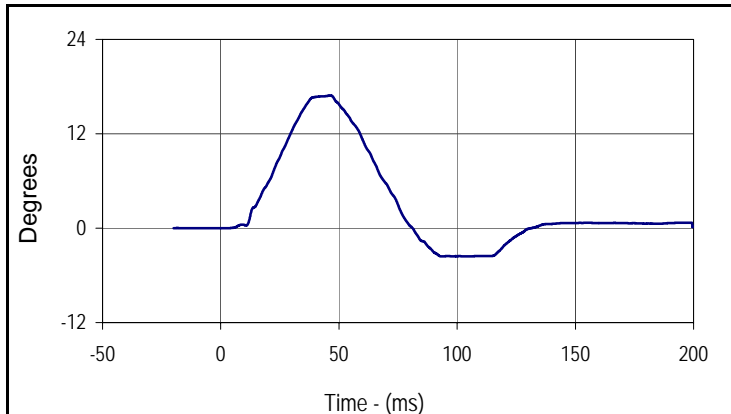
Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
48.9	41.3	-11.9	97.4



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
32.2	41.1	-8.3	97.4



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
27.2	42.2	-7.7	104.6



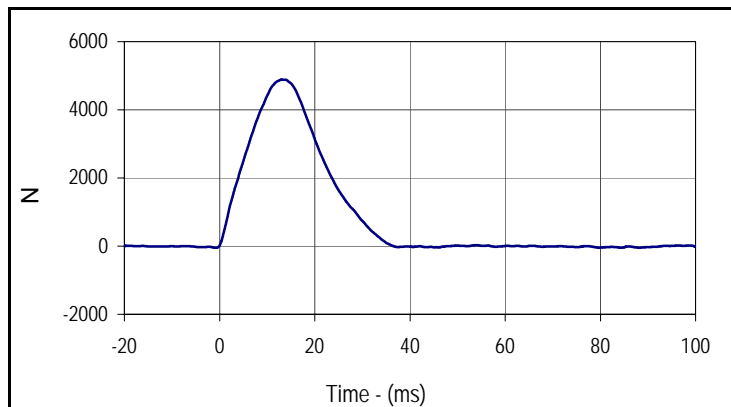
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
006	FIL	180	Degrees
Max	Time	Min	Time
16.9	47.0	-3.6	94.1

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

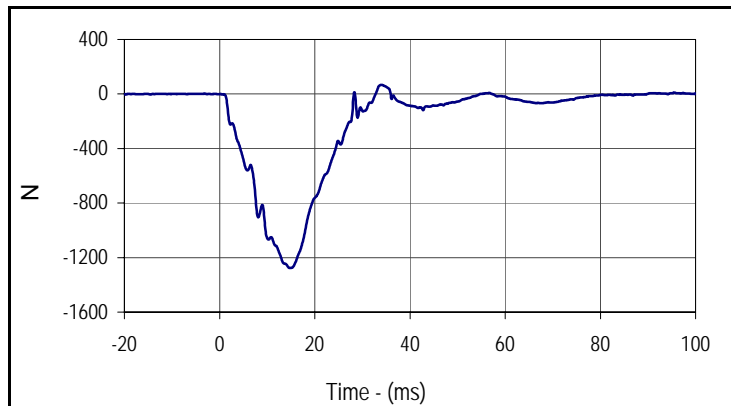
Test Date: 11/12/15  
 Test I.D.: F037PL078



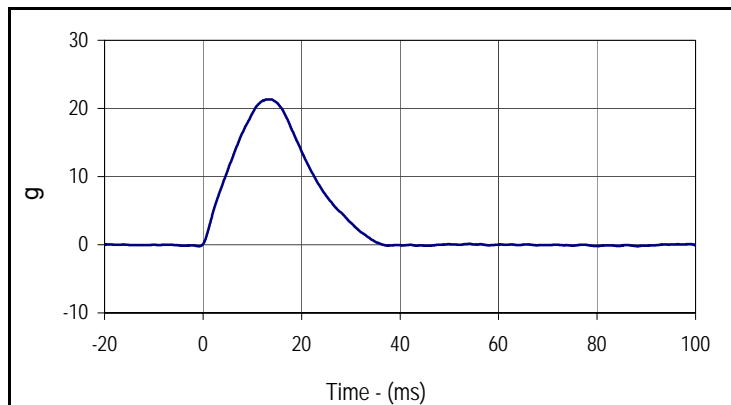
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	875	Pass
Temperature During Soak	Max	20.6 to 22.2	21.3	Pass
	Min		21.2	Pass
Humidity During Soak	Max	10.0 to 70.0	23.8	Pass
	Min		23.7	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.7	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.32	Pass
Peak Impactor Force	N	4700 to 5400	4887.4	Pass
	msec	11.8 to 16.1	13.1	Pass
Peak Pubic Symphysis Load	N	-1230 to -1590	-1277.0	Pass
	msec	12.2 to 17.0	14.8	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	N
Max	Time	Min	Time
4887.4	13.1	-49.9	88.2



Curve Description			
Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
002	FIL	600	N
Max	Time	Min	Time
67.7	34.0	-1277.0	14.8



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
21.3	13.1	-0.2	88.2

Test Program: SID IIs External Measurements

Test Date: 11/13/15



ATD Serial No.: 307

Test I.D.: N/A

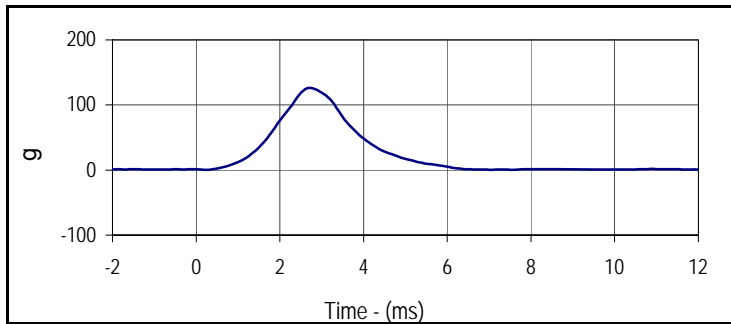
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	23	Pass
A Sitting Height	mm	772 - 788	778	Pass
B Shoulder Pivot Height	mm	437 - 453	443	Pass
C H-Point Height	mm	79 - 89	85	Pass
D H-Point from Seatback	mm	141 - 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

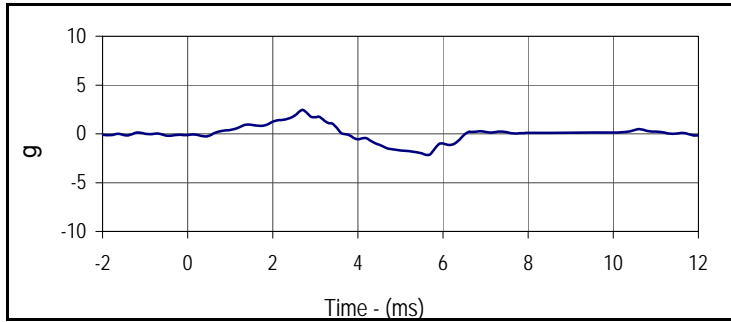
Test Date: 11/13/15  
 Test I.D.: 307HD087



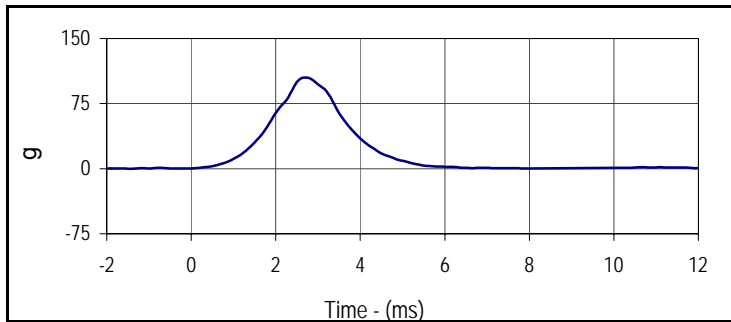
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	402	Pass
Temperature During Soak	Max	18.9 to 25.6	21.6	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass
	Min		22.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.6	Pass
Peak Head Resultant Acceleration	g	115 to 137	126.0	Pass
Peak Head X Acceleration	g	<15	2.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	1.3	Pass
<b>Overall Test Results</b>				<b>Pass</b>



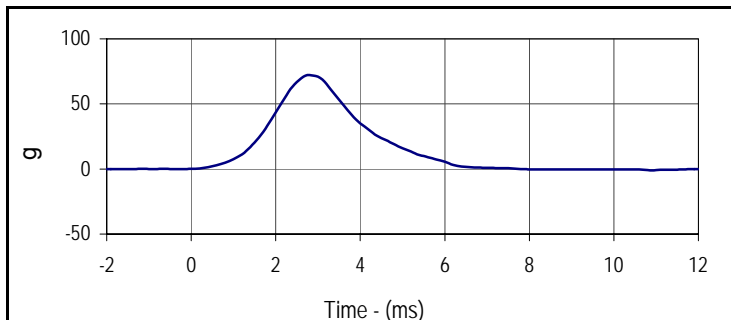
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	g
Max	Time	Min	Time
126.0	2.7	0.3	0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	g
Max	Time	Min	Time
2.5	2.7	-2.2	5.6



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	g
Max	Time	Min	Time
105.2	2.7	-0.3	-3.4



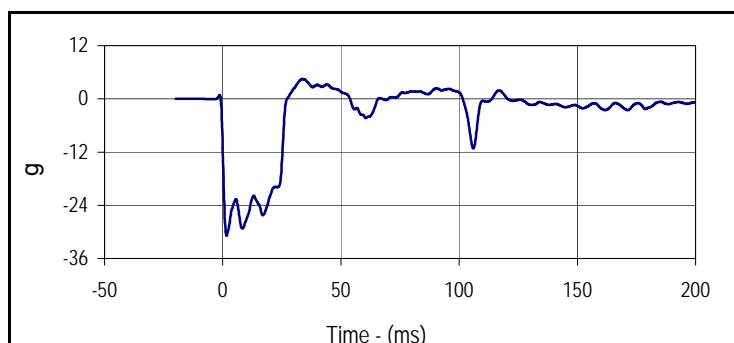
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	g
Max	Time	Min	Time
72.1	2.8	-1.0	10.9

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

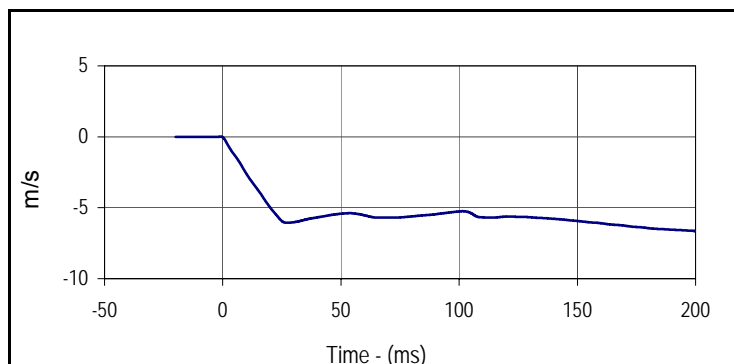
Test Date: 11/13/15  
 Test I.D.: 307NB087



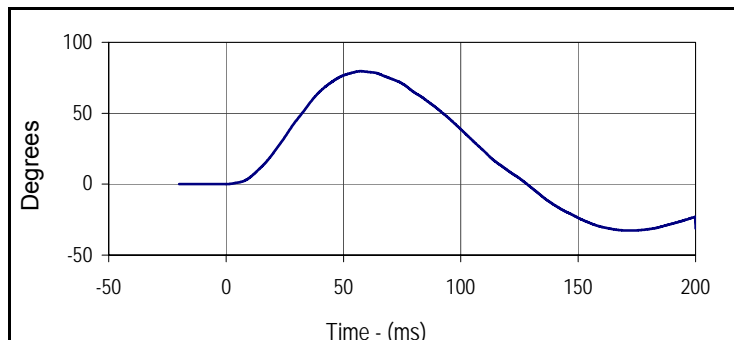
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	447	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass	
	Min		21.1	Pass	
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass	
	Min		22.4	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	22.6	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.53	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.60	Pass
	15 msec	m/s	-3.30 to -4.10	-3.77	Pass
	20 msec	m/s	-4.40 to -5.40	-4.98	Pass
	25 msec	m/s	-5.40 to -6.10	-5.94	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.05	Pass
D-Plane Rotation	Max	Degrees	71 to 81	79.6	Pass
	Time	msec	50 to 70	57.3	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-42.6	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	106.9	Pass	
Overall Test Results			Pass	Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	g
Max	Time	Min	Time
4.5	0.0	-30.9	0.0



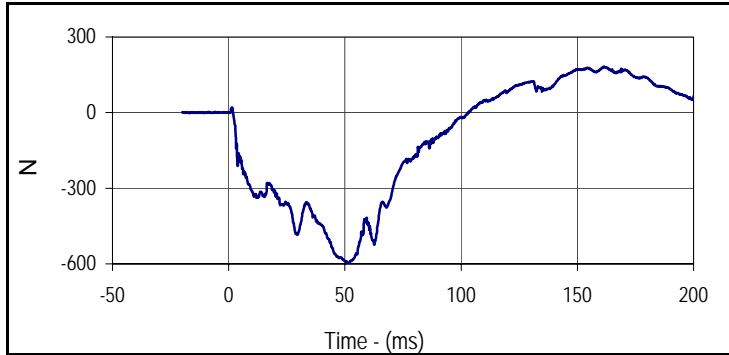
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
002	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.9	-6.6	199.9



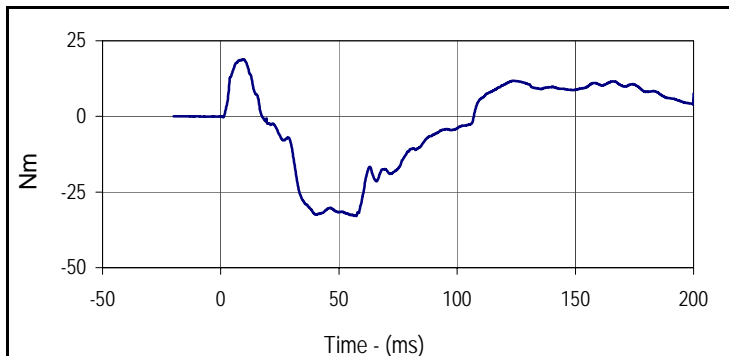
Curve Description			
D-Plane Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
79.6	57.3	-32.7	172.0

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

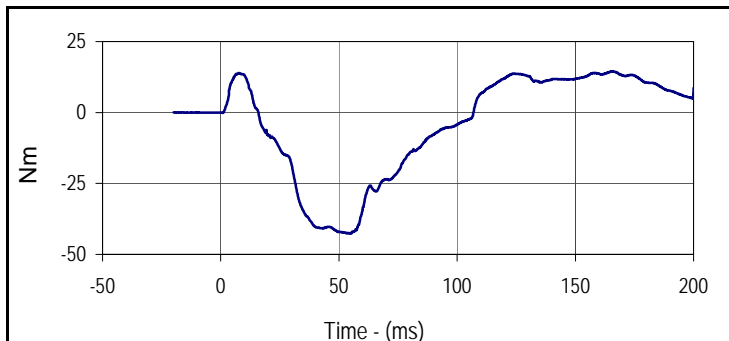
Test Date: 11/13/15  
 Test I.D.: 307NB087



Curve Description			
Neck Force Y			
Plot No.	Type	SAE Class	Units
004	FIL	1000	N
Max	Time	Min	Time
183.0	161.5	-602.3	51.6



Curve Description			
Neck Moment X			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
18.9	9.6	-33.0	57.3



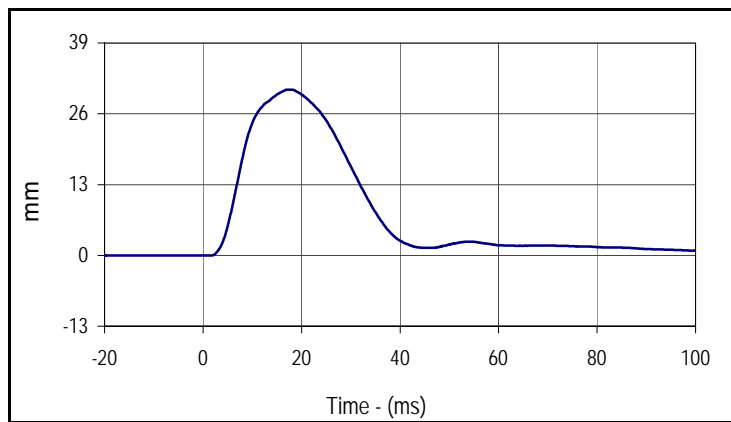
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
006	FIL	600	Nm
Max	Time	Min	Time
14.5	165.0	-42.6	55.1

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

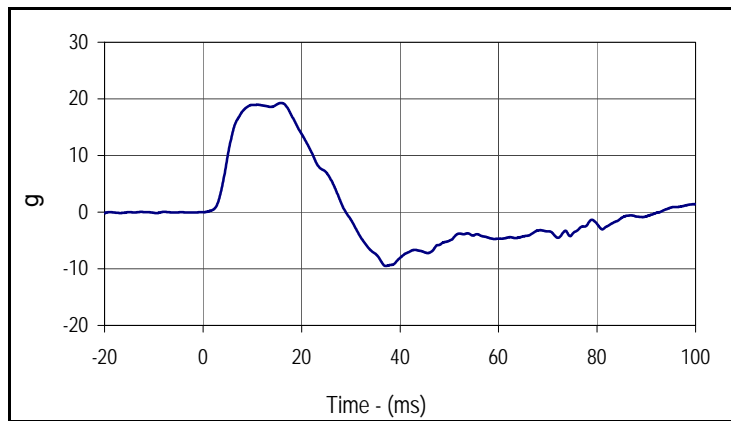
Test Date: 11/13/15  
 Test I.D.: 307SH087



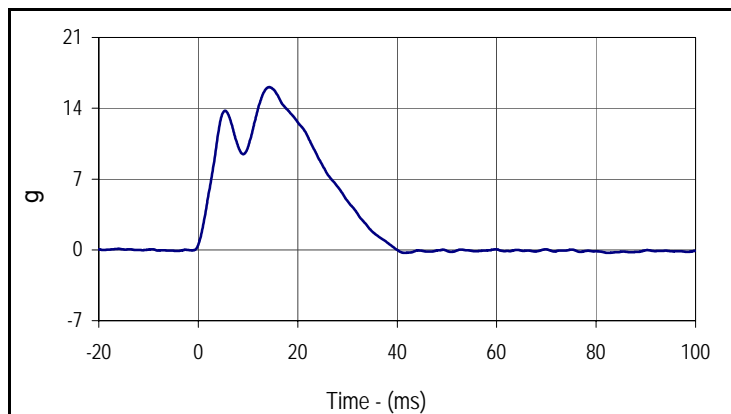
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	502	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass
	Min		22.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.8	Pass
Impactor Velocity	m/s	4.20 to 4.40	4.32	Pass
Peak Shoulder Deflection	mm	28 to 37	30.4	Pass
Peak Lateral Spine Acceleration Y	g	17 to 22	19.3	Pass
Peak Impactor Acceleration	g	13 to 18	16.1	Pass
Overall Test Results			Pass	



Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	mm
Max	Time	Min	Time
30.4	17.7	0.0	-3.4



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	g
Max	Time	Min	Time
19.3	15.9	-9.5	37.1



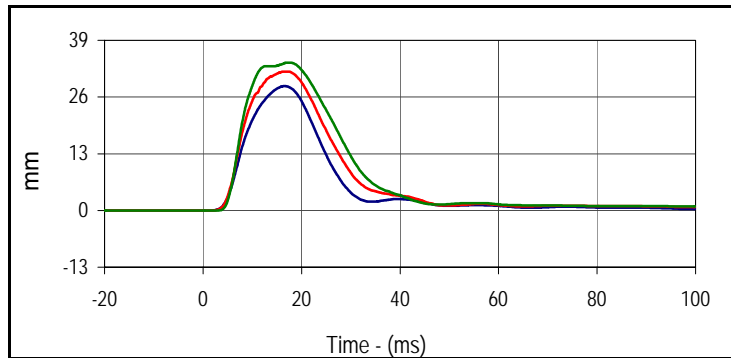
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
16.1	14.3	-0.3	82.4

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

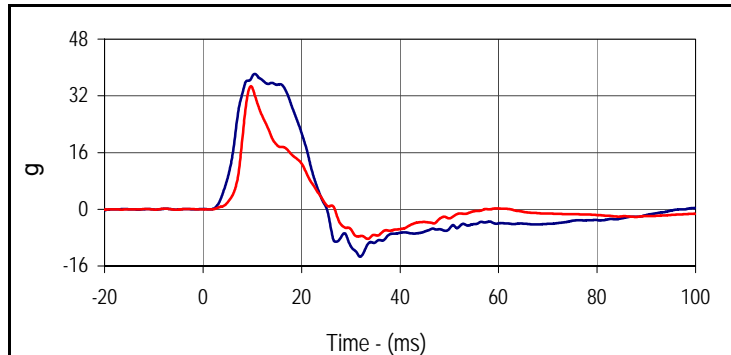
Test Date: 11/13/15  
 Test I.D.: 307TWA087



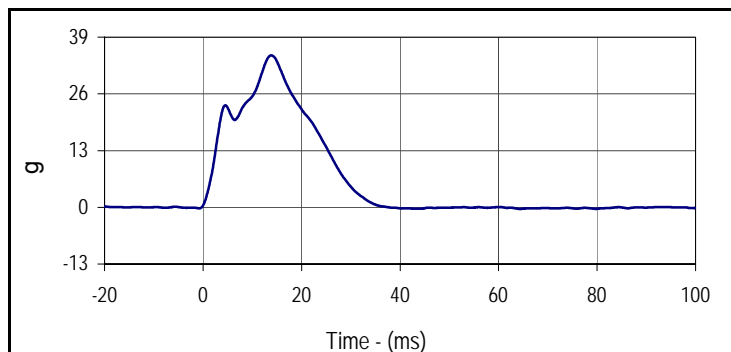
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	547	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass
	Min		22.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.8	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.69	Pass
Peak Shoulder Deflection	mm	31 to 40	36.7	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	28.5	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	31.8	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	33.9	Pass
Peak Upper Spine Y Acceleration	g	34 to 43	38.1	Pass
Peak Lower Spine Y Acceleration	g	29 to 37	34.7	Pass
Peak Impactor Acceleration	g	30 to 36	34.8	Pass
<b>Overall Test Results</b>				<b>Pass</b>



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	mm
Max	Time	Min	Time
28.5	16.5	0.0	-2.6
Middle Thorax Deflection			
Max	Time	Min	Time
31.8	16.9	0.0	-1.1
Lower Thorax Deflection			
Max	Time	Min	Time
33.9	17.6	0.0	-2.2



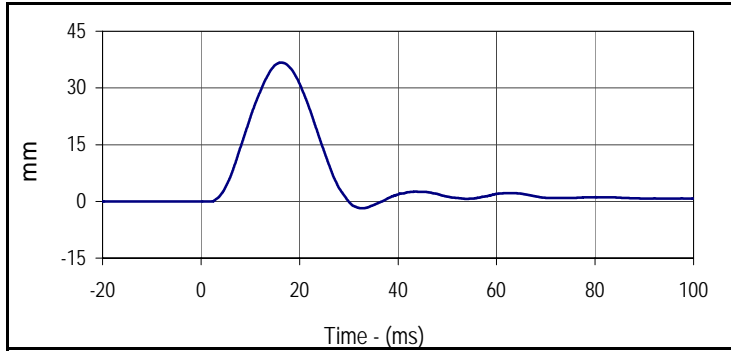
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
38.1	10.5	-13.4	31.9
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	g
Max	Time	Min	Time
34.7	9.7	-8.3	33.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	g
Max	Time	Min	Time
34.8	13.9	-0.4	64.4

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

Test Date: 11/13/15  
 Test I.D.: 307TWA087



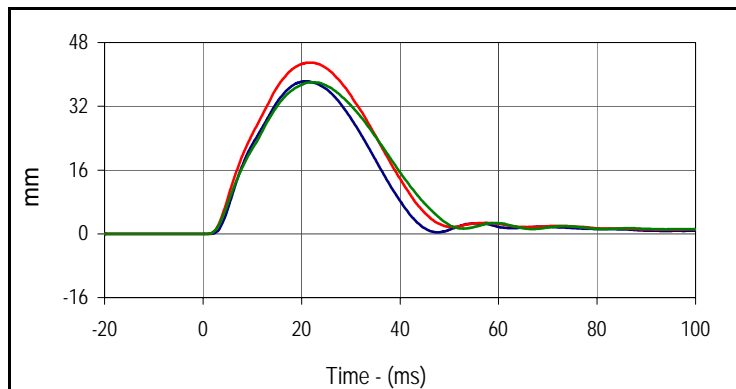
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	mm
Max	Time	Min	Time
36.7	16.2	-1.8	32.6

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

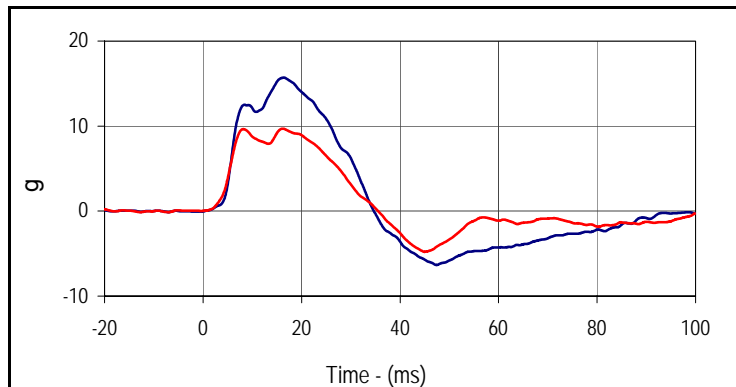
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 Test I.D.: 307TWOA087



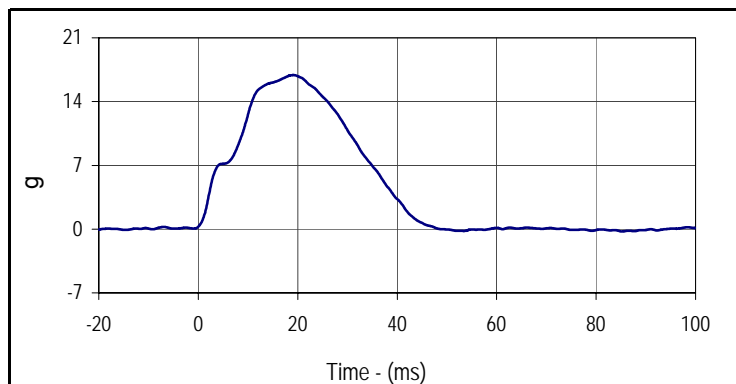
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	602	Pass
Temperature During Soak	Max	18.9 to 25.6	21.6	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass
	Min		22.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.9	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.30	Pass
Peak Upper Thorax Rib Deflection	mm	32 to 40	38.3	Pass
Peak Middle Thorax Rib Deflection	mm	39 to 45	43.0	Pass
Peak Lower Thorax Rib Deflection	mm	35 to 43	38.0	Pass
Peak Upper Spine Y Acceleration	g	13 to 17	15.7	Pass
Peak Lower Spine Y Acceleration	g	7 to 11	9.7	Pass
Peak Impactor Acceleration	g	14 to 18	16.9	Pass
Overall Test Results				Pass



Curve Description			
<b>Upper Thorax Deflection</b>			
Plot No.	Type	SAE Class	Units
001	FIL	600	mm
Max	Time	Min	Time
38.3	21.1	0.0	-18.4
<b>Middle Thorax Deflection</b>			
Max	Time	Min	Time
43.0	21.7	0.0	-10.4
<b>Lower Thorax Deflection</b>			
Max	Time	Min	Time
38.0	22.2	0.0	-18.1



Curve Description			
<b>Upper Spine Y Acceleration</b>			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
15.7	16.4	-6.3	47.4
<b>Lower Spine Y Acceleration</b>			
Plot No.	Type	SAE Class	Units
005	FIL	180	g
Max	Time	Min	Time
9.7	16.1	-4.8	45.0



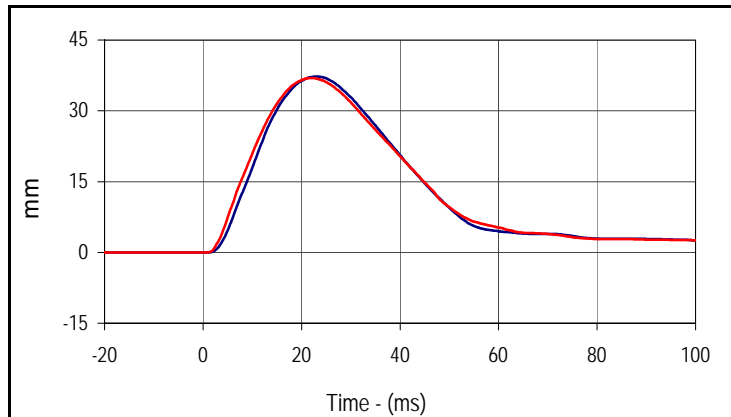
Curve Description			
<b>Impactor Acceleration</b>			
Plot No.	Type	SAE Class	Units
006	FIL	180	g
Max	Time	Min	Time
16.9	19.1	-0.3	85.2

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

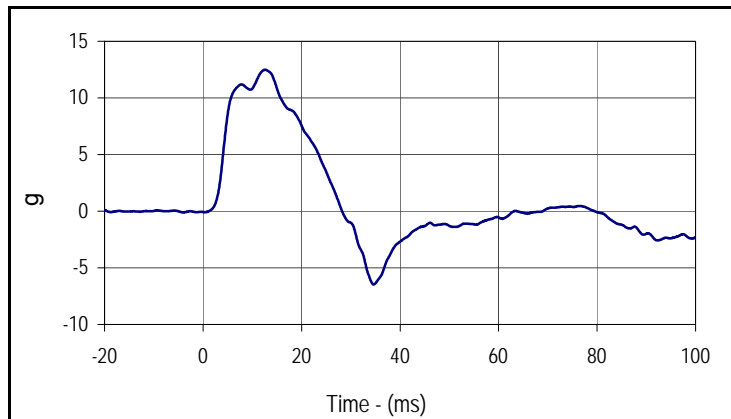
Test Date: 11/13/15  
 Test I.D.: 307ABD087



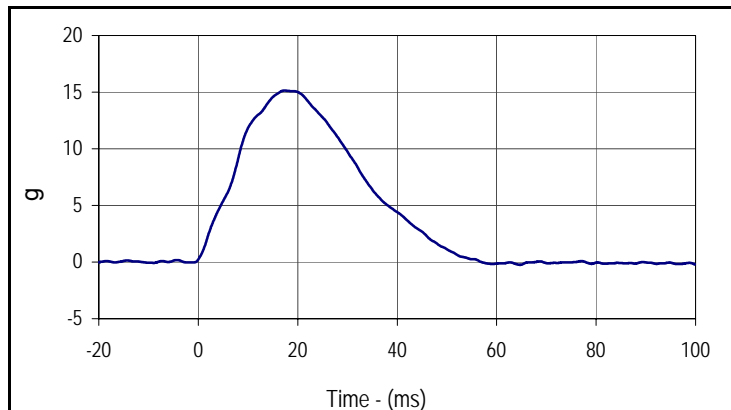
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	657	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass
	Min		22.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.9	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.31	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	37.3	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	36.9	Pass
Peak Lower Spine Y Acceleration	g	9 to 14	12.5	Pass
Peak Impactor Acceleration	g	12 to 16	15.1	Pass
Overall Test Results				Pass



Curve Description			
Upper Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	mm
Max	Time	Min	Time
37.3	23.1	0.0	-11.5



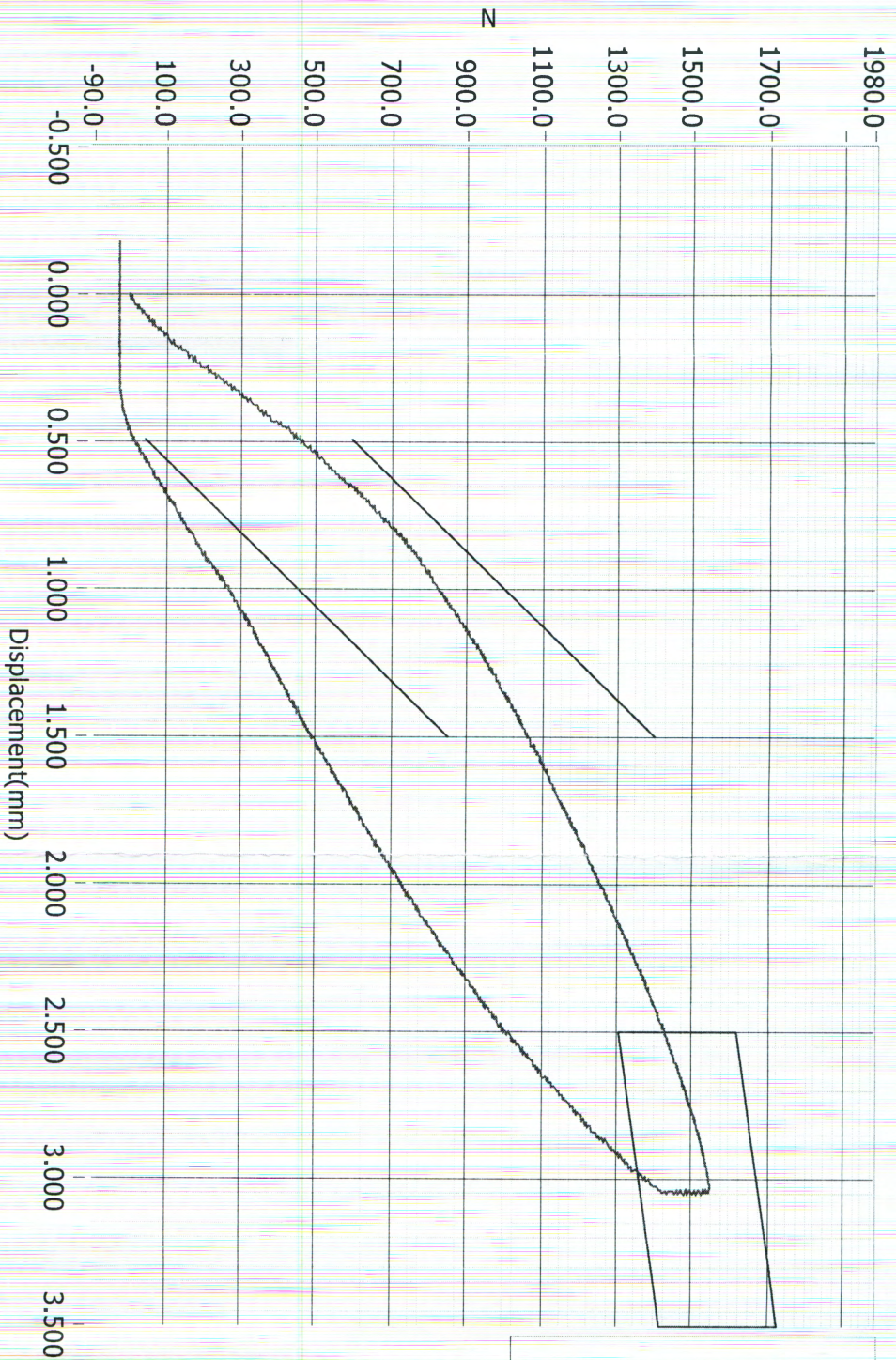
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	mm
Max	Time	Min	Time
36.9	22.2	0.0	-13.4



Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
12.5	12.6	-6.5	34.6

Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	g
Max	Time	Min	Time
15.1	17.4	-0.3	0.0

# Resultant Data - SIDIIs Plug Compression



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

1546N

## ATD Calibration Lab

Test ID	Part Serial Number	Test Date	Test Time
	70629	12/12/2013	8:15 PM
Cert ID	ATD Serial Number	ATD Type	
	N/A	SIDIIs	

Current Date : 12/12/2013

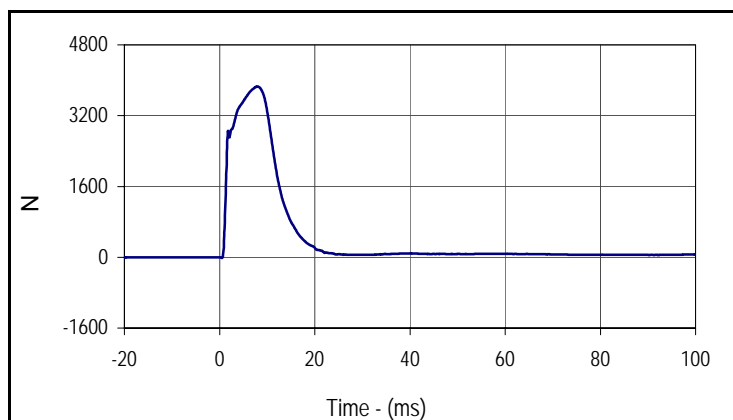
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Test Program: SID IIs Pelvis Acetabulum Impact Test  
 ATD Serial No.: 307

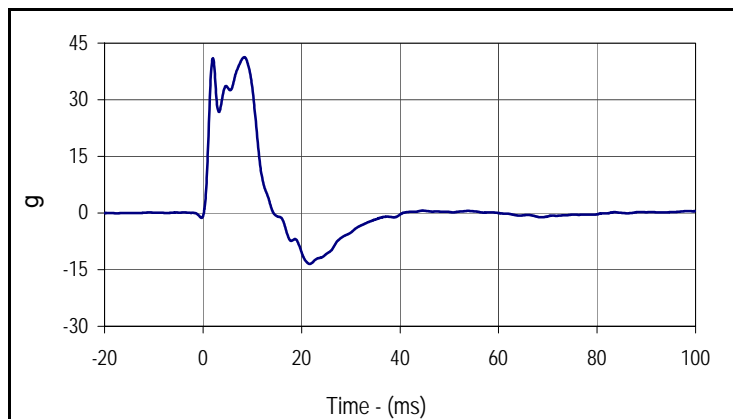
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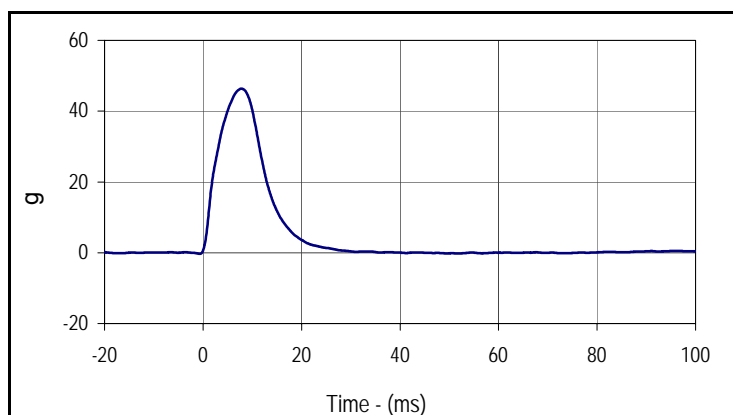
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	707	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass
	Min		22.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	23.0	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.64	Pass
Peak Acetabulum Force Y	N	3600 to 4300	3859.9	Pass
Peak Pelvis Y Acceleration After 6 msec.	g	34 to 42	41.3	Pass
Peak Impactor Acceleration	g	38 to 47	46.3	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
3859.9	8.0	-16.1	0.5



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	g
Max	Time	Min	Time
41.3	8.4	-13.5	21.7



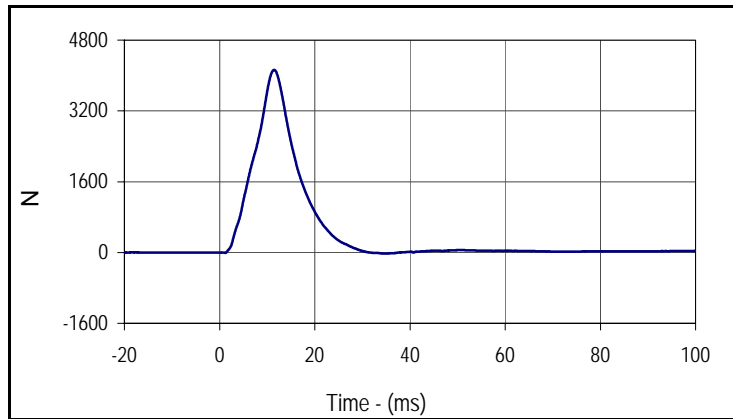
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
46.3	7.8	-0.3	-0.7

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

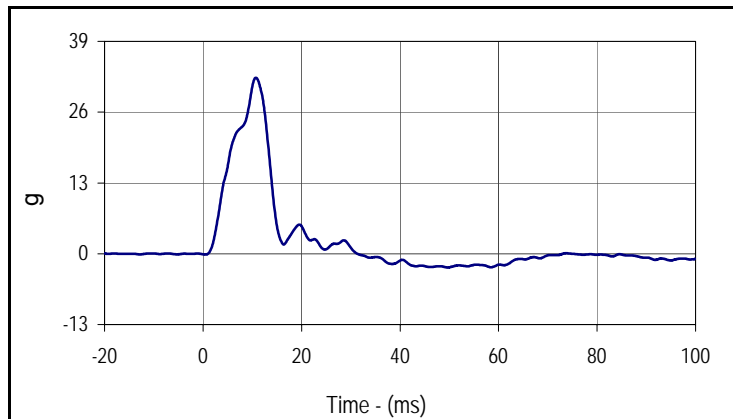
Test Date: 11/13/15  
 Test I.D.: 307PL087



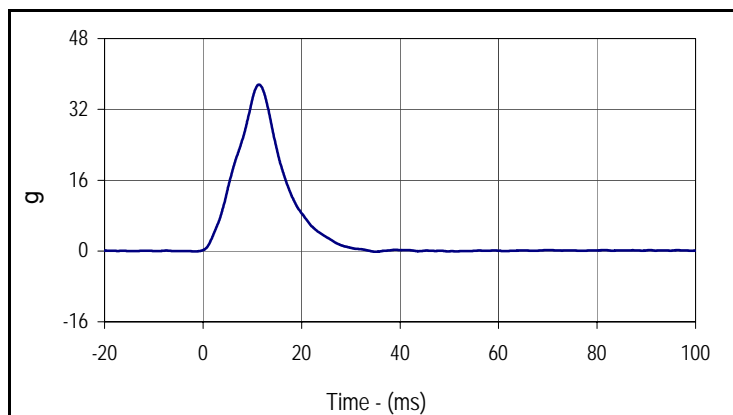
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	762	Pass
Temperature During Soak	Max	20.6 to 22.2	21.6	Pass
	Min		21.1	Pass
Humidity During Soak	Max	10.0 to 70.0	23.0	Pass
	Min		22.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	22.4	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.31	Pass
Peak Iliac Force	N	4100 to 5100	4125.8	Pass
Peak Pelvis Y Acceleration	g	28 to 39	32.3	Pass
Peak Impactor Acceleration	g	36 to 45	37.6	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	N
Max	Time	Min	Time
4125.8	11.4	-22.3	35.3



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	g
Max	Time	Min	Time
32.3	10.7	-2.5	49.7



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	g
Max	Time	Min	Time
37.6	11.4	-0.2	35.2

**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	7/16/15
		Y	P58865	Endevco	7/16/15
		Z	P58867	Endevco	7/16/15
	Redundant	X	P58859	Endevco	7/16/15
		Y	P58866	Endevco	7/16/15
		Z	P58873	Endevco	7/16/15
Thorax Rib Displacement Potentiometers	Upper	Y	209	FTSS	7/18/15
	Middle	Y	210	FTSS	7/18/15
	Lower	Y	207	FTSS	7/18/15
Abdomen Load Cells	Forward	Y	1504	Denton	7/21/15
	Middle	Y	1505	Denton	7/21/15
	Rear	Y	1506	Denton	7/21/15
Lower Spine Accelerometers (T12)		X	P63856	Endevco	7/18/15
		Y	P50063	Endevco	7/18/15
		Z	P51880	Endevco	7/18/15
Pubic Symphysis Load Cell		Y	DG6784	Denton	7/21/15

**TABLE 2 – Dummy Instrumentation (SID-IIs)**

			SID-IIs S/N 307			
			Serial Number	Manufacturer	Calibration	
Head Accelerometers	Primary	X	P58900	Endevco	7/10/15	
		Y	P58902	Endevco	7/10/15	
		Z	P58983	Endevco	7/10/15	
	Redundant	X	P58901	Endevco	7/10/15	
		Y	P58906	Endevco	7/10/15	
		Z	P58989	Endevco	7/10/15	
Displacement Potentiometers	Thoracic Rib	Upper	Y	1249	FTSS	7/14/15
		Middle	Y	1265	FTSS	7/14/15
		Lower	Y	1229	FTSS	6/21/15
	Abdominal Rib	Upper	Y	1286	FTSS	7/14/15
		Lower	Y	1290	FTSS	7/14/15
Lower Spine Accelerometers (T12)		X	AHRW5	Endevco	7/10/15	
		Y	P59015	Endevco	7/10/15	
		Z	P58995	Endevco	7/10/15	
Acetabulum Load Cell		Y	260	Denton	7/20/15	
Iliac Wing Load Cell		Y	272	Denton	7/21/15	
Pelvis Plug (Struck Side)			70652	FTSS	12/12/13	
Pelvis Plug (Non-Struck Side)			70629	FTSS	12/12/13	

**TABLE 3 – Vehicle Instrumentation**

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X	A145986	MSI	7/8/15
	Vehicle Center of Gravity	Y	A145956	MSI	7/8/15
	Vehicle Center of Gravity	Z	A145996	MSI	7/8/15
2	Right Sill at Front Seat	X	A147392	MSI	7/8/15
	Right Sill at Front Seat	Y	A160689	MSI	7/8/15
	Right Sill at Front Seat	Z	A160687	MSI	7/8/15
3	Right Sill at Rear Seat	X	A148184	MSI	7/8/15
	Right Sill at Rear Seat	Y	A159438	MSI	7/8/15
	Right Sill at Rear Seat	Z	A160354	MSI	7/8/15
4	Left Sill at Front Door	Y	A147406	MSI	7/8/15
5	Left Sill at Rear Door	Y	A136686	MSI	7/7/15
6	Left A-Post Lower	Y	A148220	MSI	7/7/15
7	Left A-Post Middle	Y	A147464	MSI	7/7/15
8	Left B-Post Lower	Y	A160694	MSI	7/7/15
9	Left B-Post Middle	Y	A148252	MSI	7/8/15
10	Front Seat Track	Y	A148252	MSI	7/7/15
11	Rear Seat Structure	Y	A148280	MSI	7/7/15
12	Right Rear Occ. Compartment	Y	A147420	MSI	7/7/15
13	Engine Block	X	A160376	MSI	7/8/15
	Engine Block	Y	A145924	MSI	7/8/15
14	Rear Floorpan Above Axle	X	A145963	MSI	7/7/15
	Rear Floorpan Above Axle	Y	A145966	MSI	7/7/15
	Rear Floorpan Above Axle	Z	A160703	MSI	7/8/15

**TABLE 4 – MDB Instrumentation**

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X	A128040	MSI	7/8/15
MDB Center of Gravity	Y	A124105	MSI	7/8/15
MDB Center of Gravity	Z	A104832	MSI	7/8/05
Left Frame at Rear Axle Centerline	X	A148320	MSI	7/8/15
Left Frame at Rear Axle Centerline	Y	A148316	MSI	7/8/15