

**REPORT NUMBER: SINCAP-KAR-12-051**

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

**FORD MOTOR CO.  
2012 FORD SUPERDUTY F-250 CREW CAB 4-DOOR TRUCK**

**NHTSA No: MC0208**

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



**FEBRUARY 24, 2012**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF CRASHWORTHINESS STANDARDS  
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**15. Supplementary Notes**

**16. Abstract**

A 55/28 km/h 90 deg. Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2012 Ford SuperDuty F-250 Crew Cab 4-door truck 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 February 10, 2012.

The impact velocity of the Moving Deformable Barrier was 62.1 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 21.7 deg. C. The target vehicle's maximum post-test static crush was 411 mm located at level 1. The test vehicle's occupant performance data is as follows:

Measurement Description	Driver ATD (ES-2re)		
	Units	IARV	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	26.9
Maximum Thorax Rib Deflection	mm	44	15
Total Abdominal Force	N	2500	224
Pubic Symphysis Force	N	6000	1236

Measurement Description	Passenger ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	55.8
Resultant Lower Spine Acceleration	g	82	29
Total Pelvic Force (Sum of Acetubular and Iliac Forces)	N	5525	1048
Maximum Thoracic Rib Deflection	mm	38*	2
Maximum Abdominal Rib Deflection	mm	45*	9

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

\* Proposed IARV

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

This moving deformable barrier side impact test is part of the MY 2012 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00122. The purpose of this test is to generate comparative side impact performance in a 2012 Ford SuperDuty F-250 Crew Cab 4-door truck. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated August 2011.

## SECTION 2

### SUMMARY OF TEST RESULTS

A 2012 Ford SuperDuty F-250 Crew Cab 4-door truck was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.1 km/h (38.6 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 February 10, 2012. 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 August 2011. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were 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.

Dummy injury readings were recorded as follows:

Measurement Description	Units	Driver ATD (ES-2re)	
		Threshold	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	26.9
Maximum Thorax Rib Deflection	mm	44	15
Combined Abdominal Force	N	2500	224
Pubic Symphysis Force	N	6000	1236

Measurement Description	Units	Passenger ATD (SID-IIs)	
		Threshold	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	55.8
Lower Spine (T12) Resultant Acceleration	g	82	29
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	1048
Maximum Thoracic Rib Deflection	mm	38*	2
Maximum Abdominal Rib Deflection	mm	45*	9

\*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	No		No	
Side Airbag 1 (Curtain)	Yes	Yes	Yes	Yes
Side Airbag 2 (Torso/Pelvis)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other	No		No	

### GENERAL COMMENTS

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 were no ATD values that exceeded limits.

### SECTION 3

#### OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208

Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12

#### 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: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA Number	MC0208
Model Year	2012
Make	Ford
Model	SuperDuty F-250 Crew Cab
Body Style	4-Door Truck
VIN	1FT7W2A62CEA27719
Body Color	Vermillion Red
Odometer Reading (km / mi)	10 / 6
Engine Displacement (L)	6.2
Type / No. of Cylinders	V8
Engine Placement	Longitudinal
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	Rear
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
All Wheel Drive (AWD)	No

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks	Yes
Power Window Auto-Reverse	Yes
Other Optional Feature	None
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso/Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head/Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso/Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	None

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

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Ford Motor Co.
Date of Manufacture	Aug-11
Vehicle Type	Truck

GVWR (kg)	4536
GAWR Front (kg)	2064
GAWR Rear (kg)	2767

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity	3	3		6
Capacity Weight (VCW) (kg)				1531.0
DSC x 68.04 (kg)				408.2
Cargo Weight (RCLW) (kg)				136.0

A  
B  
A-B

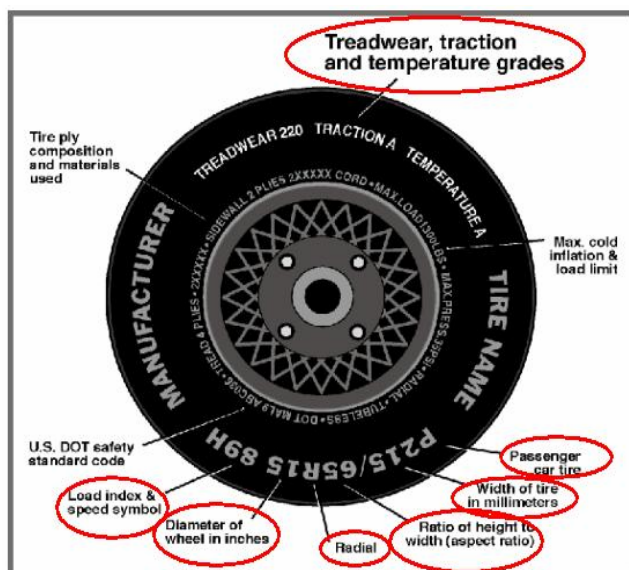
**VEHICLE SEAT TYPE**

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: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12



**TIRE PLACARD INFORMATION**

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	450	550
Recommended Tire Size	LT245/75R17E	LT245/75R17E

**VEHICLE TIRE INFORMATION**

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	550	550
Tire Size on Vehicle	LT245/75R17	LT245/75R17
Tire Manufacturer	General	General
Tire Name	Grabber	Grabber
Tire Type	Light Truck	Light Truck
Tire Width	245	245
Aspect Ratio	75	75
Radial	Yes	Yes
Wheel Diameter	17	17
Load Index/Speed Symbol	121/118S	121/118S
Treadware	N/A	N/A
Traction Grade	N/A	N/A
Temperature Grade	N/A	N/A
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide

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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

**TIRE PRESSURES**

	Units	LF	RF	LR	RR
As Delivered	kPa	450	420	540	540
Tire Placard	kPa	450	450	550	550
Owner's Manual	kPa	450	450	550	550
As Tested	kPa	450	450	550	550

**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	843.0	674.0		888.5	781.0		889.5	780.5	
Right	kg	800.5	657.5		823.0	738.0		821.5	742.5	
Ratio	%	55.2%	44.8%	100.0%	53.0%	47.0%	100.0%	52.9%	47.1%	100.0%
Total	kg	1643.5	1331.5	2975.0	1711.5	1519.0	3230.5	1711.0	1523.0	3234.0

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2975.0	A
Actual Weight of 2 P572 ATDs Used	kg	125.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	136.0	C
Calculated Vehicle Target Wt (TVTW)	kg	3236.0	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

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

Component Description	Weight (kg)
Non Struck Side Door Panels	7.0
Hub Caps	1.5
Ballast / Equipment Added	135.7

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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208

Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

**TEST VEHICLE ATTITUDE AND CG**

Measurement Description	Units	Fully Loaded	As Tested	Meets Requirement***
LF	mm	940	939	Yes
RF	mm	955	954	Yes
RR	mm	982	983	Yes
LR	mm	1004	995	Yes
Vehicle CG (Aft of Front Axle)	mm	1877	1874	
Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline)	mm	30	29	

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

## DATA SHEET NO. 2

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

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

#### 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 rear-most, lowest, mid-angle position.

#### SCRL ANGLE RANGE

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	Fixed	Fixed	Fixed
Front Passenger Seat	Fixed	Fixed	Fixed
Front Center Seat	Fixed	Fixed	Fixed
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	SCR P Height	SCR P Height (mm)		
				Rearmost	Mid Fore/Aft	Forwardmost
Driver Seat	Fixed	937	Max	934	937	940
			Mid	934	937	940
			Min	934	937	940
Front Passenger Seat	Fixed	933	Max	930	933	936
			Mid	930	933	936
			Min	930	933	936
Front Center Seat	Fixed	Fixed	Max	Fixed	Fixed	Fixed
			Mid	Fixed	Fixed	Fixed
			Min	Fixed	Fixed	Fixed
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**

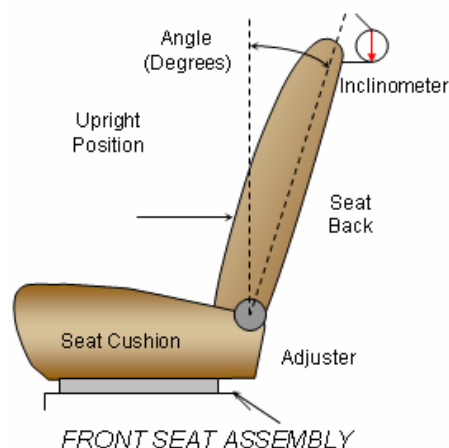
Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

**SEAT FORE/AFT POSITION**

Seat	Total Fore/Aft Travel		Test Position From Forwardmost Position	
	mm	Detents*	mm	Detent*
Driver Seat	204	47	102	23
Front Passenger Seat	220	54	110	27
Front Center Seat	Fixed	Fixed	Fixed	Fixed
Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

**SEAT BACK ADJUSTMENT**

The driver's seat back is positioned to the manufacturer's designated design angle. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck side rear 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	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degree	Detent*
Driver Seat w/Seated Dummy	48.5	26	20.3	9
Front Passenger Seat	48.7	26	20.3	9
Front Center Seat	Fixed	Fixed	Fixed	Fixed
Struck Side Rear Seat w/Seated Dummy	Fixed	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed	Fixed

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

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

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

#### 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	M1
Rear Seat	Fixed	Fixed

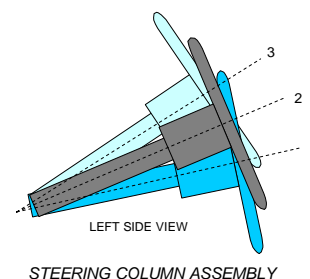
#### HEAD RESTRAINT ADJUSTMENT

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	3	Full Up
Rear Seat	2	Full Down

#### STEERING COLUMN ADJUSTMENT

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



	Degrees	Fore-Aft Position (mm)
Lowermost - Position 1	22.3	152
Geometric Center - Position 2	24.1	163
Uppermost - Position 3	26.0	175
Telescoping Steering Wheel Travel		23
Test Position	24.1	163

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

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

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

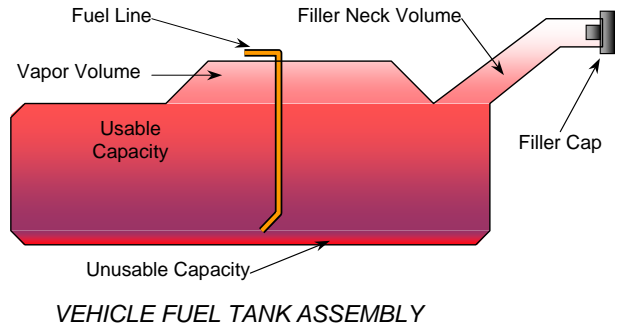
**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank" (see Form No. 1)	132.48
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	123.20
Actual amount of Solvent Used in Test	123.20
1/3 of Usable Capacity	44.16

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**

**FUEL PUMP**

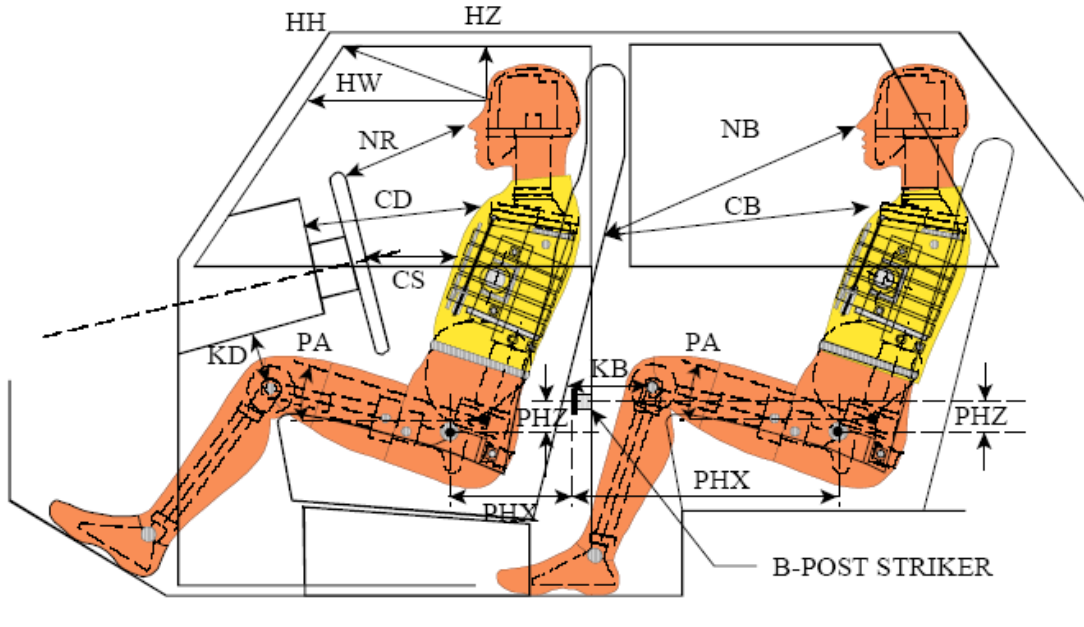
The vehicle is equipped with an electric fuel pump. The electric fuel pump operates for 2 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 2 seconds following ignition actuation the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls the fuel pump is deactivated. Also, a fuel pump shut-off switch is provided, designed to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude.



### DATA SHEET NO. 3

### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12



**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	441			
HW		Head to Windshield	688			
HZ	HZ	Head to Roof	204		332	
NR	NB	Nose to Rim/Seat Back	500		601	
CD	CB	Chest to Dash/Seat Back	614		601	
CS		Chest to Steering Wheel	324			
KD(L)/KDA(L)°	KB(L)/KBA(L)°	Left Knee to Dash/Seat Back	182	29.4	356	20.5
KD(R)/KDA(R)°	KB(R)/KBA(R)°	Right Knee to Dash/Seat Back	190	30.7	348	13.5
PAX°	PAX°	Pelvic Tilt Angle X		19.9		20.8
	PAY°	Pelvic Tilt Angle Y				0.3
PHX	PHX	Hip Point to Striker (x-axis)	339		246	
PHZ	PHZ	Hip Point to Striker (z-axis)	27		7	

## DATA SHEET NO. 4

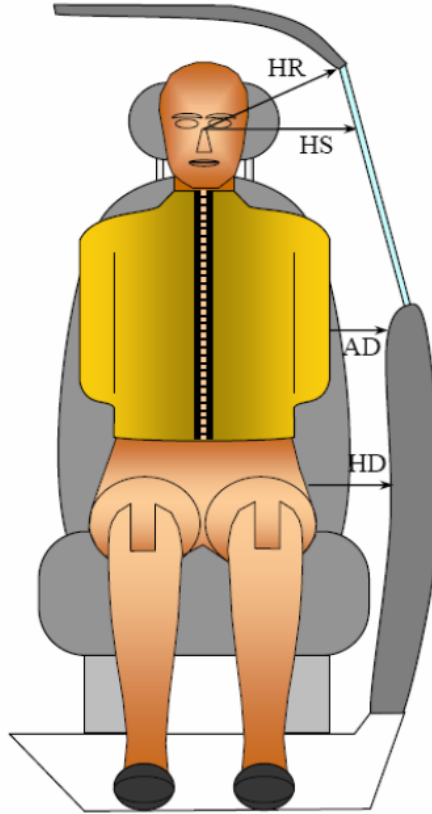
### DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck

NHTSA No. MC0208

Test Program: NCAP MDB Side Impact Test

Test Date: 02/24/12



**FRONT VIEW OF DUMMY**

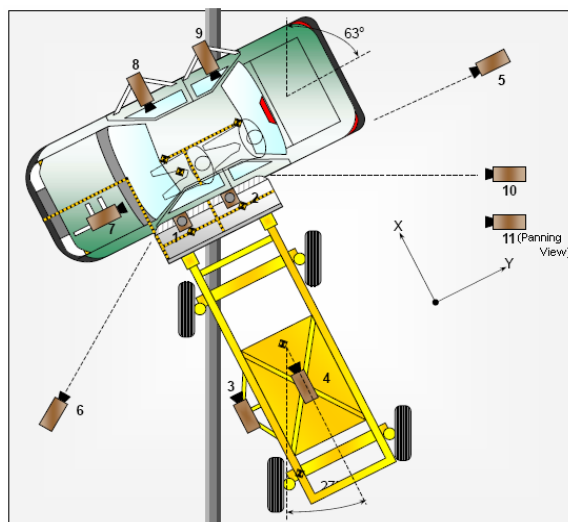
### DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

Code	Measurement Description	Units	Driver	Passenger
HR	Head to Side Header	mm	181	291
HS	Head to Side Window	mm	314	364
AD	Arm to Door	mm	123	160
HD	H-Point to Door	mm	219	229

## DATA SHEET NO. 5

### CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12



#### 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)	443	-679	-739	35	1000
8	Driver Side (On-Board)	1598	848	-425	14	1000
9	Passenger Side (On-Board)	1675	1786	-465	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  $\pm 6$  mm

#### INSTRUMENTATION

Driver Dummy Channels	16
Passenger Dummy Channels	16
Vehicle Structure Accelerometers	23
MDB Accelerometers	5
<b>Total</b>	<b>60</b>

**DATA SHEET NO. 6**

**TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

Loc. No.	Sensor Description	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	3359	0	-606
2	Right Sill at Front Seat	3980	752	-580
3	Right Sill at Rear Seat	2971	845	-580
4	Left Sill at Front Door	3922	-525	-350
5	Left Sill at Rear Door	3117	-525	-350
6	A-Pillar Lower	4625	-833	-790
7	A-Pillar Middle	4625	-833	-1085
8	B-Pillar Lower	3396	-850	-818
9	B-Pillar Middle	3396	-850	-1155
10	Front Seat Track	3717	-728	-749
11	Rear Seat Structure	2890	640	-725
12	Right Rear Occupant Compartment	3374	514	-599
13	Engine Block	5375	110	-1015
14	Rear Floorpan Above Axle	1235	410	-719

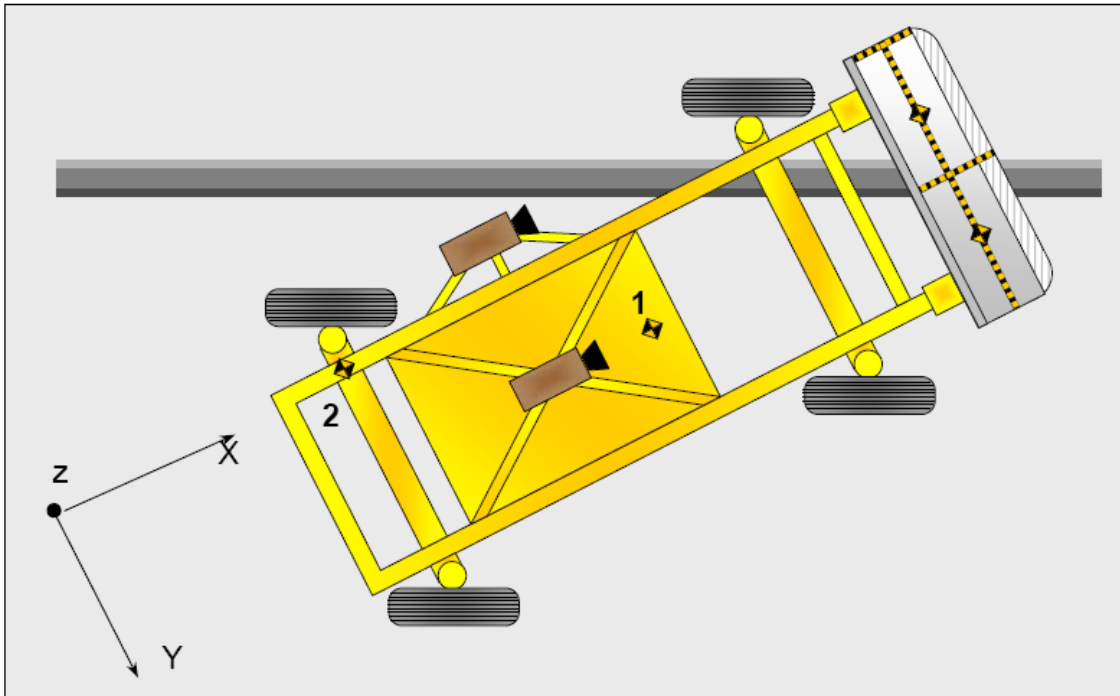
Reference: X – Rear surface of vehicle (+ forward)  
 Y – Vehicle centerline (+ to right)  
 Z – Ground plane (+ down)

**DATA SHEET NO. 7**

**MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208

Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12



**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: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12

**TEST DUMMY INFORMATION AND CONTACT POINTS**

Dummy Body Part	Front Seat Dummy (ES-2re)	Rear Seat Dummy (SID-IIs)
Face	Side Header, Curtain Airbag	Curtain Airbag
Top of Head	Side Header	Curtain Airbag
Left Side of Head	Side Header, Curtain Airbag	Curtain Airbag, C-Pillar
Back of Head	Head Restraint	C-Pillar, Head Restraint
Left Shoulder	Curtain Airbag	C-Pillar
Upper Torso	Seat	Seat
Lower Torso	Seat	Seat
Left Hip	Seat, Door Panel	Seat
Left Knee	Door Panel	Right Knee

**POST-TEST DOOR PERFORMANCE**

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

**POST-TEST SEAT PERFORMANCE**

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

**POST-TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	No Separation
Sill Separation	No Separation
Windshield Damage	None
Side Window Damage	None
Other Notable Effects	None

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

**POST-TEST OBSERVATIONS**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

**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 1 (Torso/Pelvis)	Yes	Yes	No	
Seat Belt Pretensioner	Yes	Yes	No	
Seat Belt Load Limiter	Yes	Yes	No	
Other				

**IMPACT POINT LOCATION DATA**

Measured Parameter	Units	Tolerance	Value
Vehicle Wheel Base	mm		3985
Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point)	mm		507
Actual Impact Point (Aft of Front Axle)	mm		517
Horizontal Offset (+ forward / - rearward)	mm	± 50 of Intended Impact Point	-10
Vertical Offset (+ down / - up)	mm	± 20 of Intended Impact Point	-5

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

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

**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	402	298	700
Right	kg	377	292	669
Ratio	%	56.9%	43.1%	100.0%
Totals	kg	779	590	1368

**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	61.98
MDB CL to Target Vehicle CL	degrees	88.5 to 91.5	91.0
MDB Forward Line of Motion to Target Vehicle CL	degrees	62.5 to 63.5	63.0
MDB Crabbed Angle to MDB Forward Line of Motion	degrees	26.0 to 28.0	26.0

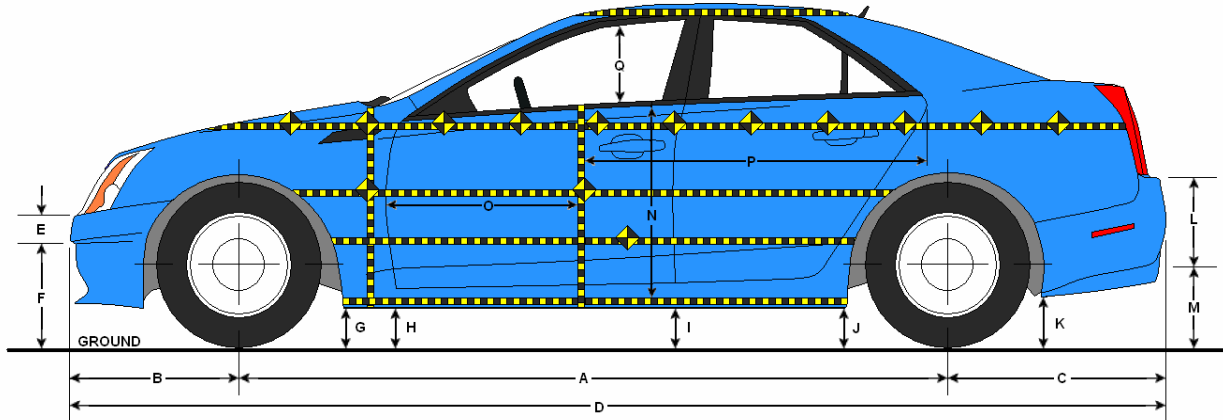
**MAXIMUM STATIC CRUSH OF HONEYCOMB FACE**

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	98
B	Top of Bumper	533	800	Left	169
C	Mid Level	686	800	Left	238
D	Top of Stack	813	800	Left	249

**DATA SHEET NO. 10**

**TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12



**LEFT SIDE VIEW**

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

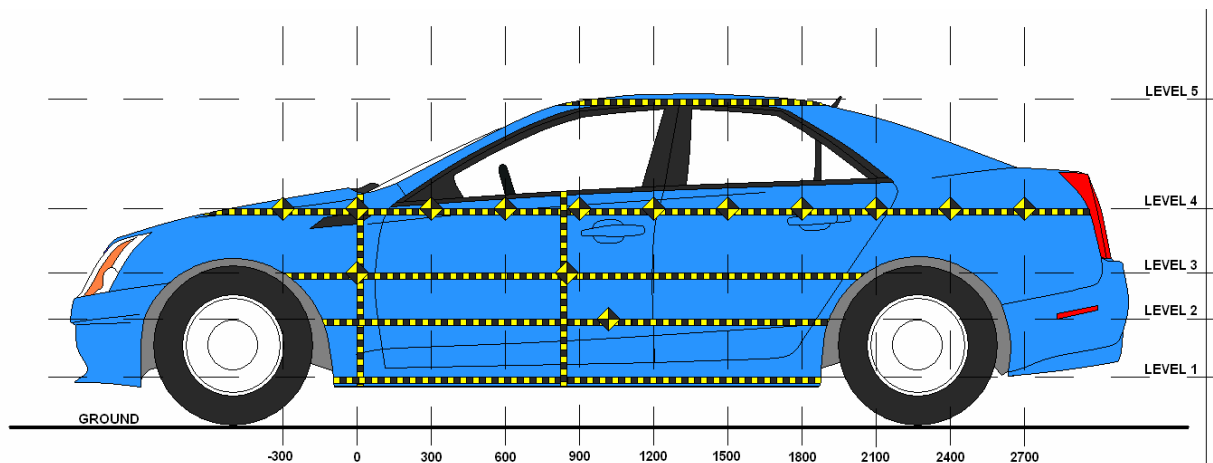
Code	Description	Pre-Test	Post-Test	Difference
A	Wheelbase	3985	3975	-10
B	Front Axle to FSOV	975	963	-12
C	Rear Axle to RSOV	1322	1325	3
D	Total Length at Centerline	6281	6263	-18
E	Front Bumper Thickness	228	229	1
F	Front Bumper Bottom to Ground	407	385	-22
G	Sill Height at Front Wheel Well	419	418	-1
H	Sill Height at Front Door Leading Edge	420	478	58
I	Sill Height at B-Pillar	448	444	-4
J1	Sill Height at Rear Wheel Well	479	453	-26
J2	Pinch Weld Height at Rear Wheel Well	430	379	-51
K	Sill Height Aft of Rear Wheel Well	511	490	-21
L	Rear Bumper Thickness	248	248	0
M	Rear Bumper Bottom to Ground	488	426	-62
N	Sill Height to Bottom of Front Window Sill	720	662	-58
O	Front Door Leading Edge to Impact CL	728	728	0
P	Rear Door Trailing Edge to Impact CL	1450	1349	-101
Q	Front Window Opening	615	630	15
R	Right Side Length	5528	5533	5
S	Left Side Length	5521	5503	-18
T	Vehicle Width at B-Pillar	2032	1843	-189

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

## DATA SHEET NO. 11

### TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12



**LEFT SIDE VIEW**

### MAXIMUM EXTERIOR CRUSH MEASUREMENTS

Level	Description	Height Above Ground (mm)	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	534	411	1500
2	Occupant H-Point	883	352	1650
3	Mid-Door	972	315	1650
4	Window Sill	1154	250	1500
5	Window Top	1870	-5	1500

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

**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208

Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12

**EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL**

	Pre-Test (mm)					Post-Test (mm)					Difference (mm)				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-900															
-750															
-600															
-450															
-300			486	526				528	550				42	24	
-150		485	495	522			549	545	554			64	50	32	
0	520	508	503	517		667	576	560	557		147	68	57	40	
150	532	504	500	516		712	631	609	573		180	127	109	57	
300	531	501	497	514		812	692	668	595		281	191	171	81	
450	531	499	495	510		838	723	682	601		307	224	187	91	
600	531	497	493	506		853	746	706	611		322	249	213	105	
750	530	496	492	503	752	863	754	707	621	566	333	258	215	118	-186
900	529	495	491	501	756	871	757	711	632	574	342	262	220	131	-182
1050	532	494	490	498	754	880	761	715	643	585	348	267	225	145	-169
1200	534	494	489	496	752	887	777	725	657	597	353	283	236	161	-155
1350	534	492	488	496	757	898	790	743	669	610	364	298	255	173	-147
1500	537	494	488	494	753	948	809	784	744	748	411	315	296	250	-5
1650	541	494	488	493	753	940	846	803	709	729	399	352	315	216	-24
1800	543	494	488	492	754	928	829	784	693	711	385	335	296	201	-43
1950	542	493	488	492	753	844	766	760	679	692	302	273	272	187	-61
2100	545	493	487	492	752	774	713	676	661	672	229	220	189	169	-80
2250	546	493	487	501	752	690	625	608	571	651	144	132	121	70	-101
2400	552	494	489	500		666	584	576	575		114	90	87	75	
2550	558	501	495	502		607	552	548	554		49	51	53	52	
2700	562	503	497			605	553	547	551		43	50	50		
2850	561	503	497			603	549	544	550		42	46	47		

DATA SHEET NO. 11 ... (CONTINUED)

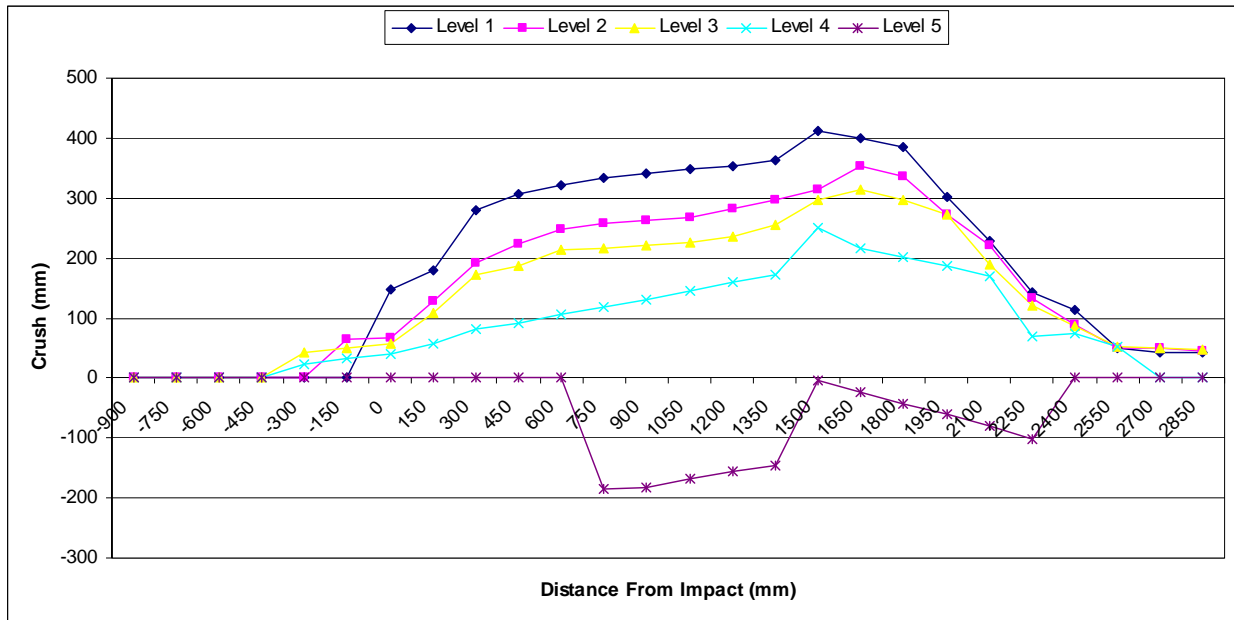
TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck

NHTSA No. MC0208

Test Program: NCAP MDB Side Impact Test

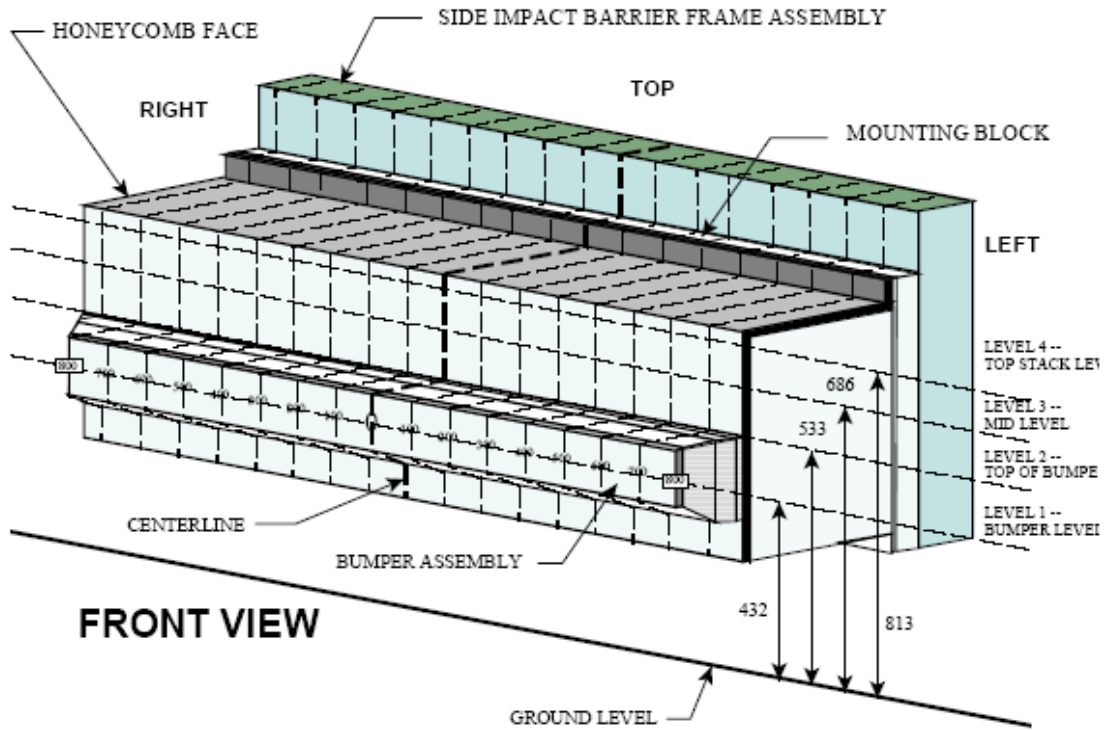
Test Date: 02/24/12



**DATA SHEET NO. 12**

**MDB EXTERIOR STATIC CRUSH MEASUREMENTS**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12



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	36	31	26	23	25	20	19	20	22	25	30	33	45	47	56	76	98
2	53	39	32	27	21	16	19	20	24	30	37	48	60	69	86	120	169
3	154	134	95	80	64	65	65	74	94	119	106	122	146	112	164	206	238
4	209	184	163	144	132	124	121	130	141	155	174	180	208	184	170	209	249

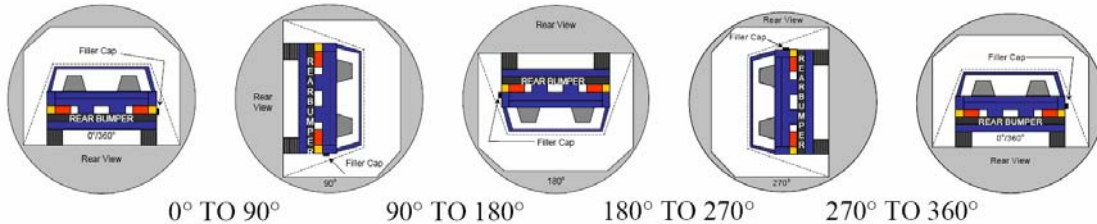
All dimensions in millimeters.

**DATA SHEET NO. 13**

**FMVSS NO. 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck NHTSA No. MC0208  
 Test Program: NCAP MDB Side Impact Test Test Date: 02/24/12  
 Temperature at Time of Impact: 21.7° C Test Time: 12:04 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: No spillage occurred  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	84	300	384
90° To 180°	82	300	382
180° To 270°	80	300	380
270° To 360°	79	300	379

**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			

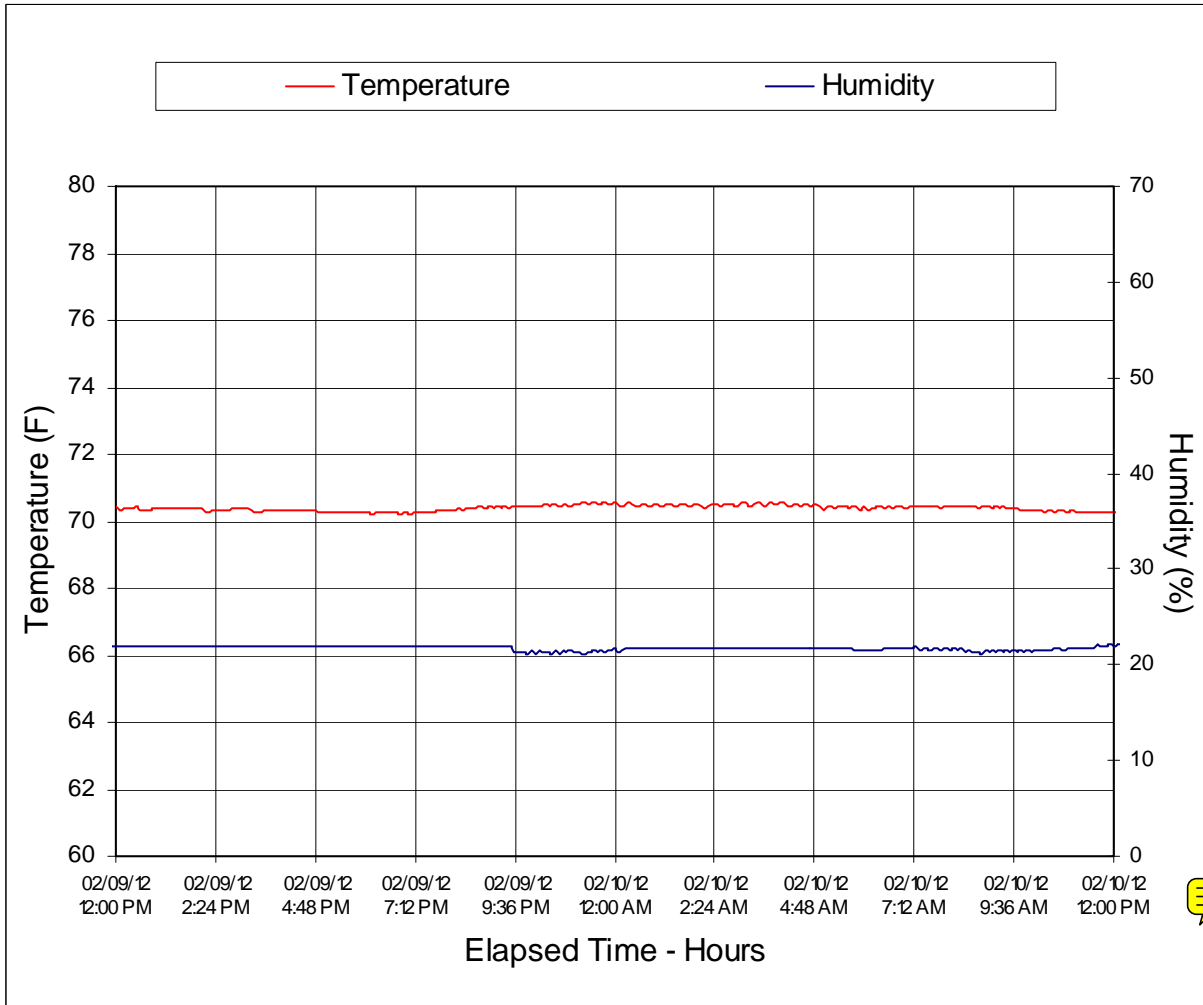
**SOLVENT SPILLAGE LOCATION TABLE**

Test Phase	Spillage Location
0° To 90°	No Spillage Occurred
90° To 180°	No Spillage Occurred
180° To 270°	No Spillage Occurred
270° To 360°	No Spillage Occurred

**DATA SHEET NO. 14**

**DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION**

Test Vehicle: 2012 Ford SuperDuty F-250 Crew Cab 4-Door Truck      NHTSA No. MC0208  
Test Program: NCAP MDB Side Impact Test      Test Date: 02/24/12



**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 Impact Zone



FIGURE 11. Pre-Test Rear View of Test Vehicle



FIGURE 12. Post-Test Rear View of Test Vehicle



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



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



FIGURE 15. Pre-Test Overhead View of Test Area



FIGURE 16. Post-Test Overhead View of Test Area



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



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



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



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



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, Chalking, and Contact Switches



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 Frontal 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



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



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



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

# Photograph Not Applicable

## No Driver Dummy Torso Contact With Side Airbag

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

# Photograph Not Applicable

## No Driver Dummy Pelvis Contact With Side Airbag

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



FIGURE 54. Pre-Test Left Side View of Rear Passenger Dummy Showing Belt, Chalking, and Contact Switches



FIGURE 55. Pre-Test Left Side View of Rear Passenger Dummy  
Shoulder and Door Top View



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



FIGURE 57. Pre-Test Frontal View of Rear Passenger Seat Back  
Prior to Dummy Positioning



FIGURE 58. Pre-Test Frontal View of Rear Passenger Dummy  
Head and Shoulders in Relation to Head Restraint



FIGURE 59. Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



FIGURE 60. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



FIGURE 61. Pre-Test View of Rear Passenger Dummy's Neck  
Showing Position of Adjustable Neck Bracket



FIGURE 62. Pre-Test View of Rear Passenger Dummy's Head  
Showing Dummy's Head is Level



FIGURE 63. Pre-Test Placement of Rear Passenger Dummy's Feet



FIGURE 64. Pre-Test View of Belt Anchorage for Rear Passenger Dummy



FIGURE 65. Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



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



FIGURE 67. Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



FIGURE 68. Pre-Test Rear Passenger Dummy and Door Clearance View



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



FIGURE 70. Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



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



FIGURE 72. Pre-Test Rear Passenger Inner Door Panel View



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



FIGURE 74. Post-Test Rear Passenger Dummy Close-Up  
Head Contact with Vehicle Interior View



**2012 FORD F-250  
MCO208  
02 / 10 / 12  
POST-TEST**

FIGURE 75. Post-Test Rear Passenger Dummy Close-Up  
Head Contact with Side Airbag View



**2012 FORD F-250  
MCO208  
02 / 10 / 12  
POST-TEST**

FIGURE 76. Post-Test Rear Passenger Dummy Close-Up  
Torso Contact with Vehicle Interior View

# Photograph Not Applicable

## Vehicle Not Equipped With Rear Passenger Side Airbag

FIGURE 77. Post-Test Rear Passenger Dummy Close-Up  
Torso Contact with Side Airbag View



FIGURE 78. Post-Test Rear Passenger Dummy Close-Up  
Pelvis Contact with Vehicle Interior View

# Photograph Not Applicable

## Vehicle Not Equipped With Rear Passenger Side Airbag

FIGURE 79. Post-Test Rear Passenger Dummy Close-Up  
Pelvis Contact with Side Airbag View



FIGURE 80. Pre-Test View of Fuel Filler Cap



FIGURE 81. Post-Test View of Fuel Filler Cap



FIGURE 82. Pre-Test Front View of MDB Impactor Face



FIGURE 83. Post-Test Front View of MDB Impactor Face



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



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



FIGURE 86. Pre-Test Left Side View of MDB Impactor Face



FIGURE 87. Post-Test Left Side View of MDB Impactor Face



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



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



FIGURE 90. Close-Up View of Vehicle's Certification Label



FIGURE 91. Close-Up View of Vehicle's Tire Information Placard

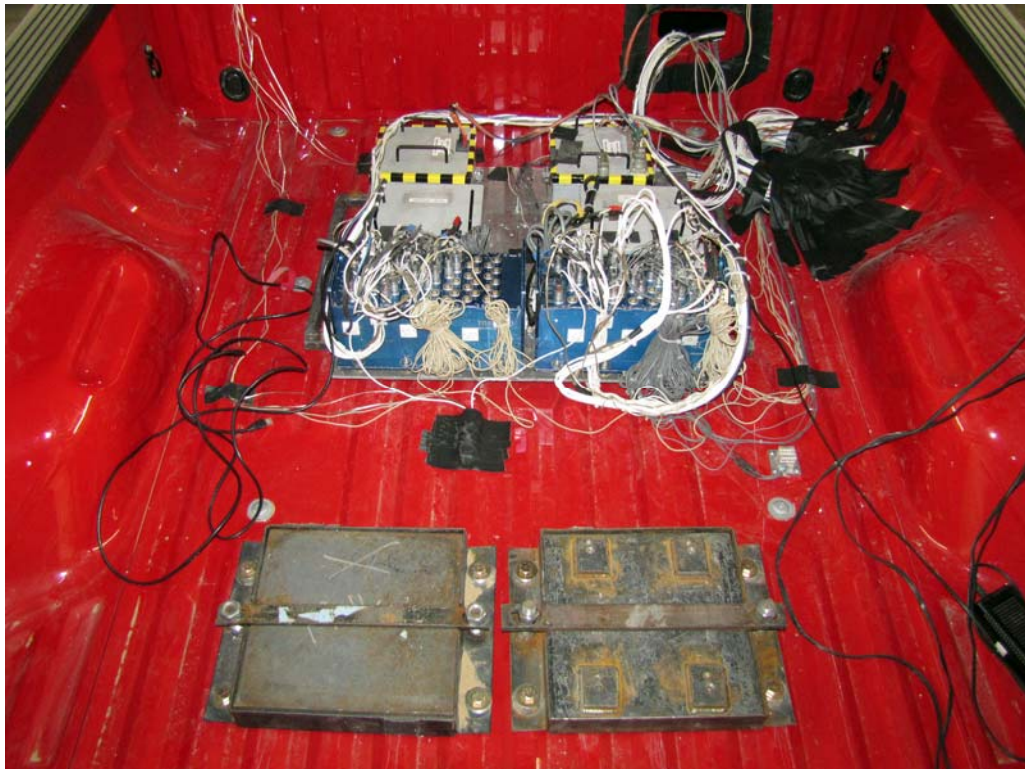


FIGURE 92. Pre-Test Ballast View



FIGURE 93. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 94. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 95. FMVSS No. 301 Static Rollover 90 Degrees

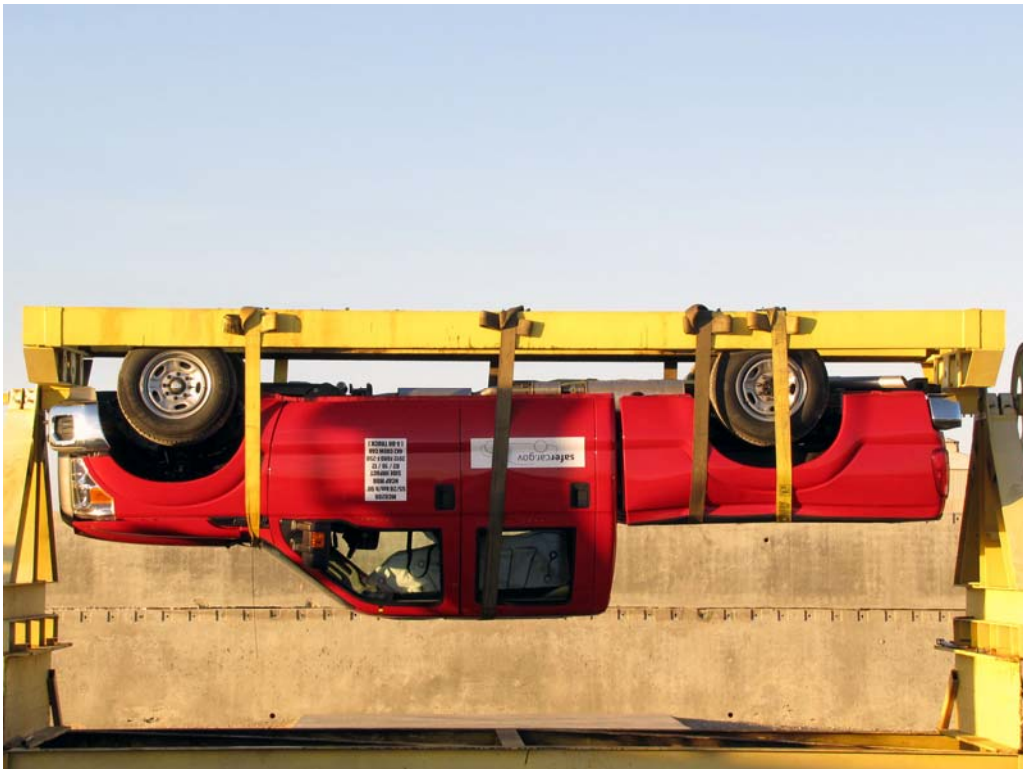


FIGURE 96. FMVSS No. 301 Static Rollover 180 Degrees



FIGURE 97. FMVSS No. 301 Static Rollover 270 Degrees



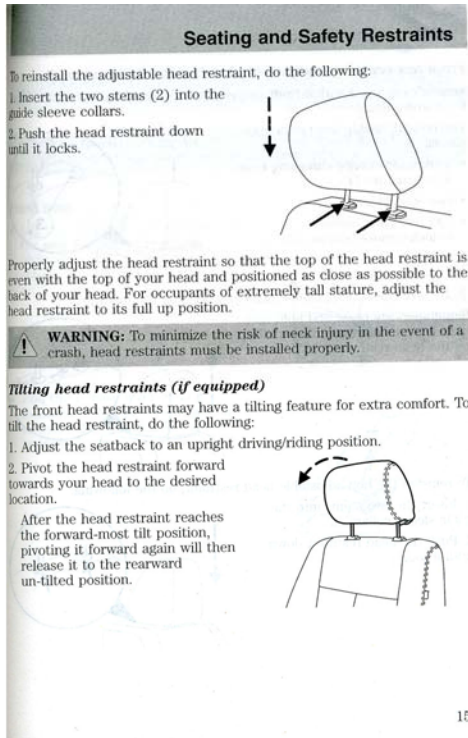
FIGURE 98. FMVSS No. 301 Static Rollover 360 Degrees



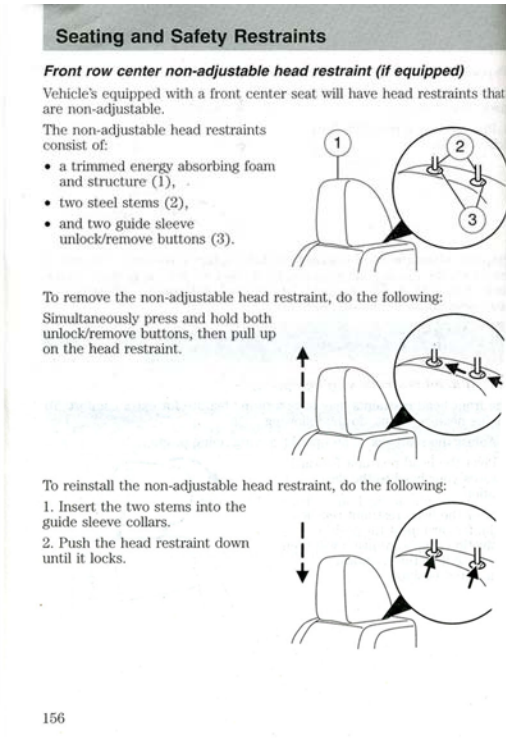
FIGURE 99. Impact Event

VEHICLE DESCRIPTION		2012 F2504X2 CREW CAB XL 166" WB STYLE-SIDE 4.3L EFI V-8 ENGINE 6 SPEED AUTOMATIC TRANS		EXTERIOR VERMILION RED INTERIOR STEEL CLOTH	CE A27719																																						
<p><b>Ford</b> <b>F-SERIES</b> <b>BUILT Ford TOUGH</b></p> <p>STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE</p> <p><b>EXTERIOR</b></p> <ul style="list-style-type: none"> <li>TOW HOOPS</li> <li>LOCKING REMOVABLE TAILGATE</li> <li>W/LIFT ASSIST-NA W/BOX DL</li> <li>PICKUP BOX, TIE DOWN HOOKS</li> <li>NA W/BOX DLT</li> <li>SPARE TIRE AND WHEEL LOCK</li> <li>NA W/BOX DLT</li> <li>BUMPERS - BLACK</li> <li>GRILLIC - BLACK</li> </ul> <p><b>INTERIOR</b></p> <ul style="list-style-type: none"> <li>AIR COND, MANUAL FRONT</li> <li>BLACK VINYL FLOOR COVERING</li> <li>FOLD DOWN REAR BENCH</li> <li>VINYL SUN VESGOS</li> </ul> <p><b>FUNCTIONAL</b></p> <ul style="list-style-type: none"> <li>FIXED INTERVAL WIPERS</li> <li>AV/FR STEREO W/CLOCK</li> <li>DAY/NIGHT REARVIEW MIRROR</li> <li>MANUAL TRAILER TOW MIRRORS</li> </ul>																																											
<p><b>EPA Fuel Economy Estimates</b></p> <p><b>FUEL ECONOMY RATINGS NOT REQUIRED ON THIS VEHICLE</b></p>																																											
<p><b>PRICE INFORMATION</b></p> <p>STANDARD VEHICLE PRICE <b>\$32,320.00</b></p> <p><b>OPTIONAL EQUIPMENT</b></p> <table border="1"> <tr><td>PREFERRED EQUIPMENT PKG. 600A</td><td>NO CHARGE</td></tr> <tr><td>6 SPEED AUTOMATIC TRANS</td><td>390.00</td></tr> <tr><td>3.73 ELECTRONIC LOCKING AXLE</td><td>1,165.00</td></tr> <tr><td>POWER EQUIPMENT GROUP</td><td>NO CHARGE</td></tr> <tr><td>XL DECOR PACKAGE</td><td>NO CHARGE</td></tr> <tr><td>1000SP CUMM. PACKAGE</td><td>160.00</td></tr> <tr><td>CAMPER PACKAGE</td><td>NO CHARGE</td></tr> <tr><td>SPARE TIRE AND WHEEL</td><td>NO CHARGE</td></tr> <tr><td>TRAILER BRAKE CONTROLLER</td><td>230.00</td></tr> <tr><td>12.5K TRAILER RITCH</td><td>NO CHARGE</td></tr> <tr><td>TELESCOPIC TT MIRR-PWR/HTD</td><td>NO CHARGE</td></tr> <tr><td>JACK</td><td>315.00</td></tr> <tr><td>AUX AUDIO INPUT JACK</td><td>595.00</td></tr> <tr><td>XL VALUE PACKAGE</td><td>NO CHARGE</td></tr> <tr><td>CRUISE CONTROL</td><td>NO CHARGE</td></tr> <tr><td>AM/FM STEREO CD/CLK</td><td>2,795.00</td></tr> <tr><td>TOTAL OPTIONS</td><td>2,795.00</td></tr> <tr><td>TOTAL VEHICLE &amp; OPTIONS</td><td>35,115.00</td></tr> <tr><td>DESTINATION &amp; DELIVERY</td><td>995.00</td></tr> </table>						PREFERRED EQUIPMENT PKG. 600A	NO CHARGE	6 SPEED AUTOMATIC TRANS	390.00	3.73 ELECTRONIC LOCKING AXLE	1,165.00	POWER EQUIPMENT GROUP	NO CHARGE	XL DECOR PACKAGE	NO CHARGE	1000SP CUMM. PACKAGE	160.00	CAMPER PACKAGE	NO CHARGE	SPARE TIRE AND WHEEL	NO CHARGE	TRAILER BRAKE CONTROLLER	230.00	12.5K TRAILER RITCH	NO CHARGE	TELESCOPIC TT MIRR-PWR/HTD	NO CHARGE	JACK	315.00	AUX AUDIO INPUT JACK	595.00	XL VALUE PACKAGE	NO CHARGE	CRUISE CONTROL	NO CHARGE	AM/FM STEREO CD/CLK	2,795.00	TOTAL OPTIONS	2,795.00	TOTAL VEHICLE & OPTIONS	35,115.00	DESTINATION & DELIVERY	995.00
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TOTAL VEHICLE & OPTIONS	35,115.00																																										
DESTINATION & DELIVERY	995.00																																										
<p><b>TOTAL MSRP \$36,110.00</b></p>																																											
<p><b>GOVERNMENT SAFETY RATINGS</b></p> <table border="1"> <tr> <td>Frontal Crash</td> <td>Driver Passenger</td> <td>Not Rated</td> </tr> <tr> <td>Side Crash</td> <td>Front seat Rear seat</td> <td>Not Rated</td> </tr> <tr> <td>Rollover</td> <td></td> <td>★★★★</td> </tr> </table> <p>Star ratings based on the risk of injury in a frontal impact. Frontal ratings should ONLY be compared to other vehicles of similar size and weight.</p> <p>Star ratings based on the risk of rollover in a single vehicle crash.</p> <p>Star ratings range from 1 to 5 stars (★★★★), with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA).</p>						Frontal Crash	Driver Passenger	Not Rated	Side Crash	Front seat Rear seat	Not Rated	Rollover		★★★★																													
Frontal Crash	Driver Passenger	Not Rated																																									
Side Crash	Front seat Rear seat	Not Rated																																									
Rollover		★★★★																																									
<p>RA35</p> <p>ONE</p>		<p>24E 902</p> <p>DEALER NO.</p>		<p>RAIL</p> <p>METHOD OF TRANSP.</p>																																							
<p>RA35</p> <p>ONE</p>		<p>24E 902</p> <p>DEALER NO.</p>		<p>RAIL</p> <p>METHOD OF TRANSP.</p>																																							
<p>RA35</p> <p>ONE</p>		<p>24E 902</p> <p>DEALER NO.</p>		<p>RAIL</p> <p>METHOD OF TRANSP.</p>																																							
<p>RA35</p> <p>ONE</p>		<p>24E 902</p> <p>DEALER NO.</p>		<p>RAIL</p> <p>METHOD OF TRANSP.</p>																																							

FIGURE 100. Monroney Label

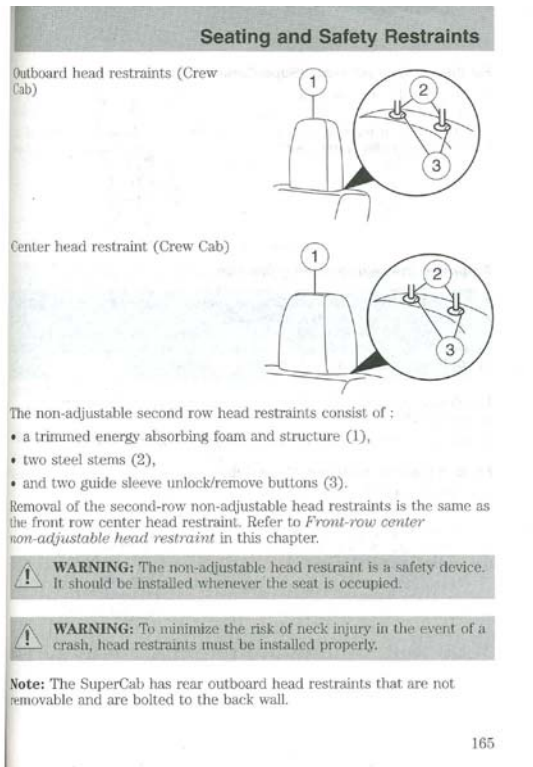


155



156

FIGURE 101. Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



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FIGURE 102. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

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

## TABLE OF DATA PLOTS

Plot		Page
1	Driver Head Acceleration (X) Primary vs. Time	B-1
2	Driver Head Acceleration (Y) Primary vs. Time	B-1
3	Driver Head Acceleration (Z) Primary vs. Time	B-1
4	Driver Head Resultant Acceleration Primary vs. Time	B-1
5	Driver Upper Thorax Rib Deflection (Y) vs. Time	B-2
6	Driver Middle Thorax Rib Deflection (Y) vs. Time	B-2
7	Driver Lower Thorax Rib Deflection (Y) vs. Time	B-2
8	Driver Thorax Rib Deflection Maximum vs. Time	B-2
9	Driver Anterior Abdominal Force (Y) vs. Time	B-3
10	Driver Middle Abdominal Force (Y) vs. Time	B-3
11	Driver Posterior Abdominal Force (Y) vs. Time	B-3
12	Driver Total Abdominal Force (Y) vs. Time	B-3
13	Driver Pubic Symphysis Force (Y) vs. Time	B-4
14	Passenger Head Acceleration (X) vs. Time Primary	B-5
15	Passenger Head Acceleration (Y) vs. Time Primary	B-5
16	Passenger Head Acceleration (Z) vs. Time Primary	B-5
17	Passenger Head Resultant Acceleration Primary vs. Time	B-5
18	Passenger Lower Spine T12 Acceleration (X) vs. Time	B-6
19	Passenger Lower Spine T12 Acceleration (Y) vs. Time	B-6
20	Passenger Lower Spine T12 Acceleration (Z) vs. Time	B-6
21	Passenger Lower Spine T12 Resultant Acceleration vs. Time	B-6
22	Passenger Iliac Force on Impact Side (Y) vs. Time	B-7
23	Passenger Acetabulum Force on Impact Side (Y) vs. Time	B-7
24	Passenger Total Pelvic Force on Impact Side (Y) vs. Time	B-7

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

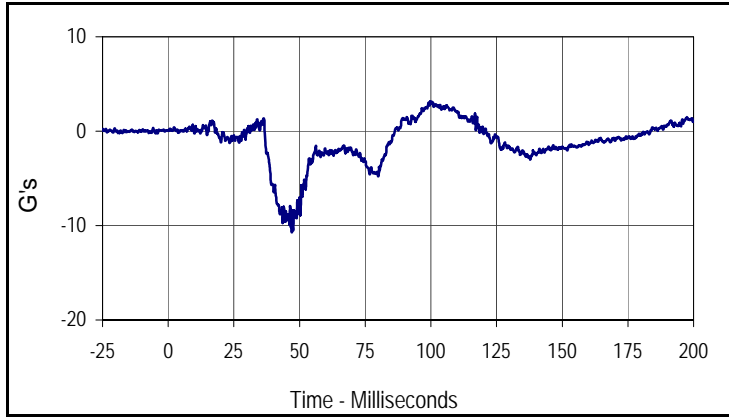
MDB Rear Acceleration (Y)

Left MDB Contact Switch

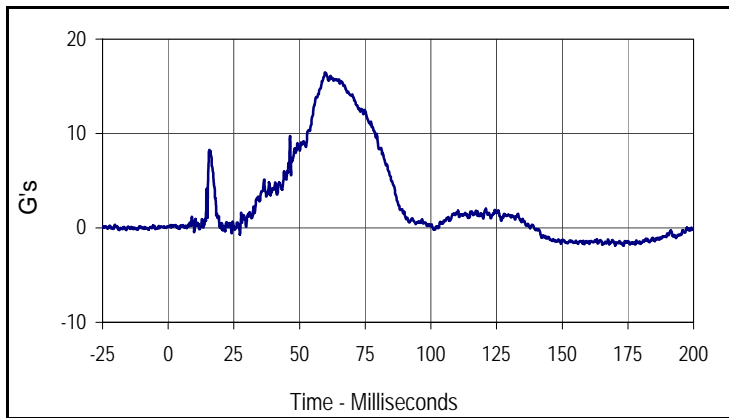
Right MDB Contact Switch

Test Vehicle: 2012 Ford SD F250 Crew Cab 4-Door Truck  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

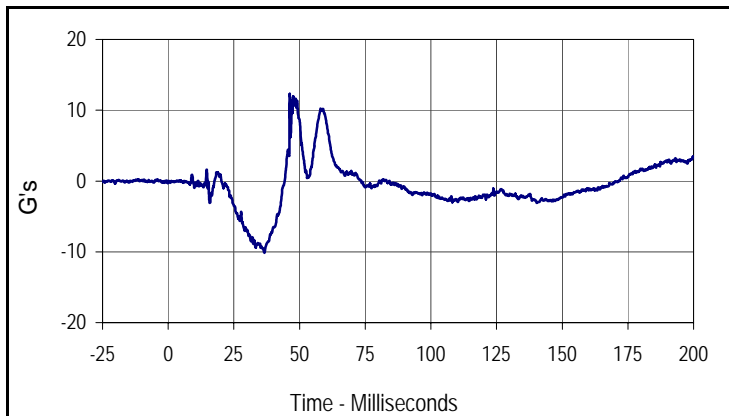
NHTSA No.: MC0208  
 Test Date: 2/10/12



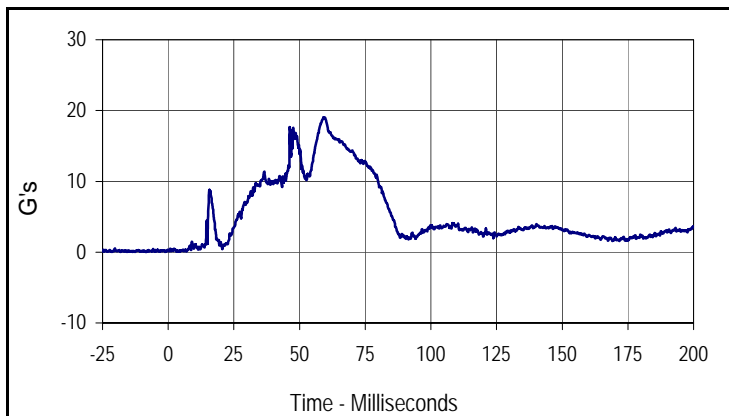
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
3.2	99.7	-10.7	47.0



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
16.5	59.8	-1.9	173.4



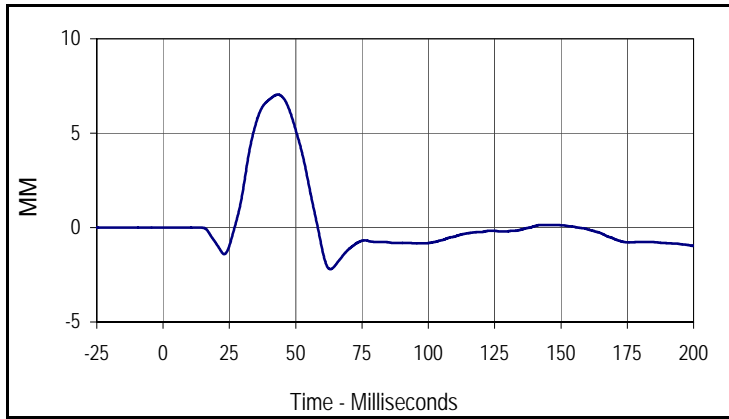
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
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Max	Time	Min	Time
12.3	46.3	-10.2	36.6



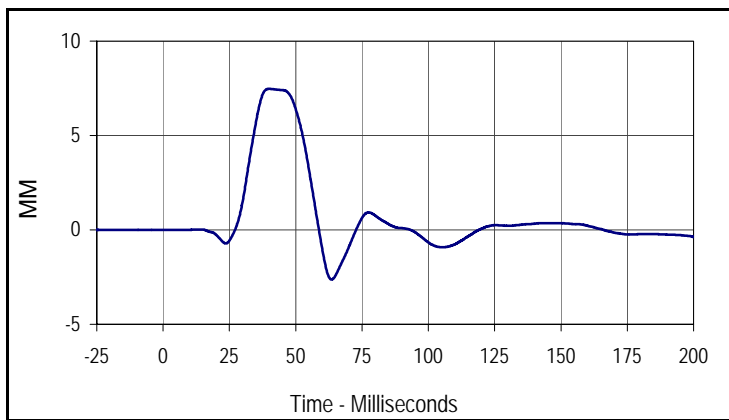
Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
19.0	59.7	0.1	6.9

Test Vehicle: 2012 Ford SD F250 Crew Cab 4-Door Truck  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

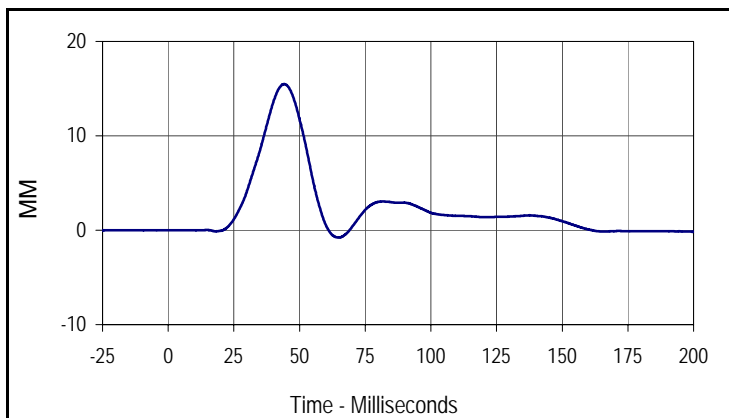
NHTSA No.: MC0208  
 Test Date: 2/10/12



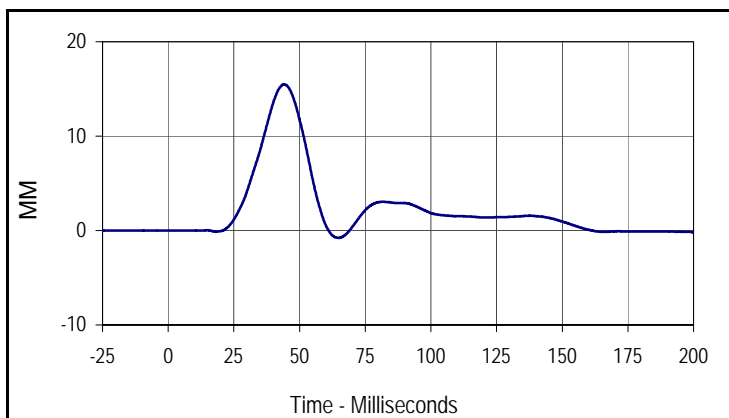
Curve Description			
Driver Upper Thorax Rib Deflection Y			
Plot No.	Type	SAE Class	Units
005	FIL	180	MM
Max	Time	Min	Time
7.0	43.3	-2.2	63.0



Curve Description			
Driver Middle Thorax Rib Deflection Y			
Plot No.	Type	SAE Class	Units
006	FIL	180	MM
Max	Time	Min	Time
7.5	40.0	-2.6	63.5



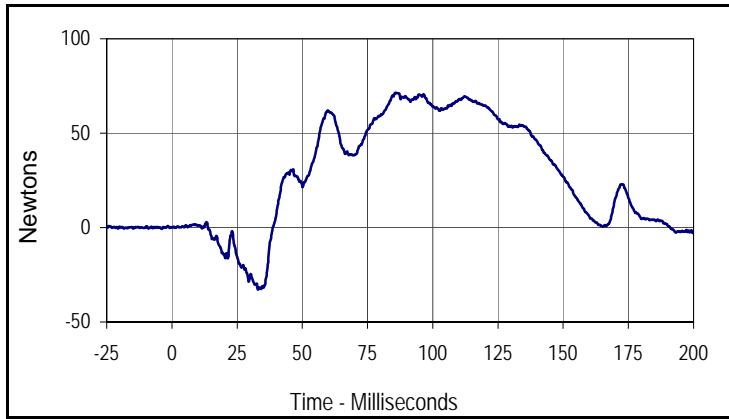
Curve Description			
Driver Lower Thorax Rib Deflection Y			
Plot No.	Type	SAE Class	Units
007	FIL	180	MM
Max	Time	Min	Time
15.5	44.2	-0.8	64.9



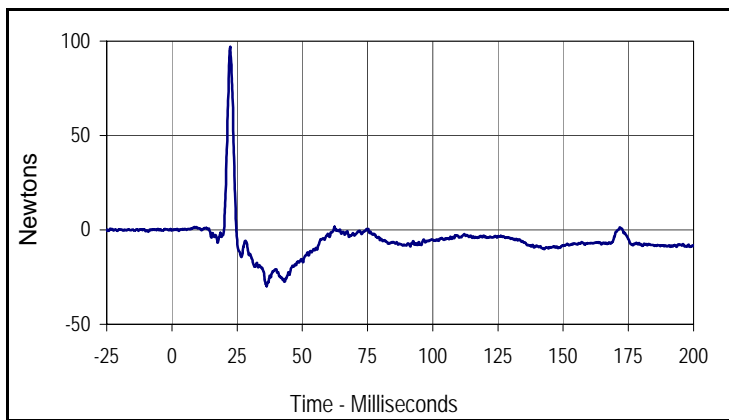
Curve Description			
Driver Thorax Rib Deflection Maximum			
Plot No.	Type	SAE Class	Units
010	FIL	180	MM
Max	Time	Min	Time
15.5	44.2	-0.8	64.9

Test Vehicle: 2012 Ford SD F250 Crew Cab 4-Door Truck  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

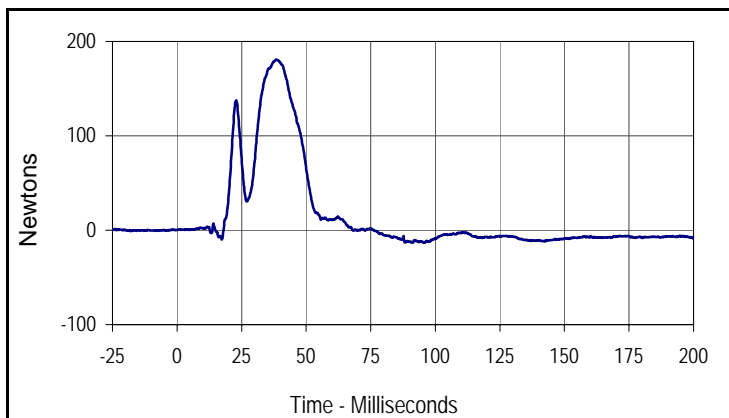
NHTSA No.: MC0208  
 Test Date: 2/10/12



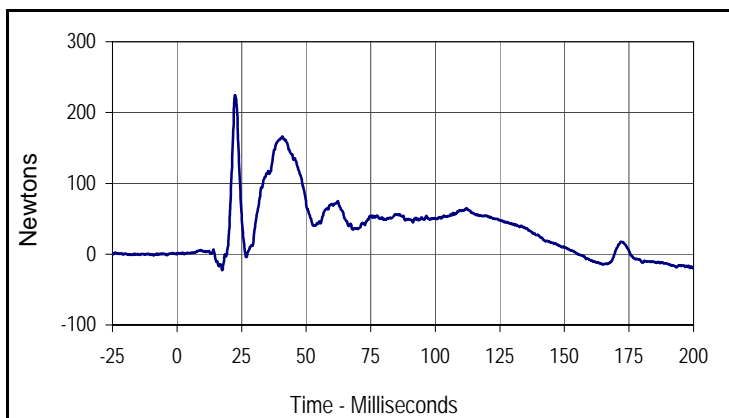
Curve Description			
Driver Anterior Abdominal Force Y			
Plot No.	Type	SAE Class	Units
008	FIL	600	Newtons
Max	Time	Min	Time
71.3	86.1	-32.8	33.0



Curve Description			
Driver Middle Abdominal Force Y			
Plot No.	Type	SAE Class	Units
009	FIL	600	Newtons
Max	Time	Min	Time
97.0	22.3	-29.9	36.3



Curve Description			
Driver Posterior Abdominal Force Y			
Plot No.	Type	SAE Class	Units
011	FIL	600	Newtons
Max	Time	Min	Time
180.8	38.3	-13.3	95.4



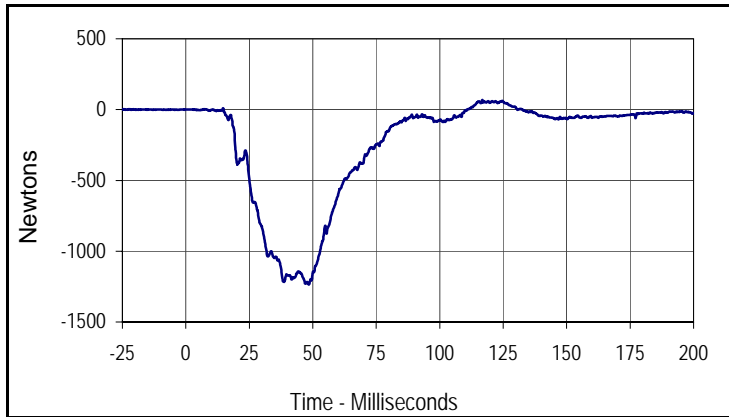
Curve Description			
Driver Total Abdominal Force			
Plot No.	Type	SAE Class	Units
012	SUM	600	Newtons
Max	Time	Min	Time
224.5	22.4	-22.5	17.5

Test Vehicle: 2012 Ford SD F250 Crew Cab 4-Door Truck

NHTSA No.: MC0208

Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

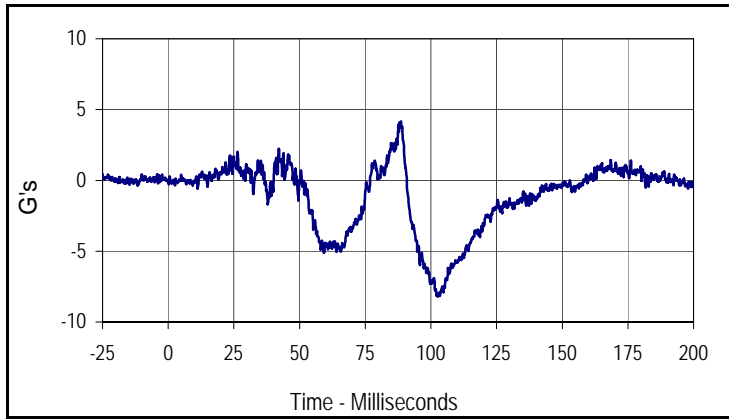
Test Date: 2/10/12



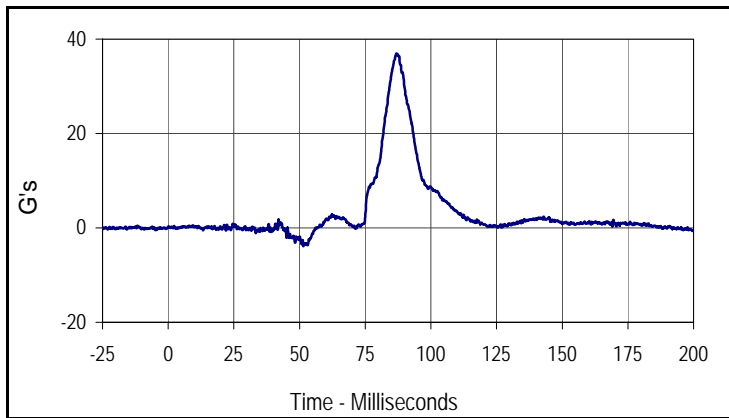
Curve Description			
Driver Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
013	FIL	600	Newtons
Max	Time	Min	Time
68.5	116.8	-1236.2	48.4

Test Vehicle: 2012 Ford SD F250 Crew Cab 4-Door Truck  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

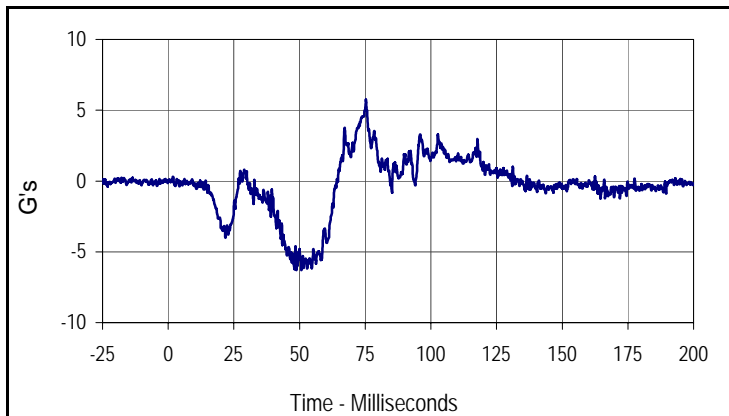
NHTSA No.: MC0208  
 Test Date: 2/10/12



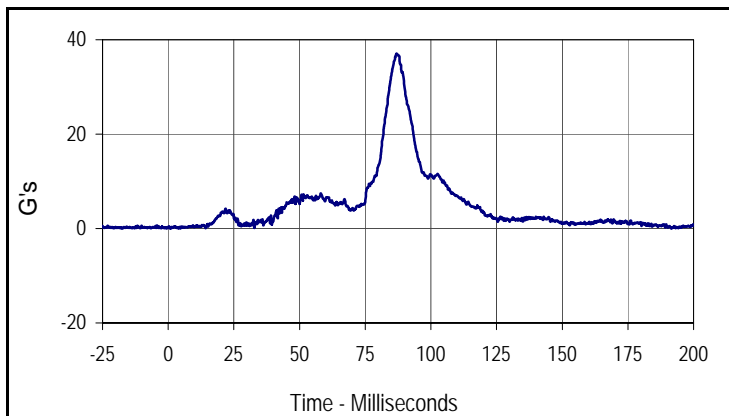
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
014	FIL	1000	G's
Max	Time	Min	Time
4.2	88.6	-8.2	102.6



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
37.0	86.9	-3.9	51.5



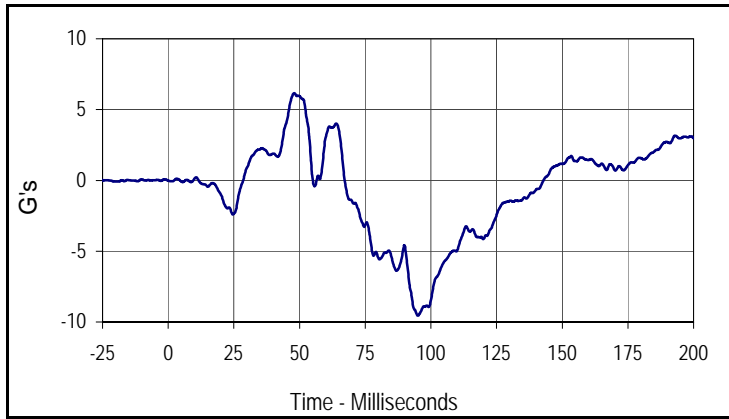
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
5.7	75.3	-6.3	50.7



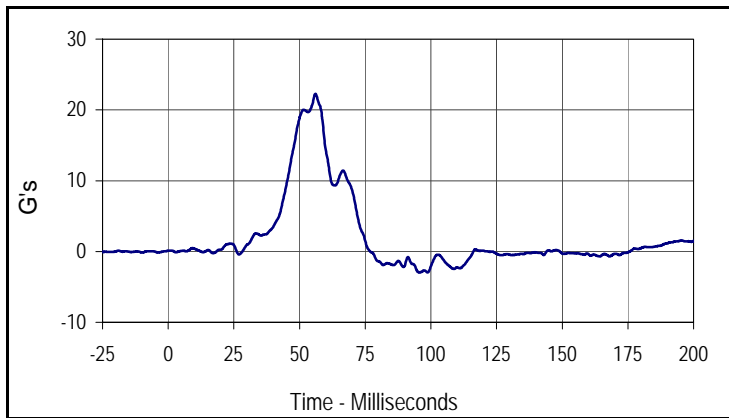
Curve Description			
Passenger Head Acceleration Resultant Primary			
Plot No.	Type	SAE Class	Units
017	RES	1000	G's
Max	Time	Min	Time
37.1	86.9	0.0	0.8

Test Vehicle: 2012 Ford SD F250 Crew Cab 4-Door Truck  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

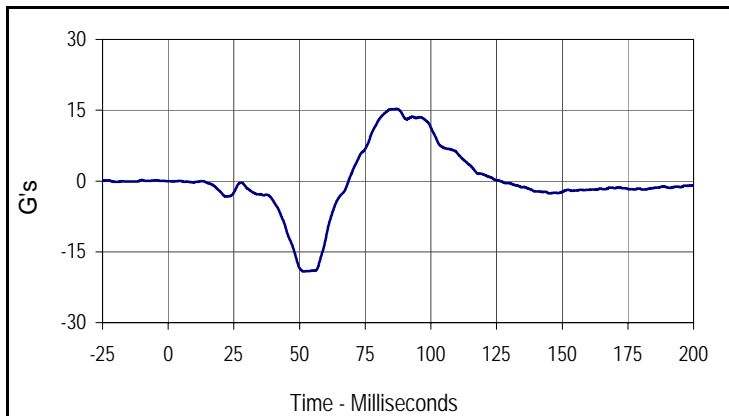
NHTSA No.: MC0208  
 Test Date: 2/10/12



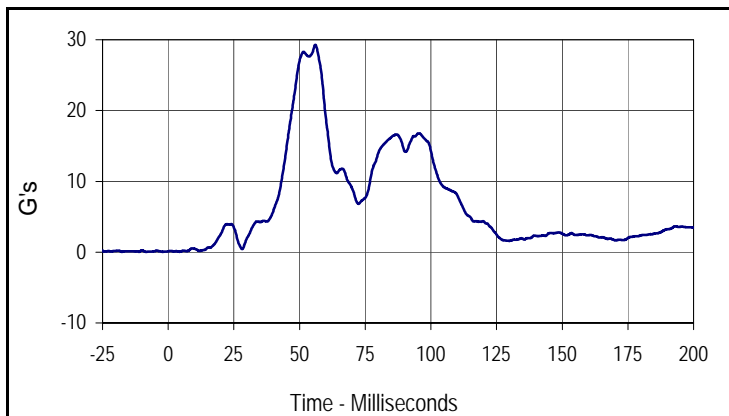
Curve Description			
Passenger Lower Spine T12 Acceleration X			
Plot No.	Type	SAE Class	Units
019	FIL	180	G's
Max	Time	Min	Time
6.2	47.9	-9.6	95.0



Curve Description			
Passenger Lower Spine T12 Acceleration Y			
Plot No.	Type	SAE Class	Units
020	FIL	180	G's
Max	Time	Min	Time
22.3	56.0	-3.0	98.7



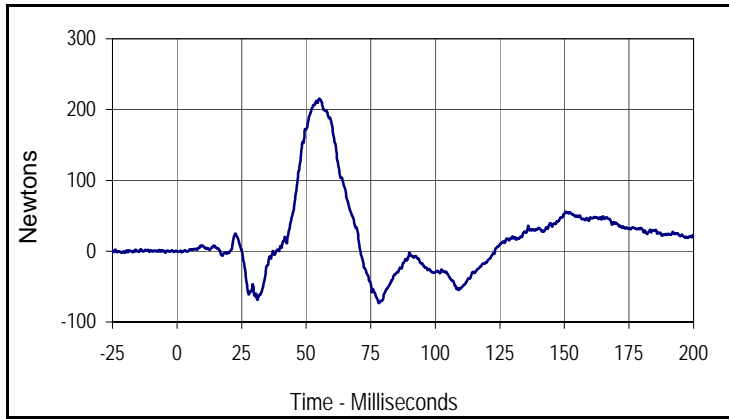
Curve Description			
Passenger Lower Spine T12 Acceleration Z			
Plot No.	Type	SAE Class	Units
021	FIL	180	G's
Max	Time	Min	Time
15.3	87.0	-19.2	51.6



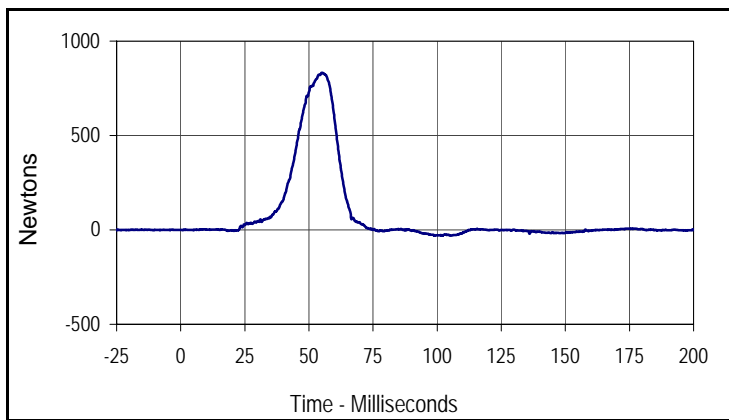
Curve Description			
Passenger Lower Spine T12 Acceleration Res.			
Plot No.	Type	SAE Class	Units
022	RES	180	G's
Max	Time	Min	Time
29.3	56.0	0.1	4.3

Test Vehicle: 2012 Ford SD F250 Crew Cab 4-Door Truck  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

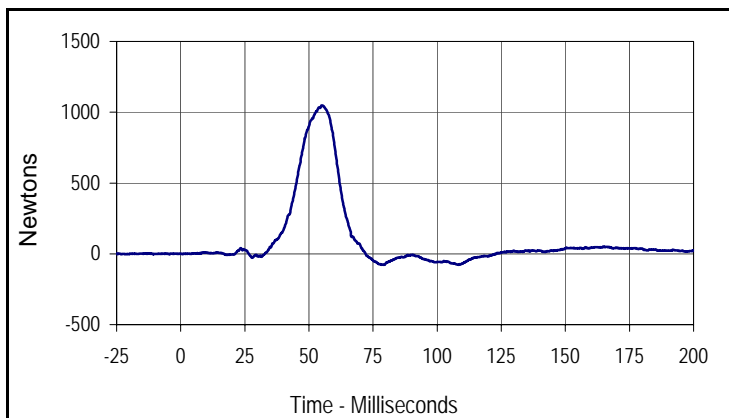
NHTSA No.: MC0208  
 Test Date: 2/10/12



Curve Description			
Passenger Iliac Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
023	FIL	600	Newtons
Max	Time	Min	Time
215.6	55.0	-73.3	78.2



Curve Description			
Passenger Acetabulum Force on Impact Side Y			
Plot No.	Type	SAE Class	Units
024	FIL	600	Newtons
Max	Time	Min	Time
832.5	55.3	-30.7	105.2



Curve Description			
Passenger Total Pelvic Force			
Plot No.	Type	SAE Class	Units
018	SUM	600	Newtons
Max	Time	Min	Time
1047.6	55.1	-77.8	79.1

**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: 2/3/12

ATD Serial No.: F035

Test I.D.: N/A



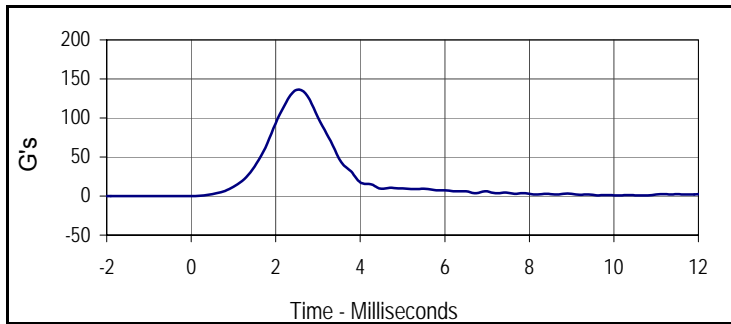
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	30	Pass
1 Sitting Height	mm	900 - 918	909	Pass
2 Seat to Shoulder Joint	mm	558 - 572	565	Pass
3 Seat to Lower Face of Thoracic Spine Box	mm	346 - 356	351	Pass
4 Seat to Hip Joint (Center of Bolt)	mm	97 - 103	99	Pass
5 Sole to Seat, Sitting	mm	333 - 451	385	Pass
6 Head Width	mm	152 - 158	156	Pass
7 Shoulder / Arm Width	mm	461 - 479	470	Pass
8 Thorax Width	mm	322 - 332	328	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	200	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	610	Pass
Overall Test Results				Pass

Test Program: ES2re Head Drop Test  
 ATD Serial No.: F035

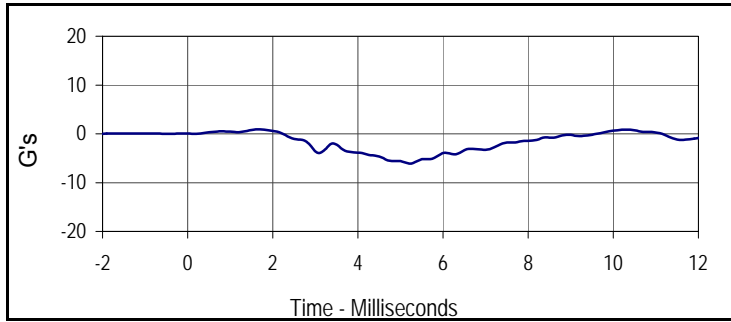
Test Date: 2/3/12  
 Test I.D.: F035HD025



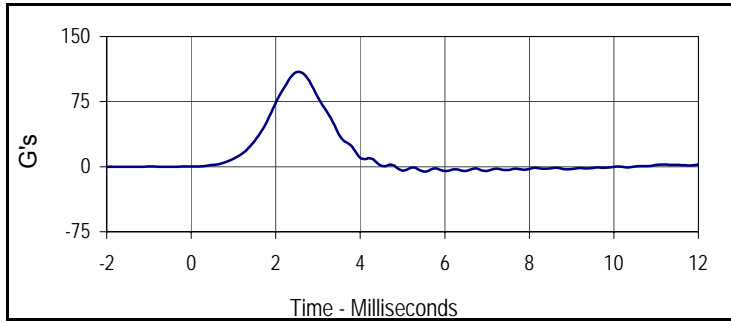
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	240	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.8	Pass
Peak Head Resultant Acceleration	G's	125 to 155	136.1	Pass
Peak Head X Acceleration	G's	≤15	6.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	7.2	Pass
<b>Overall Test Results</b>				<b>Pass</b>



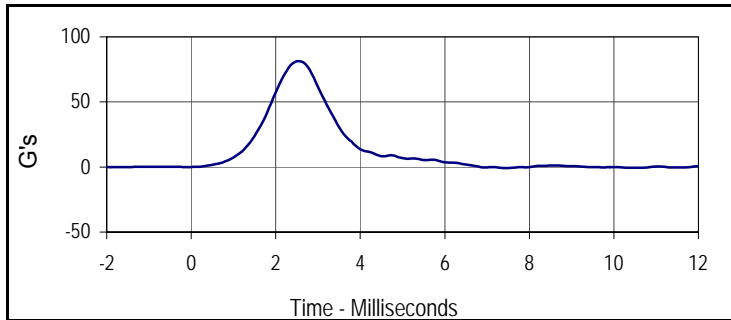
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
136.1	2.5	0.0	-2.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.9	1.7	-6.1	5.2



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
109.2	2.5	-5.6	5.5



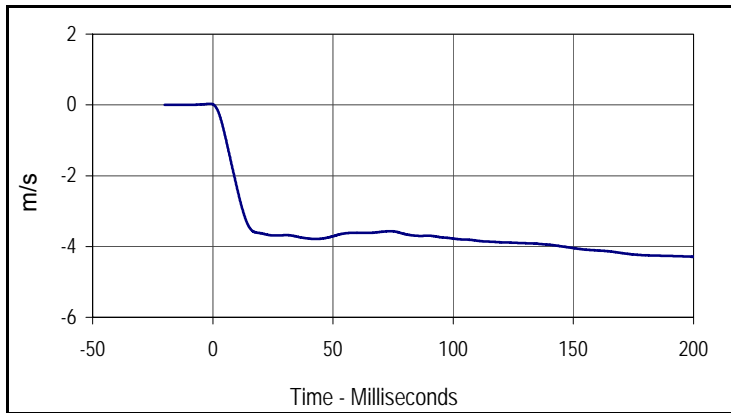
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
81.2	2.5	-0.8	7.4

Test Program: ES2re Neck Flexion Test  
 ATD Serial No.: F035

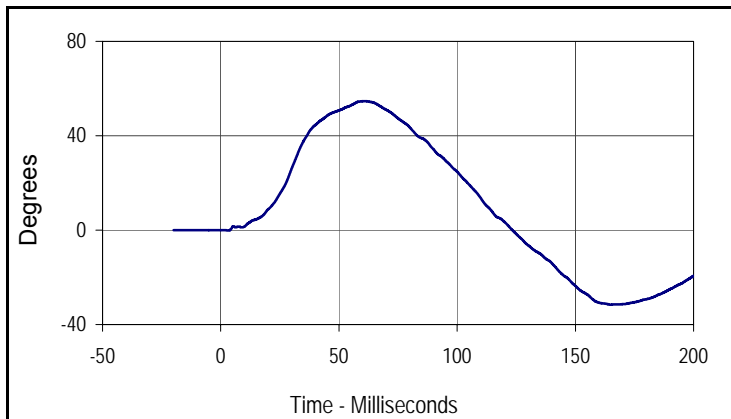
Test Date: 2/3/12  
 Test I.D.: F035NB025



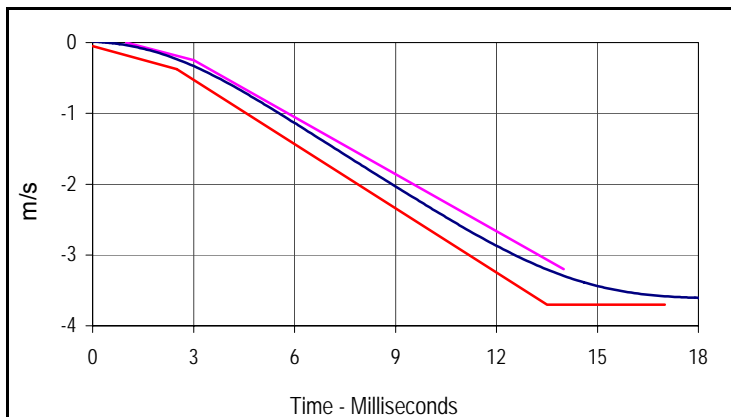
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	280	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	31.7	Pass
Pendulum Velocity	m/s	3.3 to 3.5	3.4	Pass
Headform Flexion	Max	49 to 59	54.6	Pass
	Time	54 to 66	61.0	Pass
Headform Flexion Decay (Peak to Zero)	msec	53 to 88	62.4	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.2	-4.3	200.0



Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
54.6	61.0	-31.6	164.9

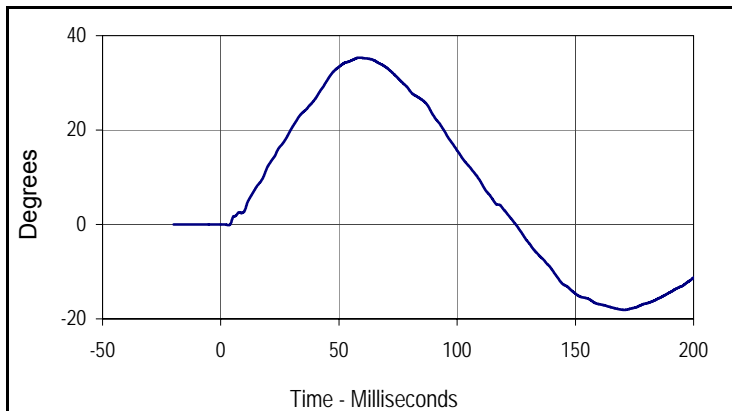


Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.2	-4.3	200.0

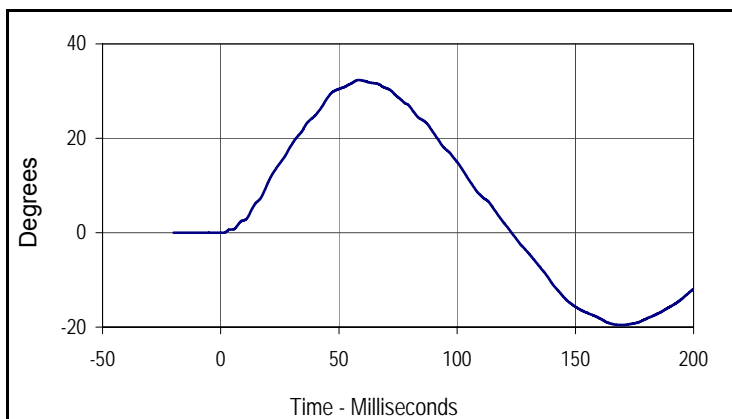
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.03	2.5	-0.375
14.0	-3.20	13.5	-3.70
		17.0	-3.70

Test Program: ES2re Neck Flexion Test  
 ATD Serial No.: F035

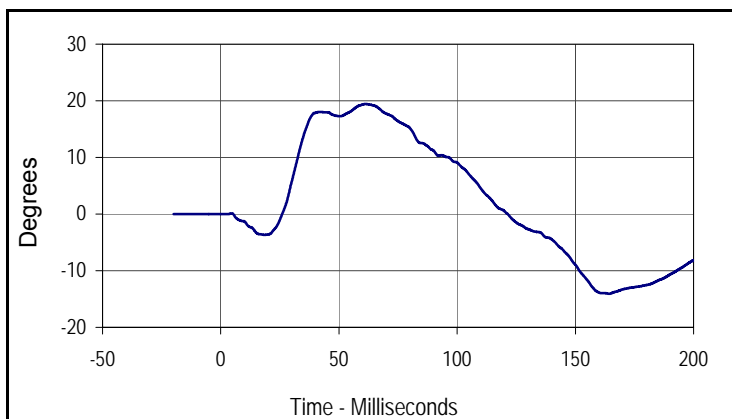
Test Date: 2/3/12  
 Test I.D.: F035NB025



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
35.3	58.6	-18.1	170.7



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
32.4	58.3	-19.5	169.4



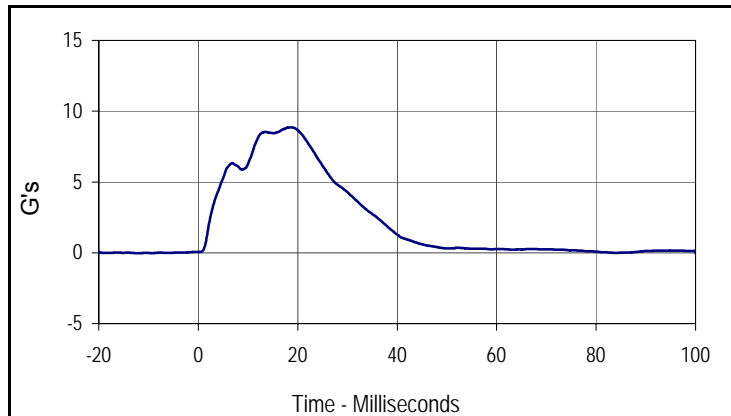
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
19.4	61.2	-14.1	164.3

Test Program: ES2re Shoulder Impact Test  
 ATD Serial No.: F035

Test Date: 2/3/12  
 Test I.D.: F035SH025



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	310	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.2	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.9	Pass
Overall Test Results				Pass



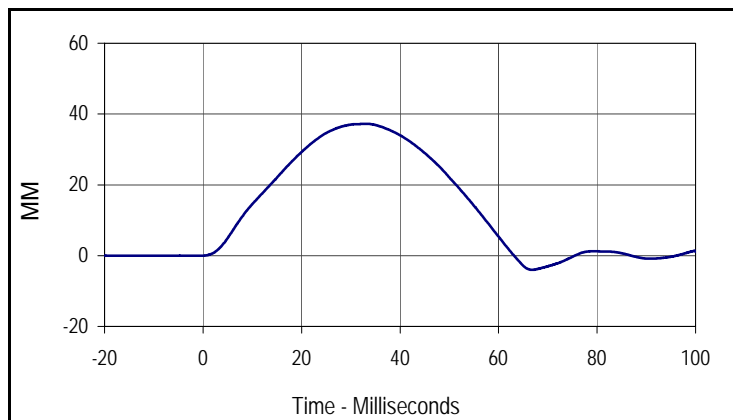
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
8.9	18.6	0.0	-12.4

Test Program: ES2re Thorax - Rib Drop Test  
 ATD Serial No.: F035 Rib #1

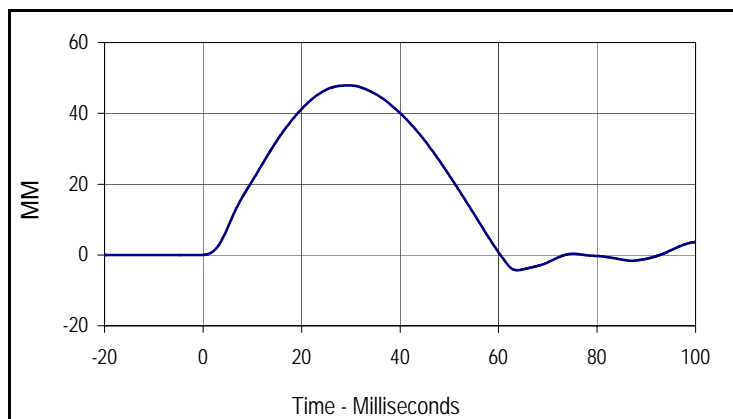
Test Date: 2/3/12  
 Test I.D.: F035RB1025



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	350	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	31.9	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	37.2	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	47.9	Pass
Overall Test Results				Pass



Curve Description			
Upper Rib Deflection (459 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
37.2	33.5	-4.0	66.8



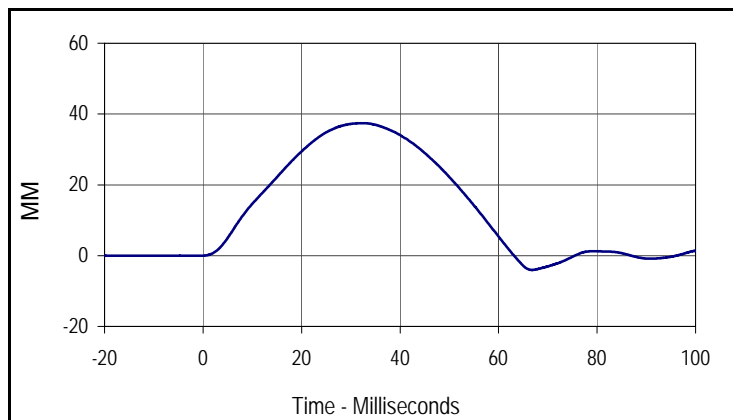
Curve Description			
Upper Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
47.9	29.9	-4.3	63.7

Test Program: ES2re Thorax - Rib Drop Test  
 ATD Serial No.: F035 Rib #2

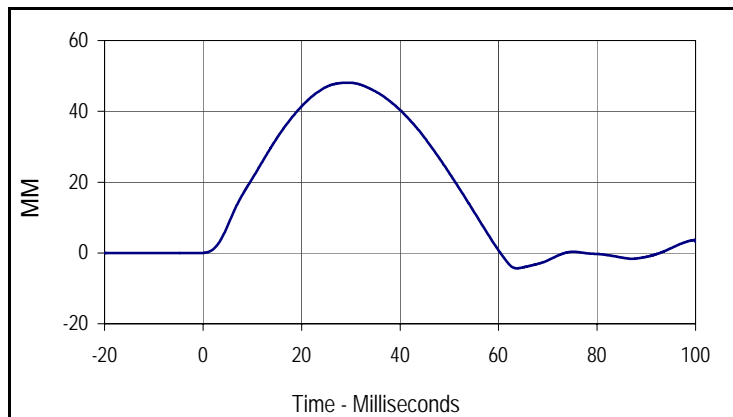
Test Date: 2/3/12  
 Test I.D.: F035RB2025



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	390	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.6	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	37.4	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	48.1	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
37.4	32.6	-4.1	66.8



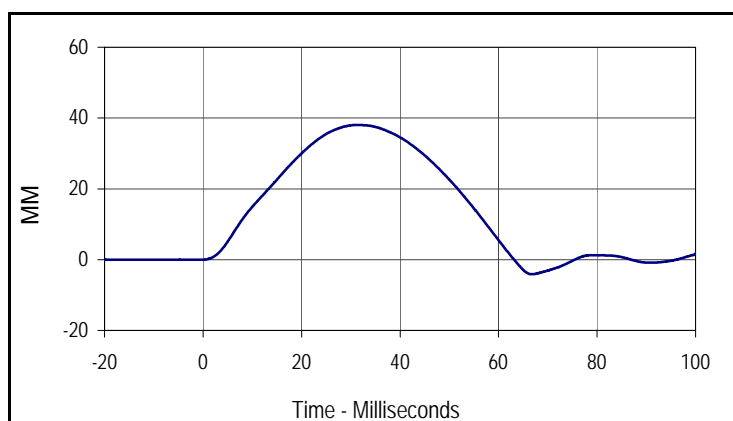
Curve Description			
Middle Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
48.1	29.7	-4.3	63.7

Test Program: ES2re Thorax - Rib Drop Test  
 ATD Serial No.: F035 Rib # 3

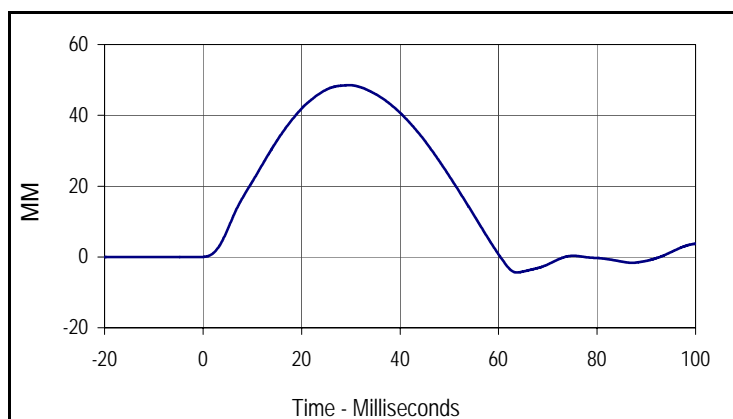
Test Date: 2/3/12  
 Test I.D.: F035RB3025



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	420	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.5	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	38.0	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	48.5	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
38.0	31.0	-4.1	66.8



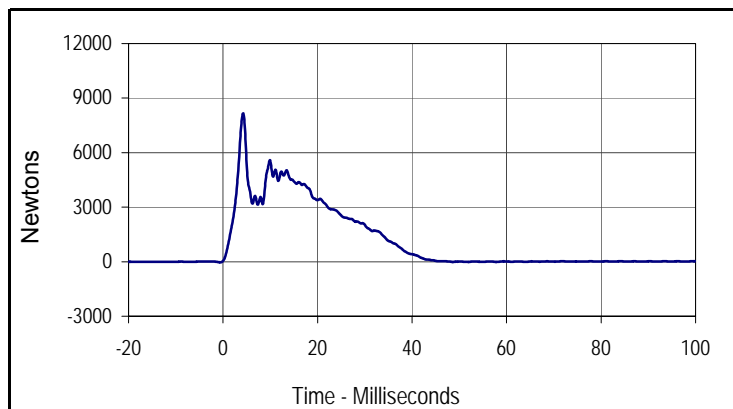
Curve Description			
Lower Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.5	29.7	-4.4	63.7

Test Program: ES2re Thorax - Full Body Impact Test  
 ATD Serial No.: F035

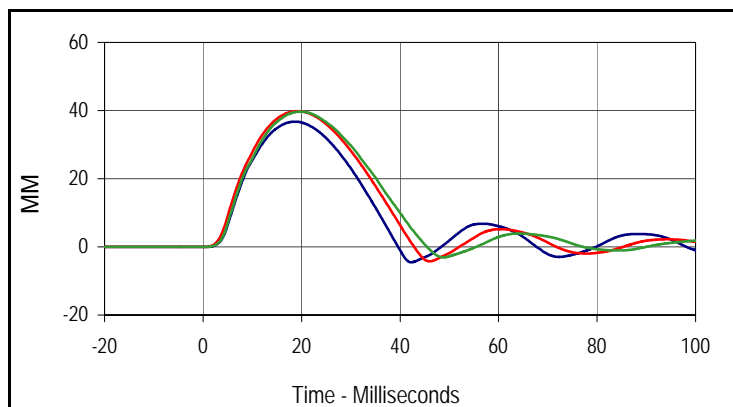
Test Date: 2/3/12  
 Test I.D.: F035TH025



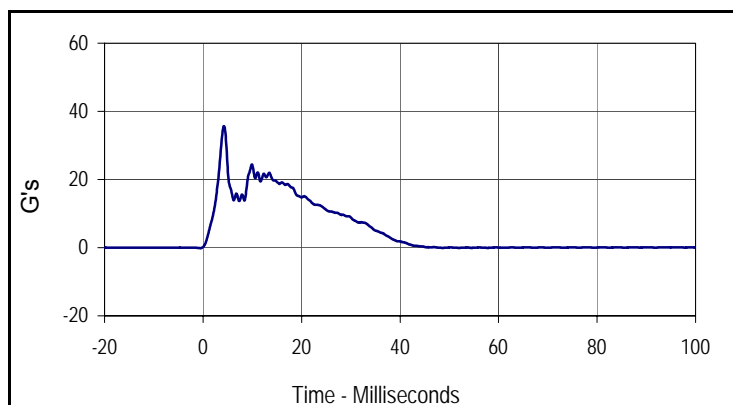
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	440	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.5	Pass
Peak Impactor Velocity	m/s	5.4 to 5.6	5.5	Pass
Peak Impactor Force	N	5100 to 6200	5593.8	Pass
	msec	> 6.0 msec	9.9	Pass
Peak Upper Rib Deflection	mm	34 to 41	36.7	Pass
Peak Middle Rib Deflection	mm	37 to 45	39.8	Pass
Peak Lower Rib Deflection	mm	37 to 44	39.7	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
8159.8	4.3	-33.6	-0.6



Curve Description			
Upper, Middle, Lower Rib Deflections			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max (Upper)	Time	Min (Upper)	Time
36.7	18.7	-4.5	42.3
Max (Middle)	Time	Min (Middle)	Time
39.8	19.3	-4.2	46.0
Max (Lower)	Time	Min (Lower)	Time
39.7	19.8	-3.1	48.8



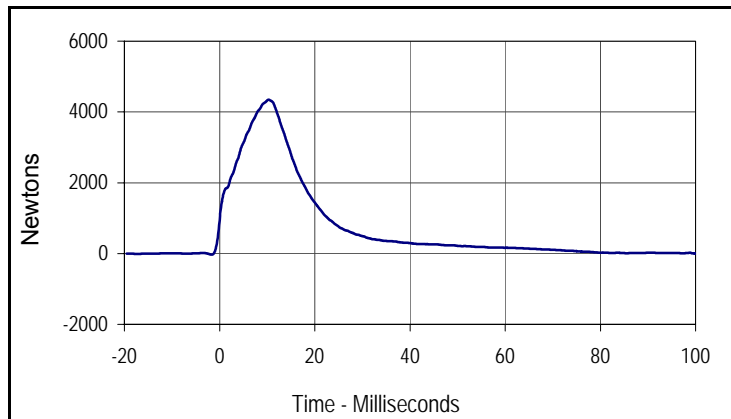
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
35.6	4.3	-0.1	-0.6

Test Program: ES2re Abdomen Impact Test  
 ATD Serial No.: F035

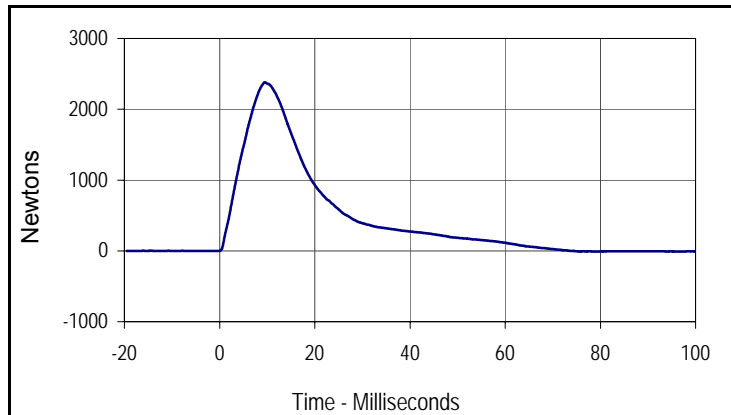
Test Date: 2/3/12  
 Test I.D.: F035ABD025



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	450	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	28.5	Pass
Probe Velocity	m/s	3.9 to 4.1	4.0	Pass
Peak Impactor Force	N	4000 to 4800	4345.6	Pass
	msec	10.6 to 13.0	11.7	Pass
Sum of Abdominal Forces	N	2200 to 2700	2382.4	Pass
	msec	10.0 to 12.3	10.9	Pass
<b>Overall Test Results</b>				<b>Pass</b>



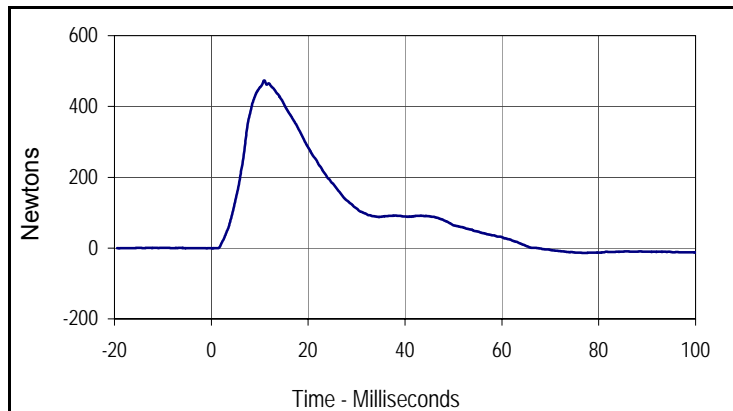
Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4345.6	11.7	-30.9	-0.3



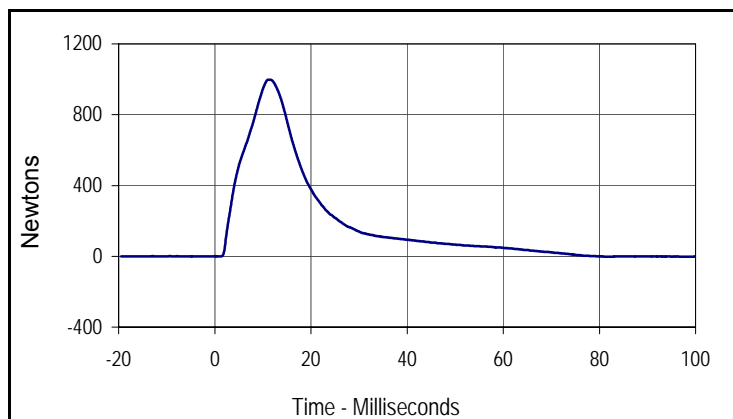
Curve Description			
Abdomen Sum Resultant			
Plot No.	Type	SAE Class	Units
002	RES	600	Newtons
Max	Time	Min	Time
2382.4	10.9	-9.5	81.0

Test Program: ES2re Abdomen Impact Test  
 ATD Serial No.: F035

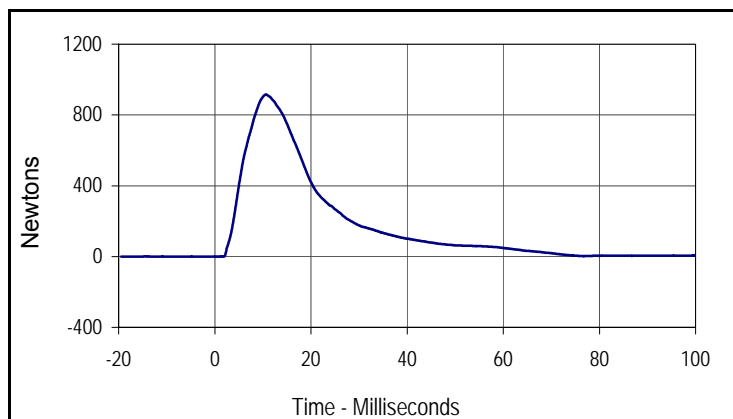
Test Date: 2/3/12  
 Test I.D.: F035ABD025



Curve Description			
Front Abdomen Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
473.7	10.9	-13.7	76.8



Curve Description			
Middle Abdomen Force			
Plot No.	Type	SAE Class	Units
004	FIL	600	Newtons
Max	Time	Min	Time
997.9	11.1	-8.5	101.7



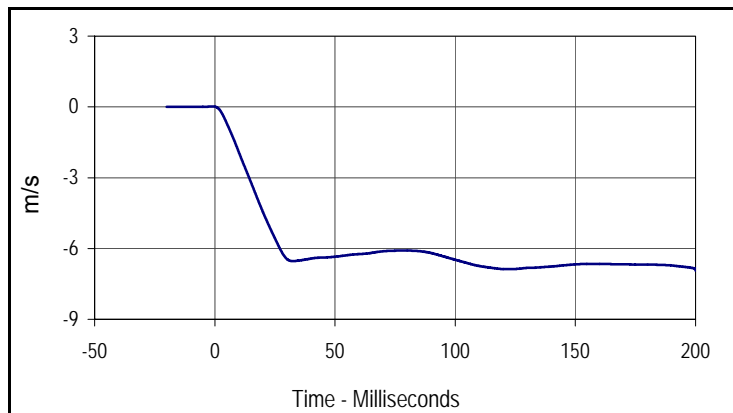
Curve Description			
Rear Abdomen Force			
Plot No.	Type	SAE Class	Units
005	FIL	600	Newtons
Max	Time	Min	Time
915.6	10.6	-8.5	101.7

Test Program: ES2re Lumbar Flexion Test  
 ATD Serial No.: F035

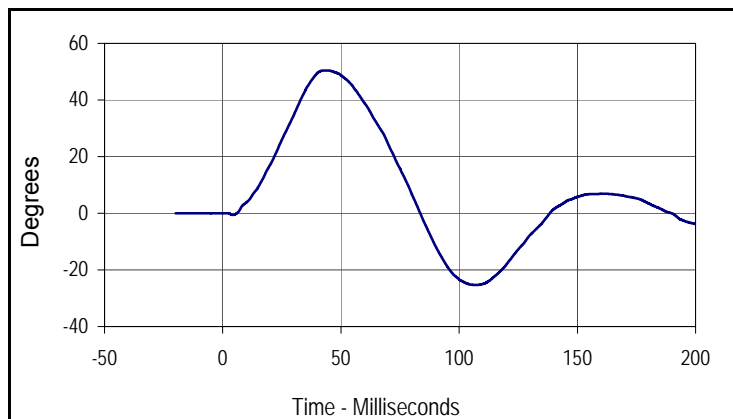
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 Test I.D.: F035LB025



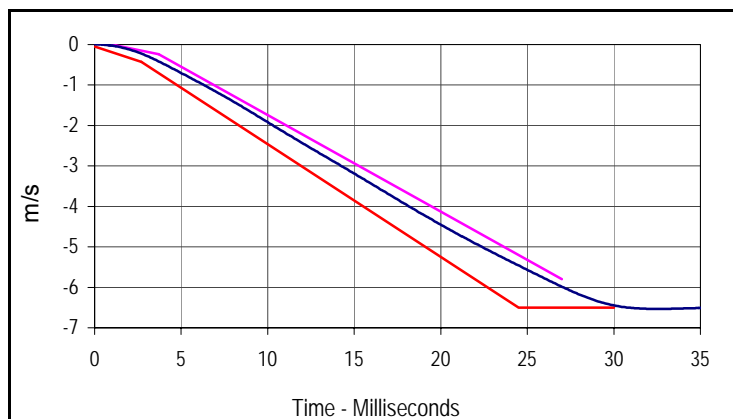
Tested Parameter	Units	Specification	Result	Pass/Fail
Lumbar Spine Assembly Soak Time	Minutes	≥240	370	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.2	Pass
Pendulum Velocity	m/s	5.95 to 6.15	6.07	Pass
Headform Rotation	Max	45 to 55	50.4	Pass
	Time	39 to 53	44.4	Pass
Time of Decay to Zero Angle from Peak	msec	37 to 57	39.2	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.0	-6.9	200.0



Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
50.4	44.4	-25.3	106.8

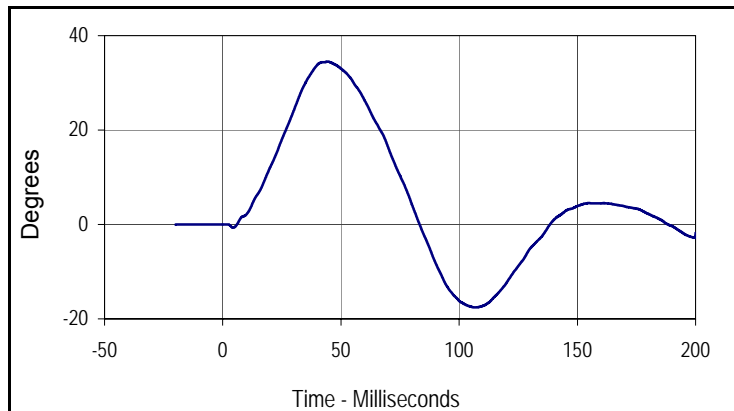


Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.0	-6.9	200.0

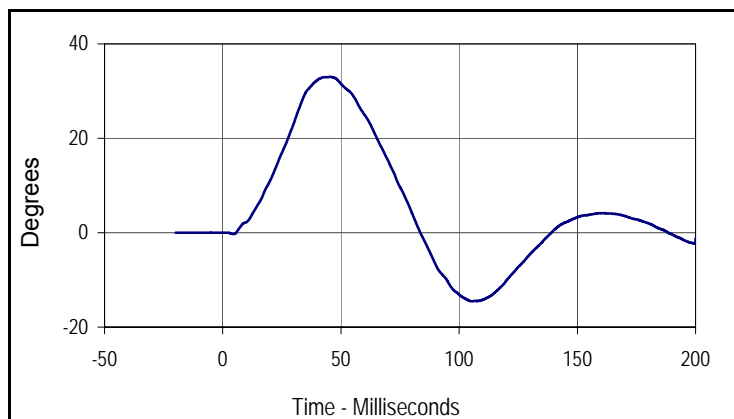
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.50
		30.0	-6.50

Test Program: ES2re Lumbar Flexion Test  
 ATD Serial No.: F035

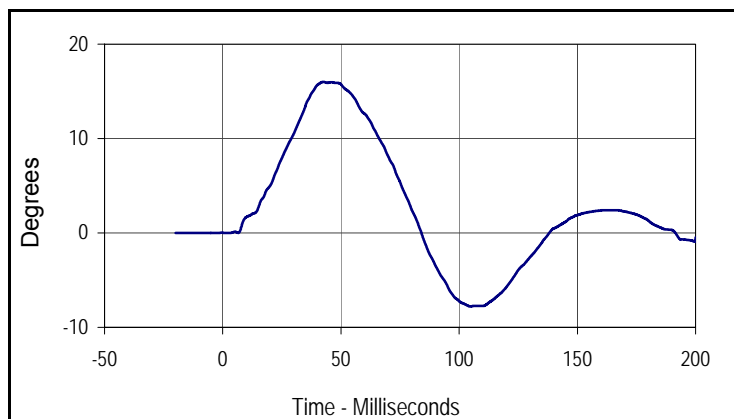
Test Date: 2/3/12  
 Test I.D.: F035LB025



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
34.5	44.4	-17.6	106.7



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
33.0	45.3	-14.5	105.4



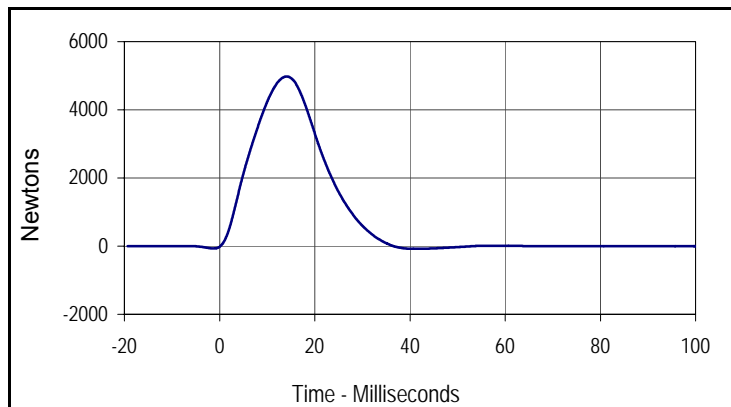
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
16.0	42.6	-7.8	104.8

Test Program: ES2re Pelvis Impact Test  
 ATD Serial No.: F035

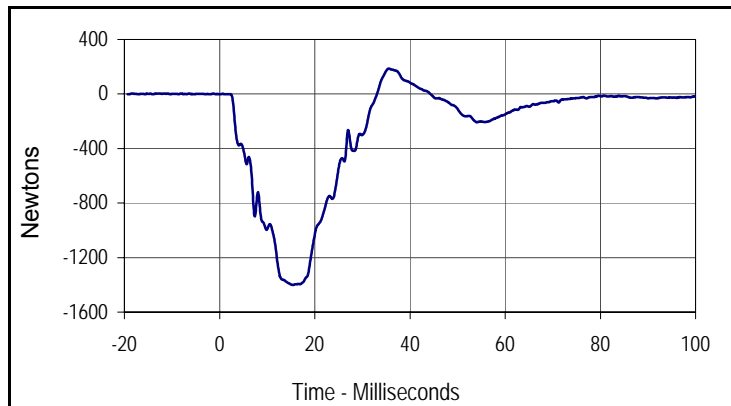
Test Date: 2/3/12  
 Test I.D.: F035PL025



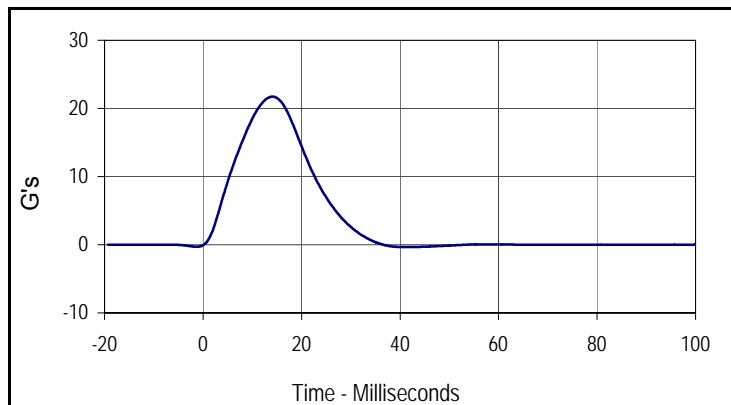
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	480	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	34.0	Pass
	Min		28.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	28.2	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Impactor Force	N	4700 to 5400	4977.3	Pass
	msec	11.8 to 16.1	14.1	Pass
Peak Pubic Symphysis Load	N	-1230 to -1590	-1401.6	Pass
	msec	12.2 to 17.0	15.5	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	60	Newtons
Max	Time	Min	Time
4977.3	14.1	-79.4	41.1



Curve Description			
Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
185.9	35.5	-1401.6	15.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	60	G's
Max	Time	Min	Time
21.7	14.1	-0.3	41.1

Test Program: SID IIs External Measurements

Test Date: 2/7/12

ATD Serial No.: 307

Test I.D.: N/A



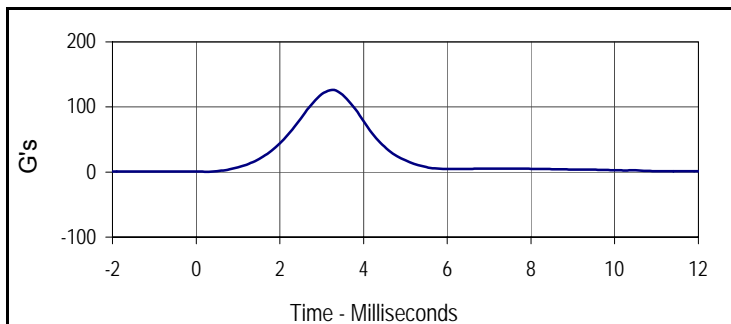
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	32	Pass
A Sitting Height	mm	772 - 788	780	Pass
B Shoulder Pivot Height	mm	437 - 453	445	Pass
C H-Point Height	mm	79 - 89	83	Pass
D H-Point from Seatback	mm	141 - 151	145	Pass
E Shoulder Pivot from Backline	mm	97 - 107	103	Pass
F Thigh Clearance	mm	119 - 135	126	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	183	Pass
J Head Circumference	mm	541 - 551	546	Pass
K Buttock to Knee Length	mm	514 - 540	528	Pass
L Popliteal Height	mm	343 - 369	349	Pass
M Knee Pivot to Floor Height	mm	392 - 409	401	Pass
N Buttock Popliteal Length	mm	416 - 442	430	Pass
O Chest Depth w/o Jacket	mm	195 - 211	205	Pass
P Foot Length	mm	216 - 232	221	Pass
Q Hip Breadth with Pelvic Plug	mm	313 - 323	318	Pass
R Arm Length	mm	249 - 259	252	Pass
S Knee Joint to Seatback	mm	477 - 493	482	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	874	Pass
Z Waist Circumference	mm	760 - 791	774	Pass
Overall Test Results				Pass

Test Program: SID IIs Head Drop Test  
 ATD Serial No.: 307

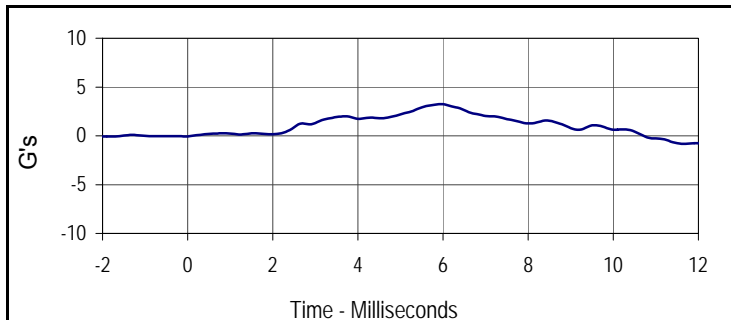
Test Date: 2/7/12  
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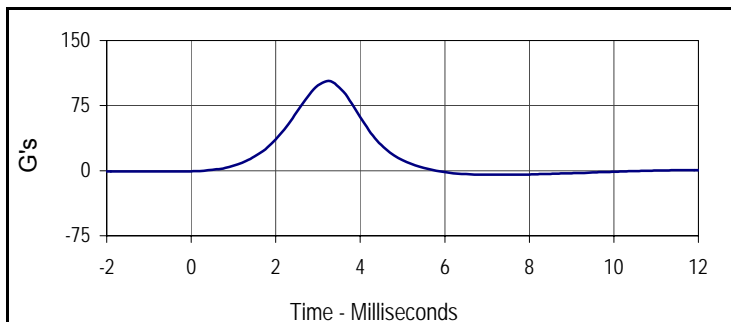
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	250	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass
	Min		28.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	28.7	Pass
Peak Head Resultant Acceleration	G's	115 to 137	126.0	Pass
Peak Head X Acceleration	G's	<15	3.2	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	14.2	Pass
Overall Test Results				Pass



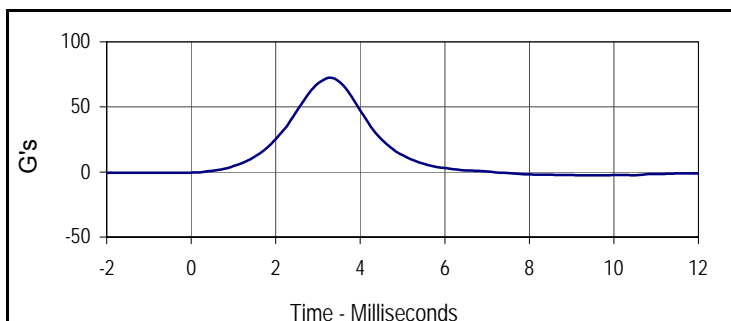
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
126.0	3.3	0.2	0.3



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.2	6.0	-0.1	-0.1



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
103.2	3.2	-4.7	7.6



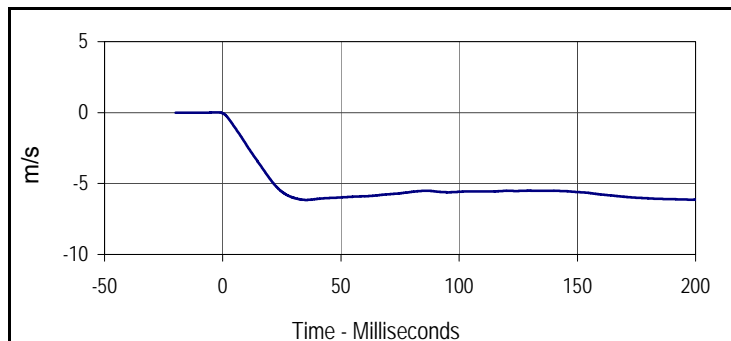
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
72.6	3.3	-2.6	9.8

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

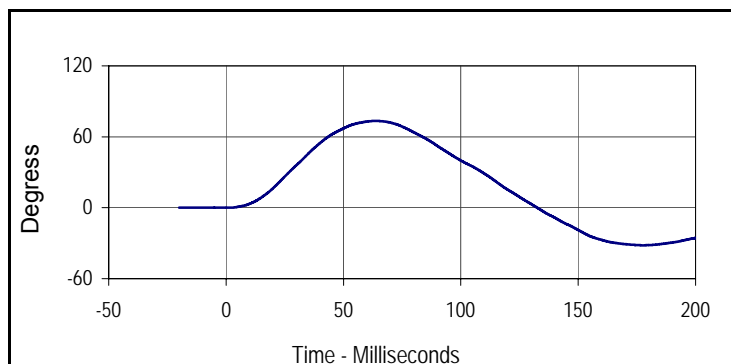
Test Date: 2/7/12  
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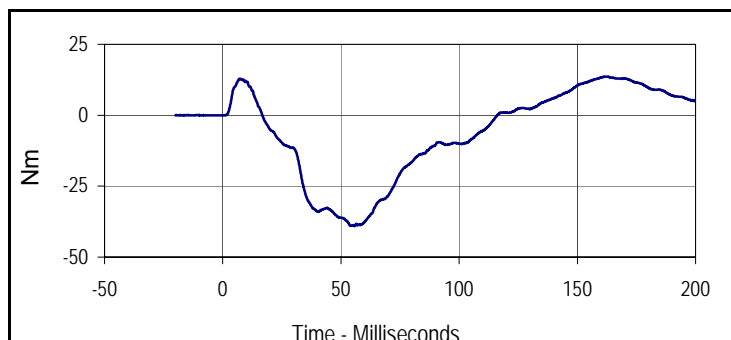
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	340	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass	
	Min		28.4	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	32.1	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.58	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.27	Pass
	15 msec	m/s	-3.30 to -4.10	-3.50	Pass
	20 msec	m/s	-4.40 to -5.40	-4.68	Pass
	25 msec	m/s	-5.40 to -6.10	-5.58	Pass
	25-100 msec	m/s	-5.50 to -6.20	-6.16	Pass
D-Plane Rotation	Max	Degrees	71 to 81	73.4	Pass
	Time	msec	50 to 70	63.6	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-39.1	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	116.2	Pass	
Overall Test Results			Pass	Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-2.2	-6.2	35.3



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degree
Max	Time	Min	Time
73.4	63.6	-31.7	177.6



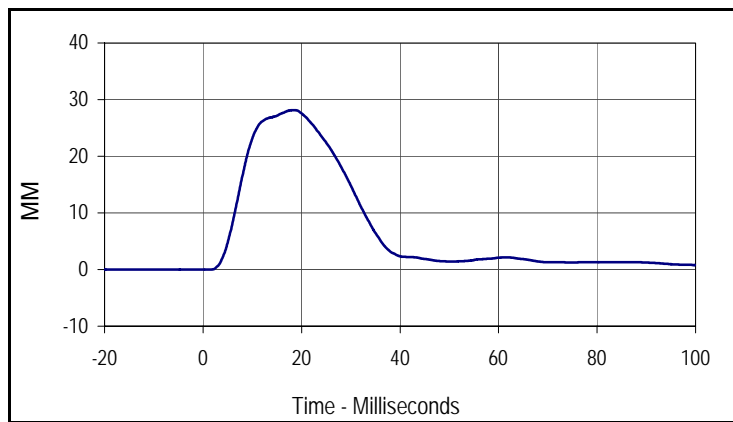
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
13.6	162.3	-39.1	55.7

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

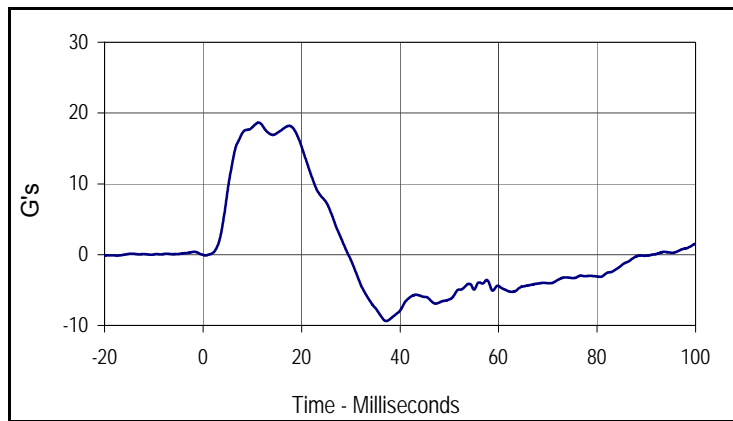
Test Date: 2/7/12  
 Test I.D.: 307SH030



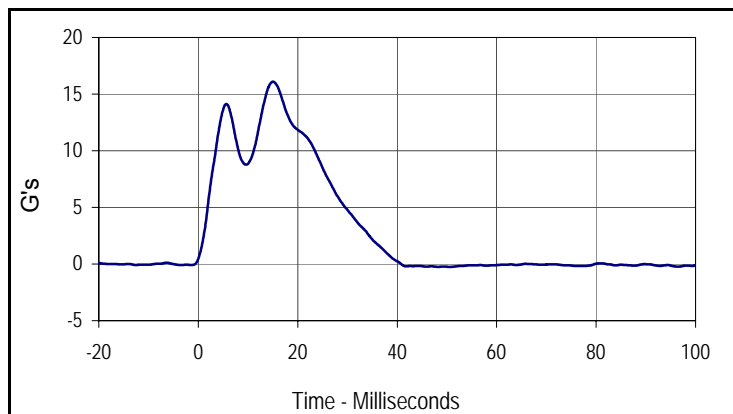
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	210	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass
	Min		28.4	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.7	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	28.7	Pass
Impactor Velocity	m/s	4.20 to 4.40	4.34	Pass
Peak Shoulder Deflection	mm	28 to 37	28.1	Pass
Peak Lateral Spine Acceleration Y	G's	17 to 22	18.7	Pass
Peak Impactor Acceleration	G's	13 to 18	16.1	Pass
Overall Test Results			Pass	Pass



Curve Description			
Shoulder Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
28.1	18.3	0.0	-3.8



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
18.7	11.3	-9.4	37.2



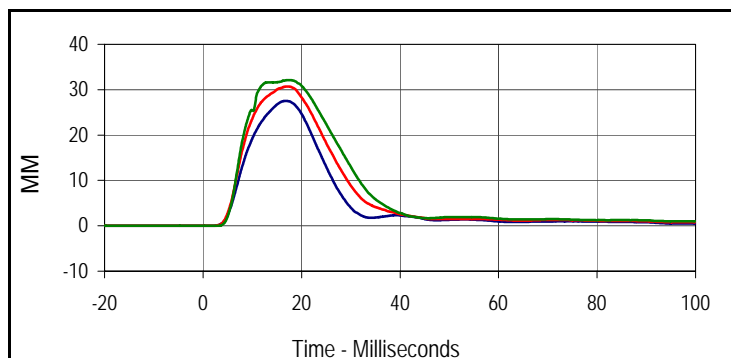
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.1	15.0	-0.3	50.6

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

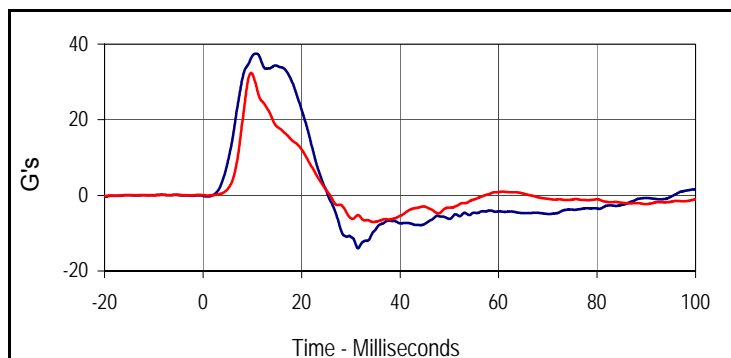
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 Test I.D.: 307TWA030



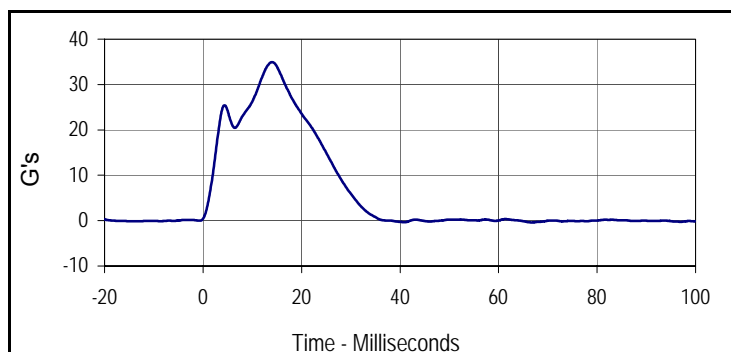
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	240	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass
	Min		28.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.7	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Shoulder Deflection	mm	31 to 40	34.3	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	27.6	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	30.7	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	32.1	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	37.5	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	32.3	Pass
Peak Impactor Acceleration	G's	30 to 36	34.9	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
27.6	16.8	0.0	-5.9
Middle Thorax Deflection			
Max	Time	Min	Time
30.7	17.1	0.0	-9.5
Lower Thorax Deflection			
Max	Time	Min	Time
32.1	17.3	0.0	-8.1



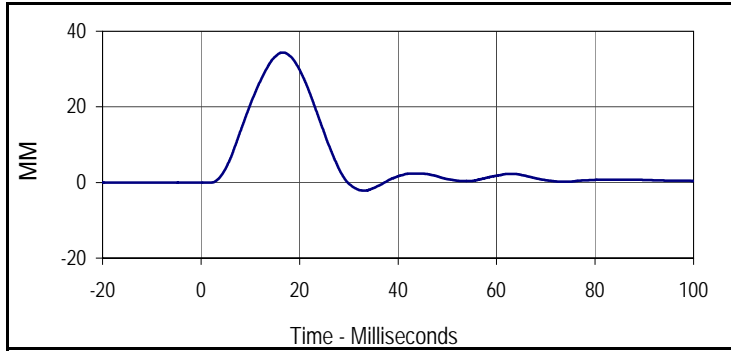
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
37.5	10.9	-14.0	31.4
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
32.3	9.7	-7.1	34.6



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
34.9	14.0	-0.4	66.8

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

Test Date: 2/7/12  
 Test I.D.: 307TWA030



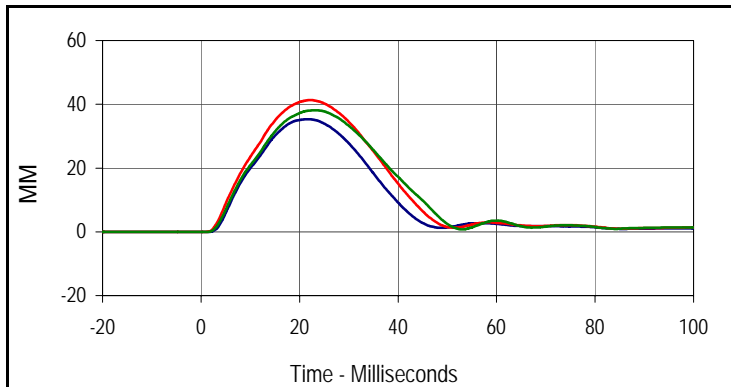
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
34.3	16.5	-2.1	33.4

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

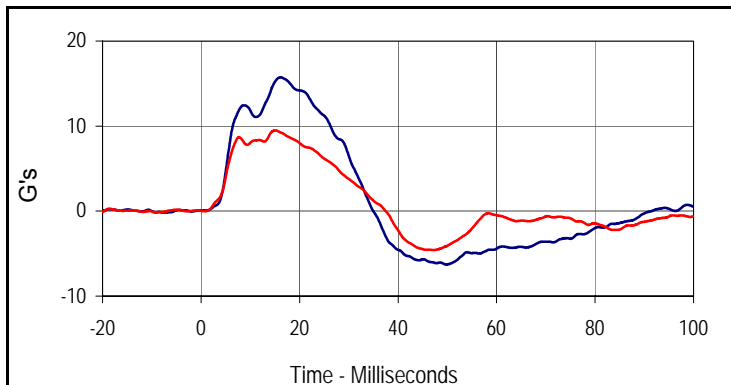
Test Date: 2/7/12  
 Test I.D.: 307TWOA030



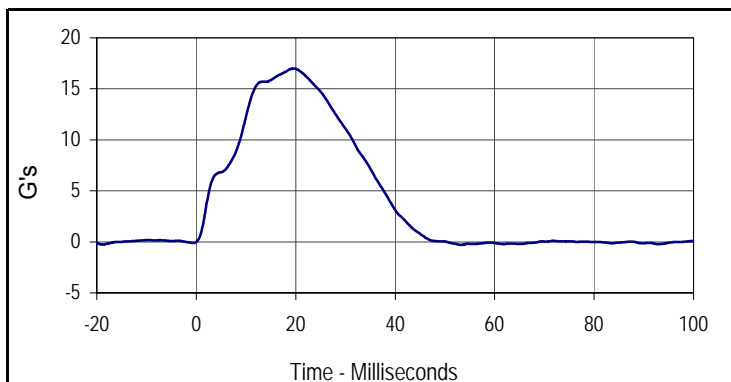
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	260	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass
	Min		28.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.4	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Thorax Rib Deflection	mm	32 to 40	35.3	Pass
Peak Middle Thorax Rib Deflection	mm	39 to 45	41.3	Pass
Peak Lower Thorax Rib Deflection	mm	35 to 43	38.1	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	15.7	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	9.5	Pass
Peak Impactor Acceleration	G's	14 to 18	17.0	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
35.3	21.4	0.0	-15.7
Middle Thorax Deflection			
Max	Time	Min	Time
41.3	22.4	0.0	-18.7
Lower Thorax Deflection			
Max	Time	Min	Time
38.1	22.9	0.0	-0.8



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.7	16.1	-6.3	49.8
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.5	15.1	-4.6	47.2



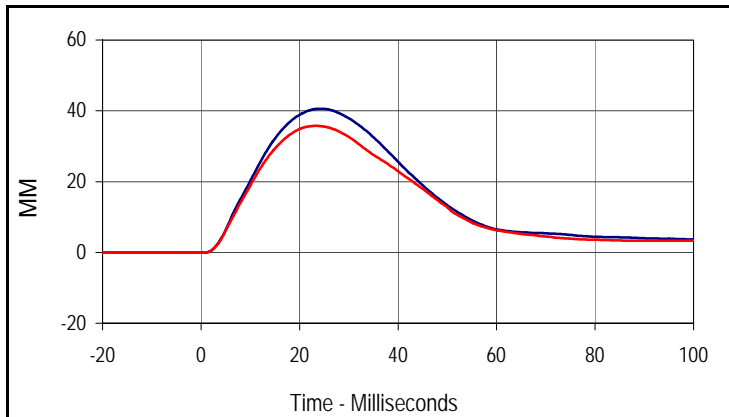
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
17.0	19.7	-0.3	53.2

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

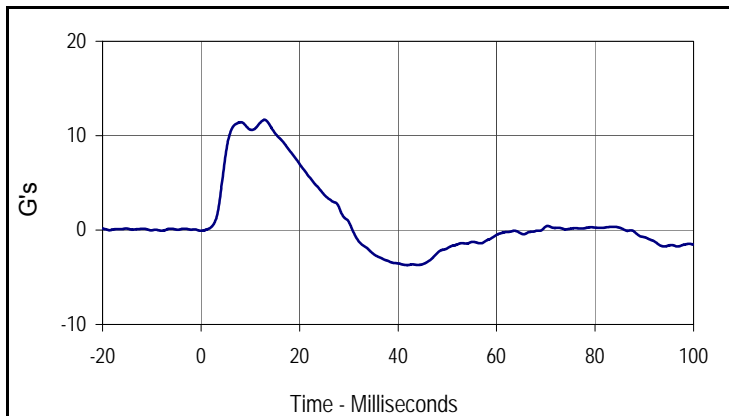
Test Date: 2/7/12  
 Test I.D.: 307ABD030



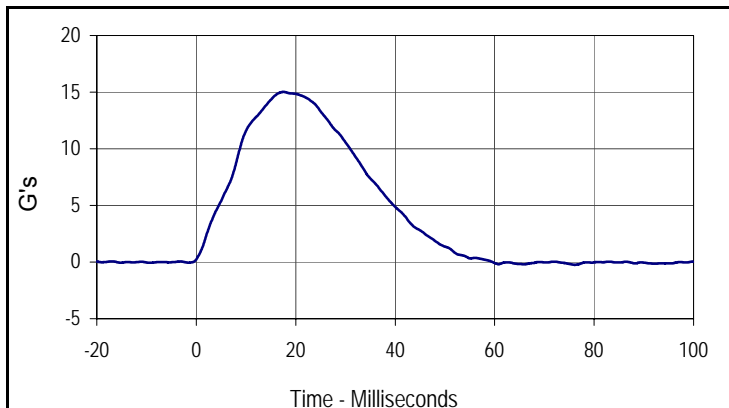
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	270	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass
	Min		28.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.3	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	40.6	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	35.7	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	11.7	Pass
Peak Impactor Acceleration	G's	12 to 16	15.0	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
40.6	24.3	0.0	-10.6



Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
35.7	23.4	0.0	-5.3

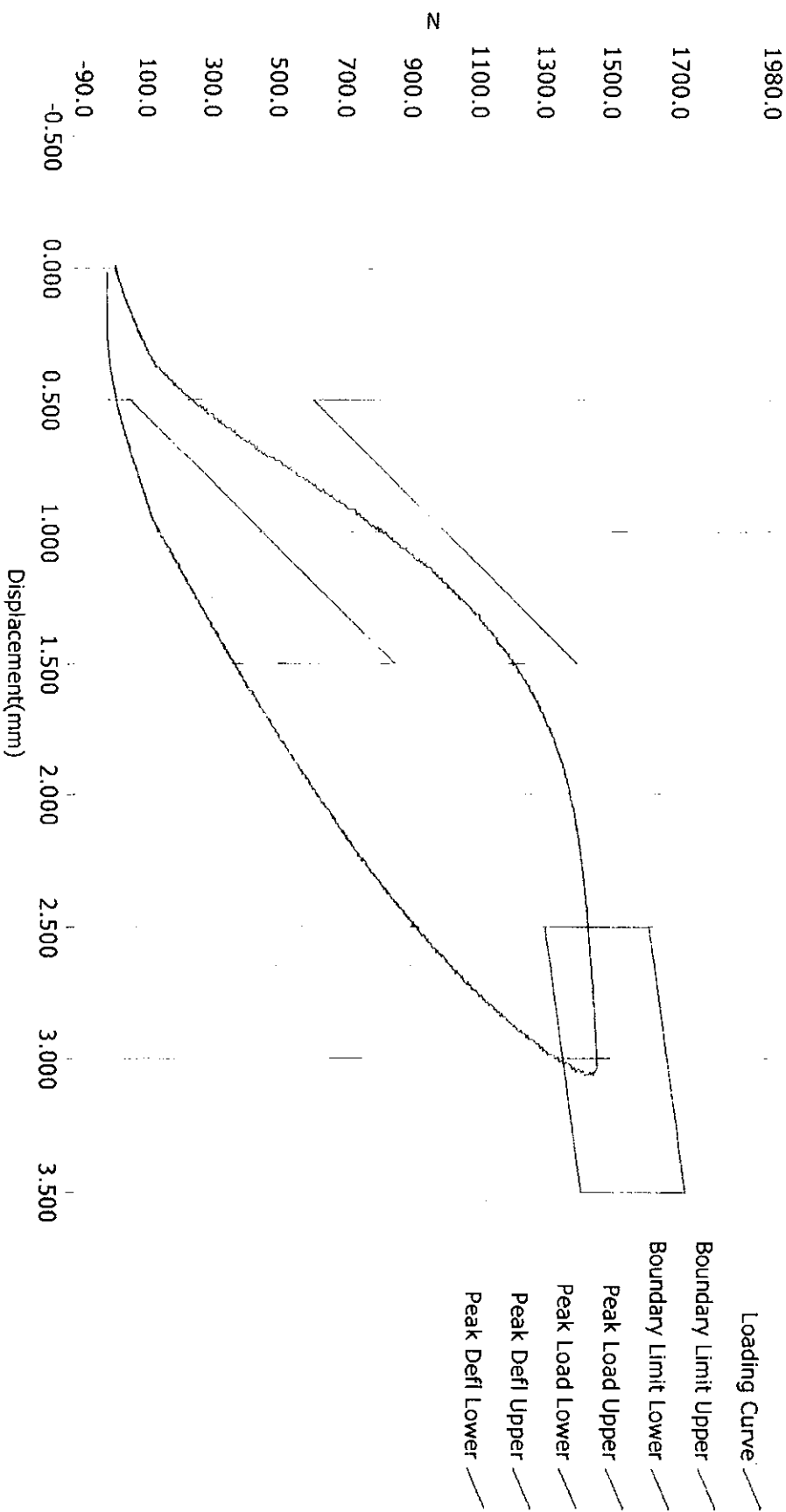


Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
11.7	12.9	-3.7	41.8

Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.0	17.6	-0.2	76.1

# MC0208 PRE TEST

## Resultant Data - SIDiIs Plug Compression



ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	36289	SIDiIs	

Current Date : 9/22/2010

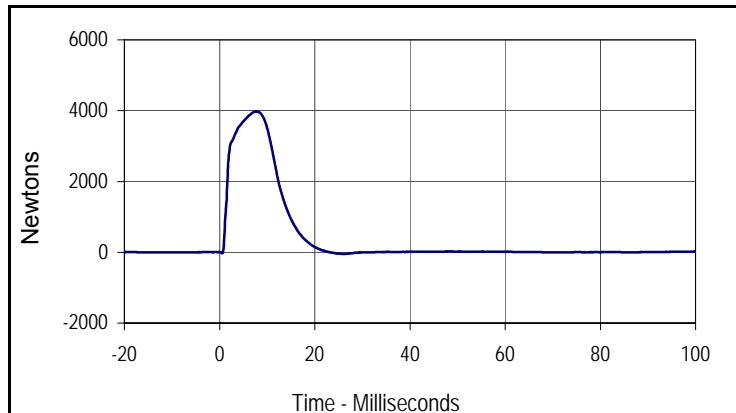
Current Time : 11:55:38

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

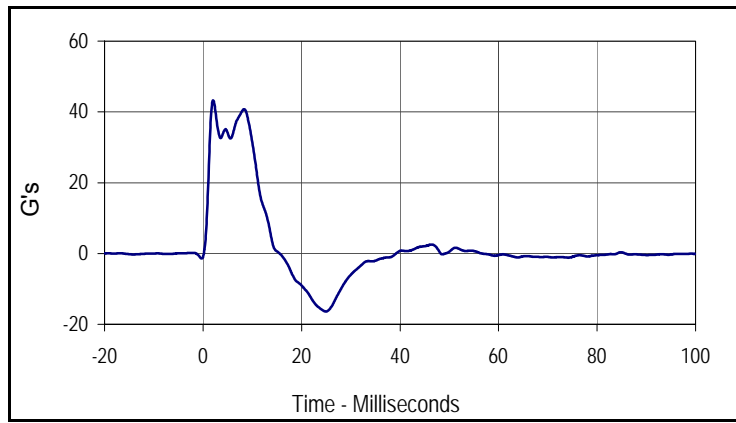
Test Date: 2/7/12  
 Test I.D.: 307ACET030



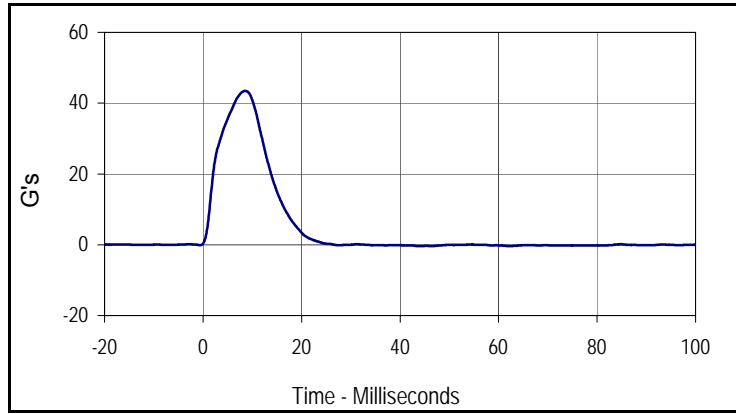
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	300	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass
	Min		28.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.3	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.1	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	3979.8	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	40.8	Pass
Peak Impactor Acceleration	G's	38 to 47	43.5	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3979.8	7.7	-48.7	26.2



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
43.3	2.0	-16.4	24.9



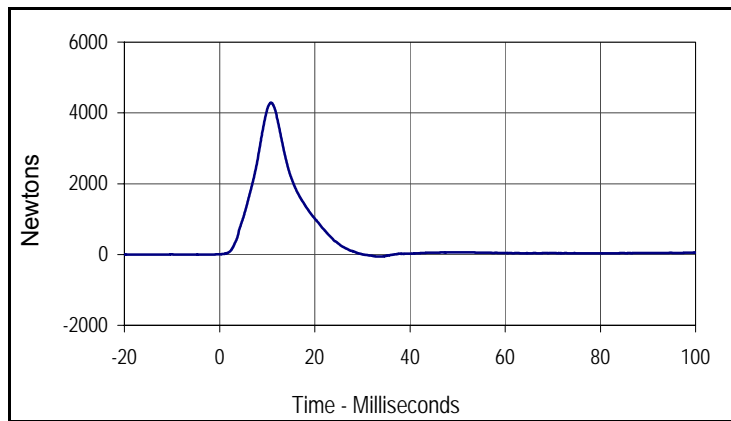
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
43.5	8.5	-0.4	62.4

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

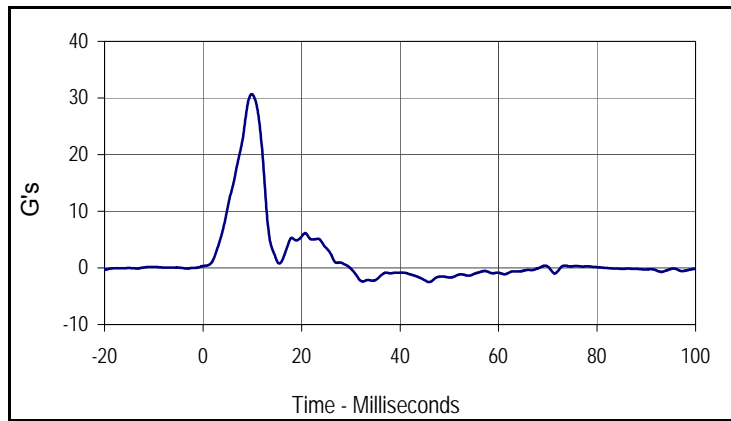
Test Date: 2/7/12  
 Test I.D.: 307PL030



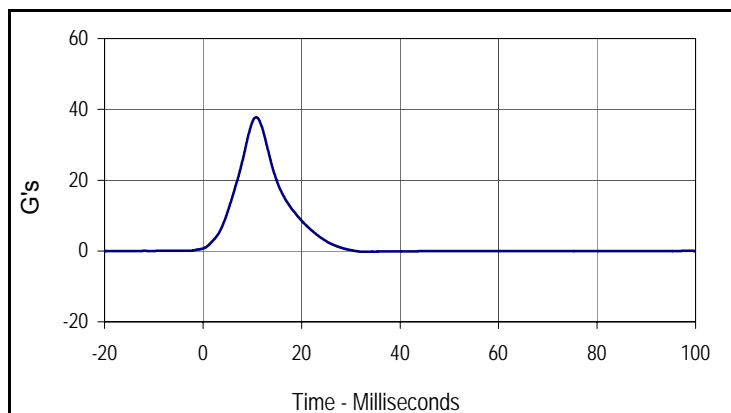
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	320	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	33.8	Pass
	Min		28.4	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.1	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Iliac Force	Newtons	4100 to 5100	4287.9	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	30.7	Pass
Peak Impactor Acceleration	G's	36 to 45	37.8	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4287.9	10.8	-60.5	34.1



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
30.7	9.9	-2.5	45.9



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
37.8	10.8	-0.2	32.6

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

Test Program: ES2re External Measurements

Test Date: 2/13/12

ATD Serial No.: F035

Test I.D.: N/A



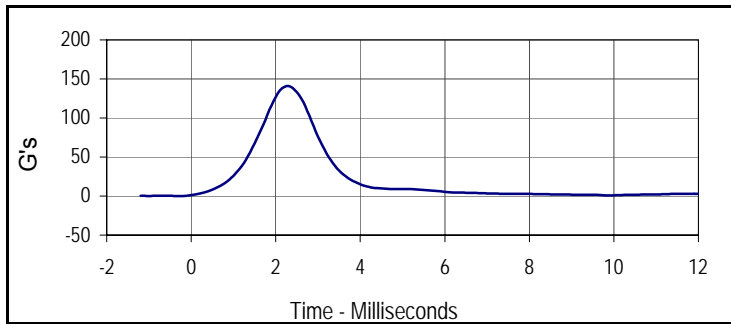
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	31	Pass
1 Sitting Height	mm	900 - 918	910	Pass
2 Seat to Shoulder Joint	mm	558 - 572	565	Pass
3 Seat to Lower Face of Thoracic Spine Box	mm	346 - 356	351	Pass
4 Seat to Hip Joint (Center of Bolt)	mm	97 - 103	100	Pass
5 Sole to Seat, Sitting	mm	333 - 451	385	Pass
6 Head Width	mm	152 - 158	156	Pass
7 Shoulder / Arm Width	mm	461 - 479	470	Pass
8 Thorax Width	mm	322 - 332	328	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	200	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	609	Pass
Overall Test Results				Pass

Test Program: ES2re Head Drop Test  
 ATD Serial No.: F035

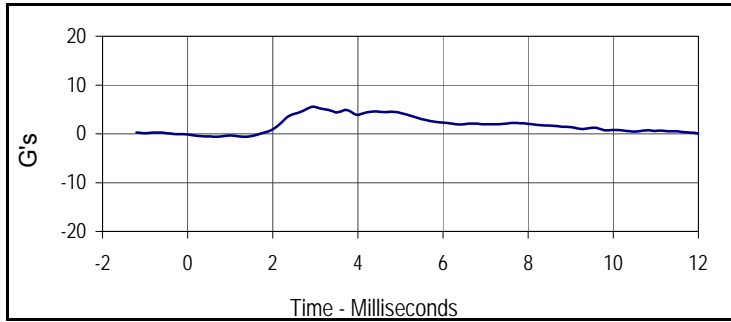
Test Date: 2/13/12  
 Test I.D.: F035HD026



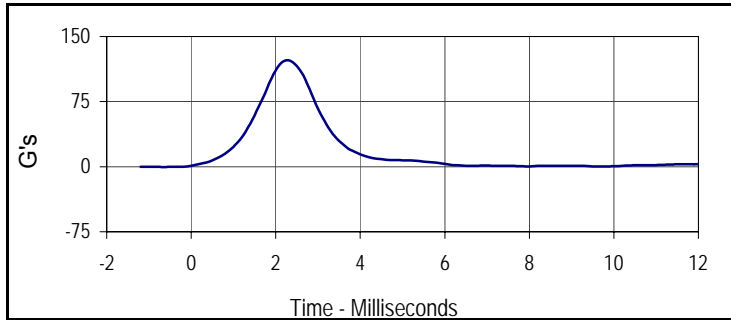
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	240	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.7	Pass
Peak Head Resultant Acceleration	G's	125 to 155	141.1	Pass
Peak Head X Acceleration	G's	≤15	5.5	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	4.6	Pass
Overall Test Results				Pass



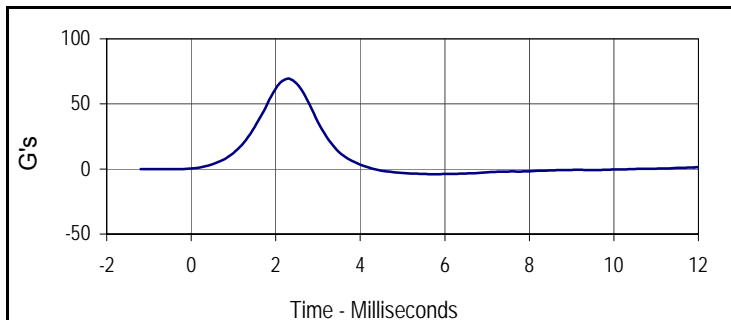
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
141.1	2.3	0.1	-0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
5.5	3.0	-0.6	1.3



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
122.8	2.3	-0.4	-0.6



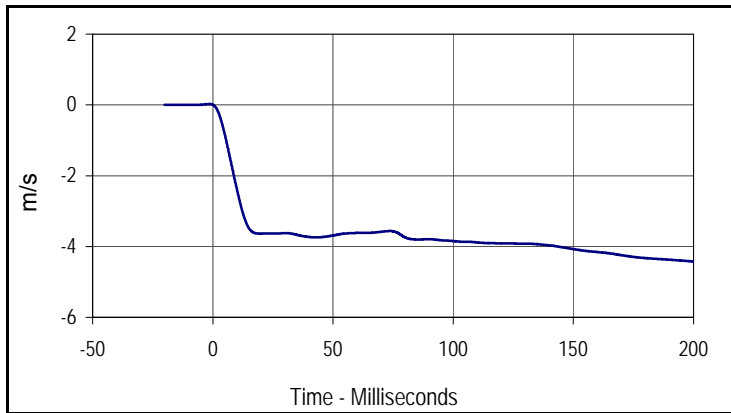
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
69.4	2.3	-4.0	5.8

Test Program: ES2re Neck Flexion Test  
 ATD Serial No.: F035

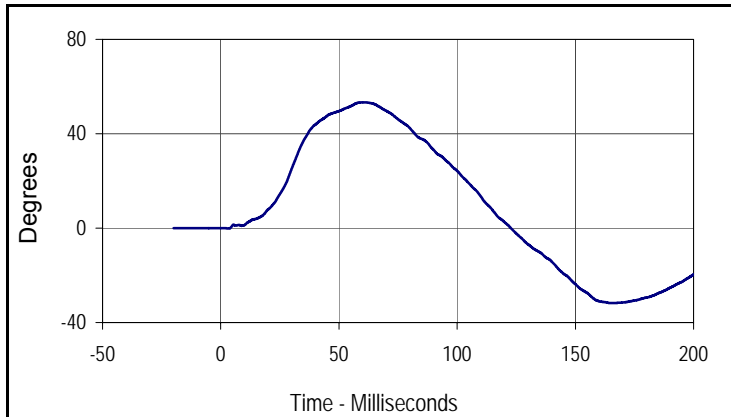
Test Date: 2/13/12  
 Test I.D.: F035NB026



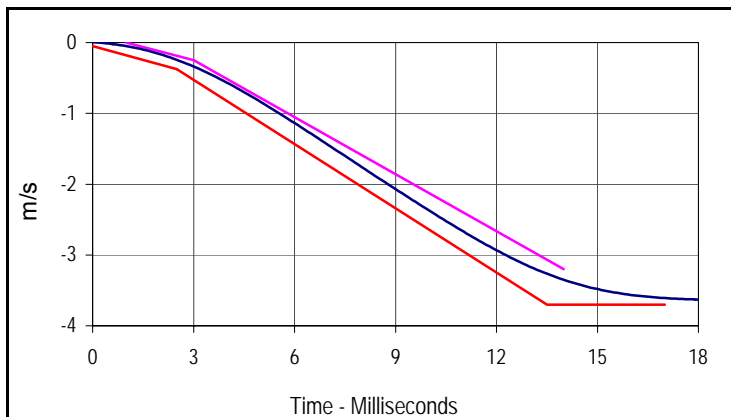
Tested Parameter	Units	Specification	Result	Pass/Fail
Neck Assembly Soak Time	Minutes	≥240	280	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.1	Pass
Pendulum Velocity	m/s	3.3 to 3.5	3.4	Pass
Headform Flexion	Max	49 to 59	53.3	Pass
	Time	54 to 66	61.0	Pass
Headform Flexion Decay (Peak to Zero)	msec	53 to 88	61.8	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.3	-4.4	200.0



Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
53.3	61.0	-31.8	164.8



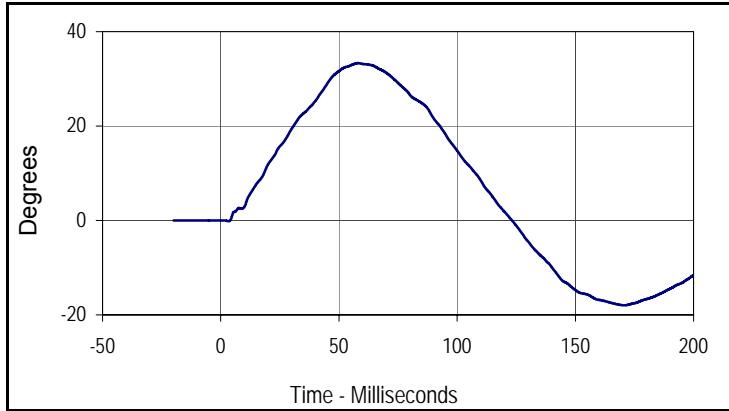
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-1.3	-4.4	200.0

Velocity Corridors

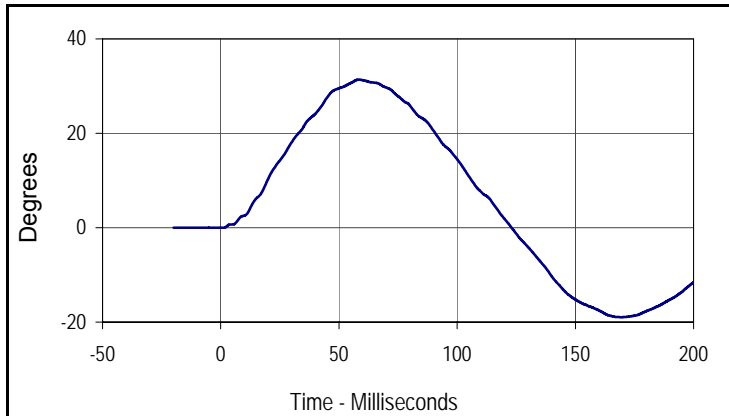
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.0	-0.03	2.5	-0.375
14.0	-3.20	13.5	-3.70
		17.0	-3.70

Test Program: ES2re Neck Flexion Test  
 ATD Serial No.: F035

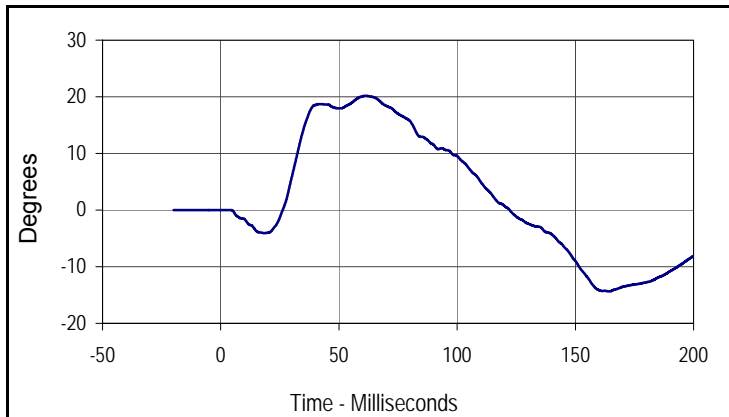
Test Date: 2/13/12  
 Test I.D.: F035NB026



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
33.3	58.0	-18.0	170.7



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
31.4	58.3	-19.0	169.4



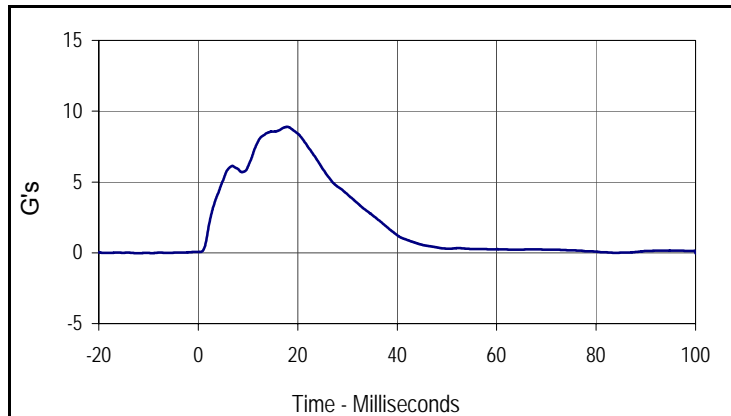
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
20.2	61.2	-14.4	164.3

Test Program: ES2re Shoulder Impact Test  
 ATD Serial No.: F035

Test Date: 2/13/12  
 Test I.D.: F035SH026



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	310	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	31.9	Pass
Pendulum Speed	m/s	4.2 to 4.4	4.3	Pass
Peak Impactor Acceleration	G's	7.5 to 10.5	8.9	Pass
Overall Test Results				Pass



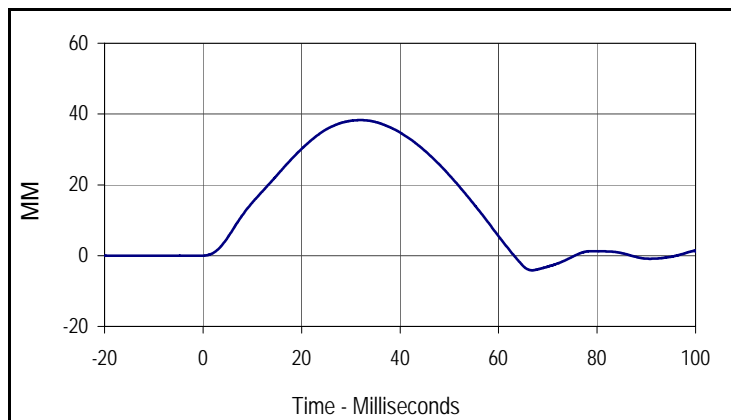
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	180	G's
Max	Time	Min	Time
8.9	17.9	0.0	-12.4

Test Program: ES2re Thorax - Rib Drop Test  
 ATD Serial No.: F035 Rib #1

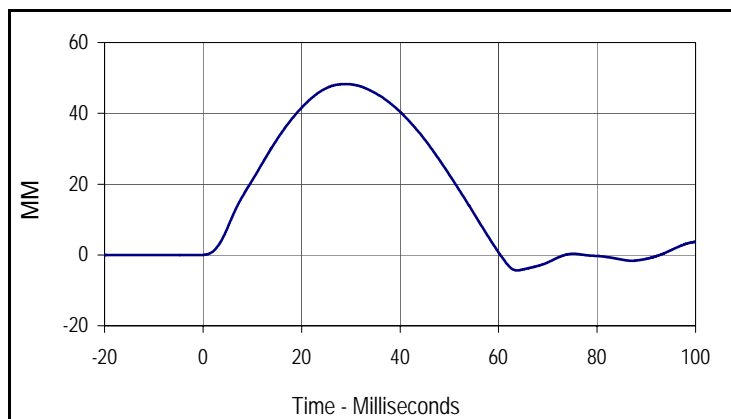
Test Date: 2/13/12  
 Test I.D.: F035RB1026



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	350	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.1	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	38.3	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	48.3	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
38.3	32.0	-4.1	66.8



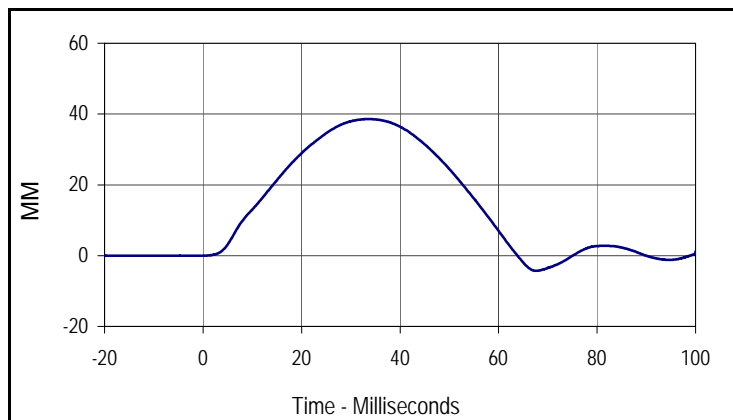
Curve Description			
Upper Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
48.3	28.9	-4.4	63.7

Test Program: ES2re Thorax - Rib Drop Test  
 ATD Serial No.: F035 Rib #2

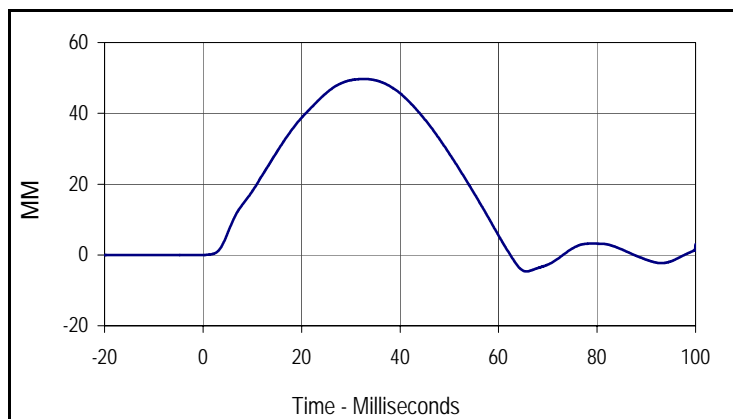
Test Date: 2/13/12  
 Test I.D.: F035RB2026



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	390	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.9	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	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
38.6	33.5	-4.3	67.7



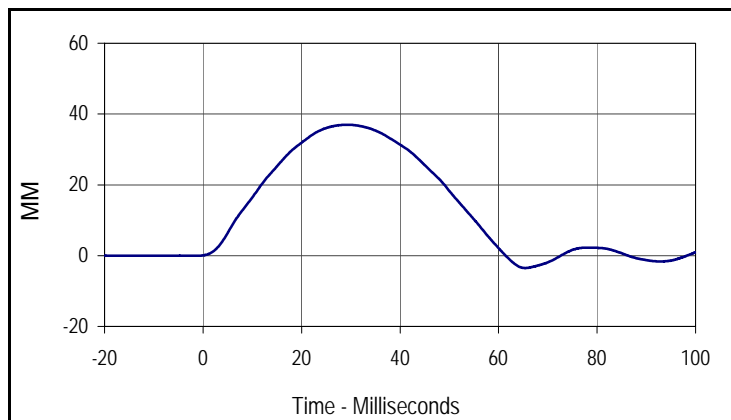
Curve Description			
Middle Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max	Time	Min	Time
49.7	32.8	-4.7	65.7

Test Program: ES2re Thorax - Rib Drop Test  
 ATD Serial No.: F035 Rib # 3

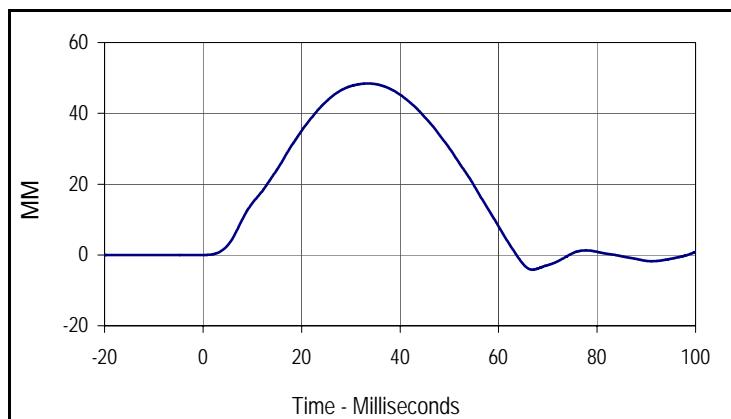
Test Date: 2/13/12  
 Test I.D.: F035RB3026



Tested Parameter	Units	Specification	Result	Pass/Fail
Rib Module Soak Time	Minutes	≥240	420	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	31.7	Pass
Peak Rib Deflection at 459 +/- 5 mm Drop Height	mm	36 to 40	37.0	Pass
Peak Rib Deflection at 815 +/- 8 mm Drop Height	mm	46 to 51	48.4	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
37.0	29.3	-3.5	65.4



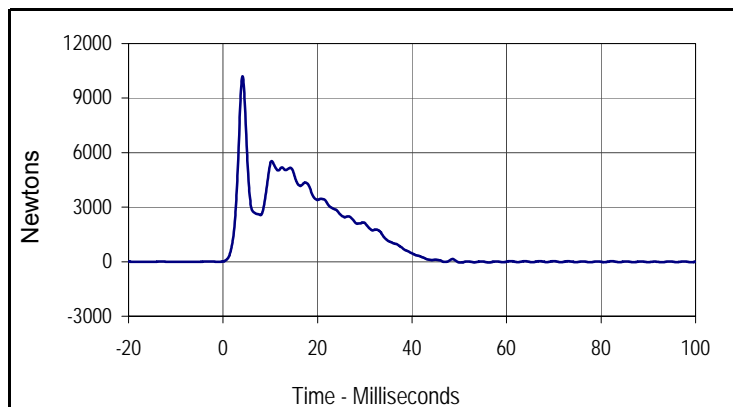
Curve Description			
Lower Rib Deflection (815 mm Drop Height)			
Plot No.	Type	SAE Class	Units
001	FIL	180	MM
Max	Time	Min	Time
48.4	33.4	-4.2	66.9

Test Program: ES2re Thorax - Full Body Impact Test  
 ATD Serial No.: F035

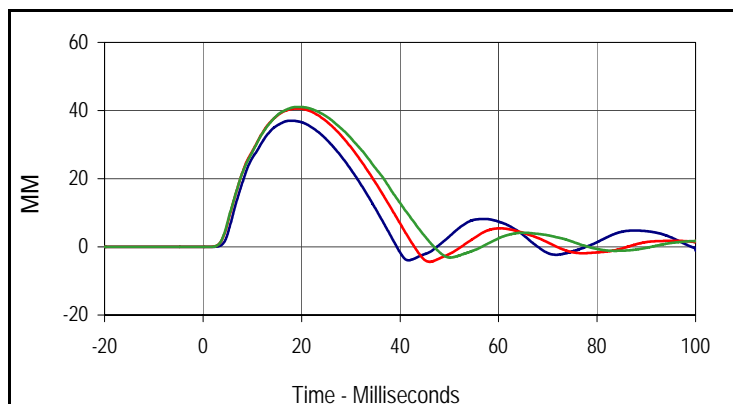
Test Date: 2/13/12  
 Test I.D.: F035TH026



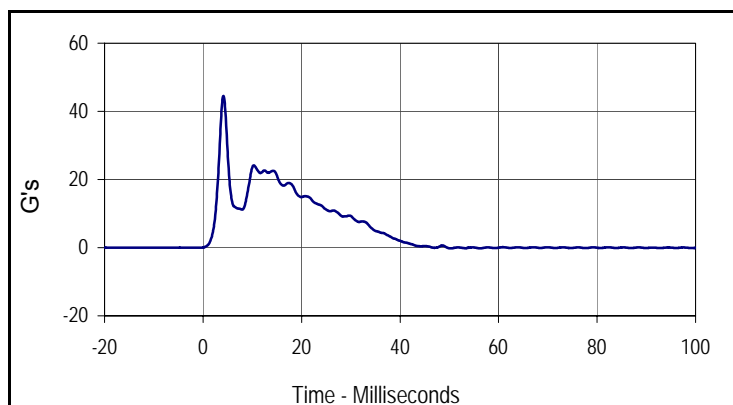
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	440	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.1	Pass
Peak Impactor Velocity	m/s	5.4 to 5.6	5.6	Pass
Peak Impactor Force	N	5100 to 6200	5536.8	Pass
	msec	> 6.0 msec	10.3	Pass
Peak Upper Rib Deflection	mm	34 to 41	37.0	Pass
Peak Middle Rib Deflection	mm	37 to 45	40.6	Pass
Peak Lower Rib Deflection	mm	37 to 44	41.1	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
10204.1	4.1	-49.8	50.2



Curve Description			
Upper, Middle, Lower Rib Deflections			
Plot No.	Type	SAE Class	Units
002	FIL	180	MM
Max (Upper)	Time	Min (Upper)	Time
37.0	17.8	-3.9	41.8
Max (Middle)	Time	Min (Middle)	Time
40.6	19.2	-4.4	46.0
Max (Lower)	Time	Min (Lower)	Time
41.1	19.3	-3.1	50.2



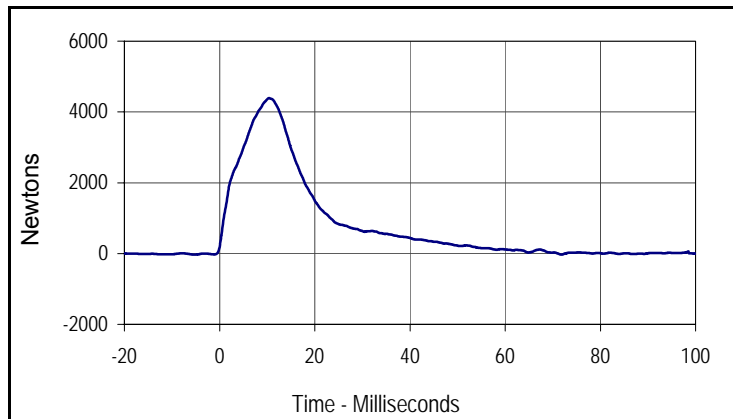
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
44.5	4.1	-0.2	50.2

Test Program: ES2re Abdomen Impact Test  
 ATD Serial No.: F035

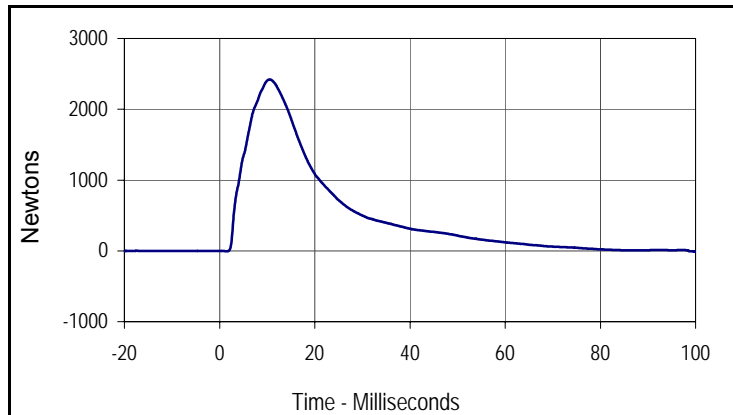
Test Date: 2/13/12  
 Test I.D.: F035ABD026



Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	450	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass
Probe Velocity	m/s	3.9 to 4.1	4.0	Pass
Peak Impactor Force	N	4000 to 4800	4391.2	Pass
	msec	10.6 to 13.0	11.8	Pass
Sum of Abdominal Forces	N	2200 to 2700	2419.5	Pass
	msec	10.0 to 12.3	12.0	Pass
Overall Test Results				Pass



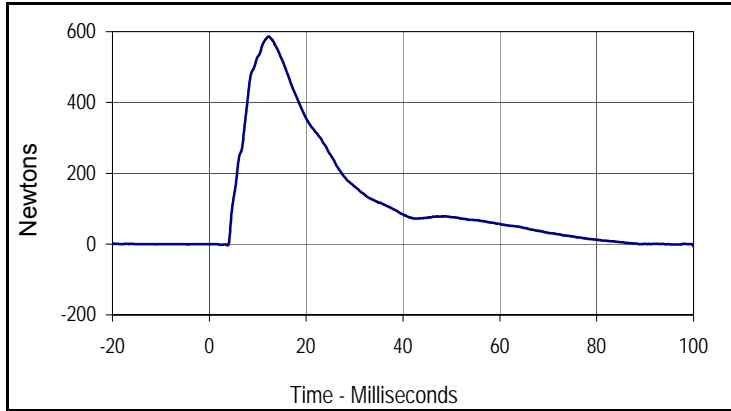
Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
4391.2	11.8	-32.3	73.2



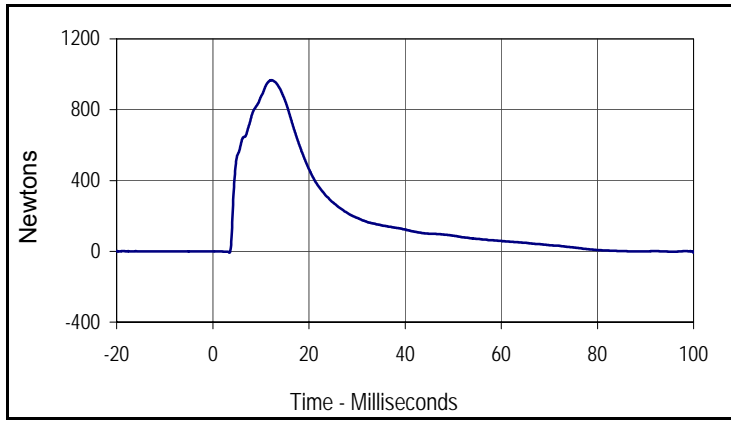
Curve Description			
Abdomen Sum Resultant			
Plot No.	Type	SAE Class	Units
002	RES	600	Newtons
Max	Time	Min	Time
2419.5	12.0	-8.5	#N/A

Test Program: ES2re Abdomen Impact Test  
 ATD Serial No.: F035

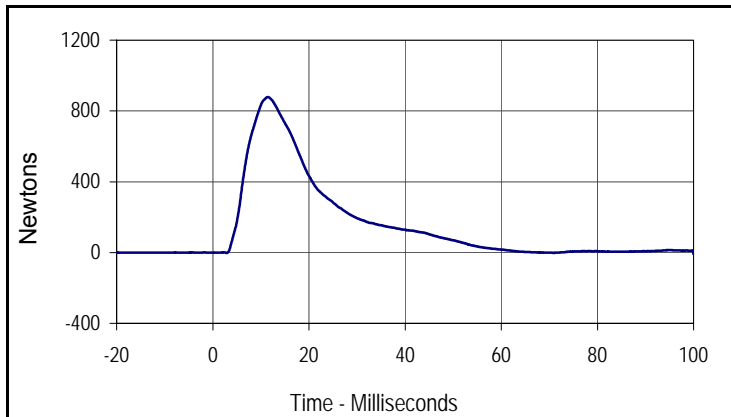
Test Date: 2/13/12  
 Test I.D.: F035ABD026



Curve Description			
Front Abdomen Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
586.7	12.3	-8.5	101.2



Curve Description			
Middle Abdomen Force			
Plot No.	Type	SAE Class	Units
004	FIL	600	Newtons
Max	Time	Min	Time
966.3	12.2	-8.5	101.2



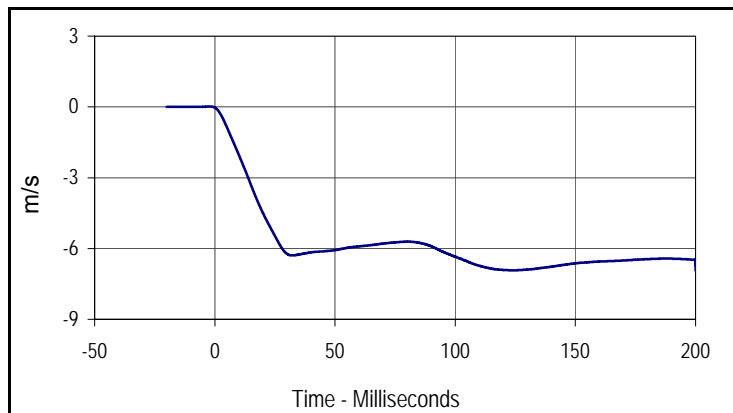
Curve Description			
Rear Abdomen Force			
Plot No.	Type	SAE Class	Units
005	FIL	600	Newtons
Max	Time	Min	Time
878.6	11.5	-8.5	101.2

Test Program: ES2re Lumbar Flexion Test  
 ATD Serial No.: F035

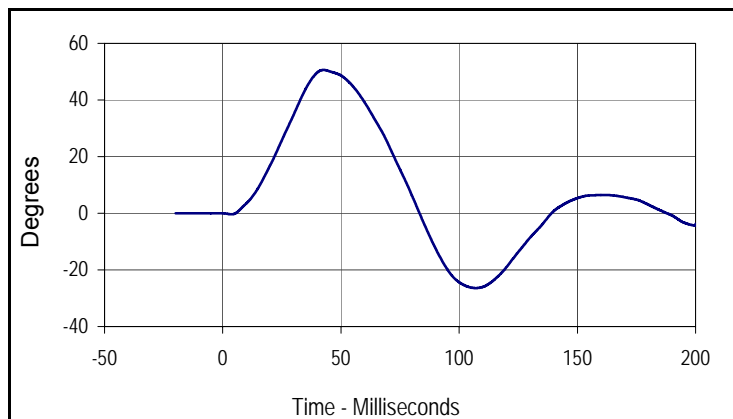
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 Test I.D.: F035LB026



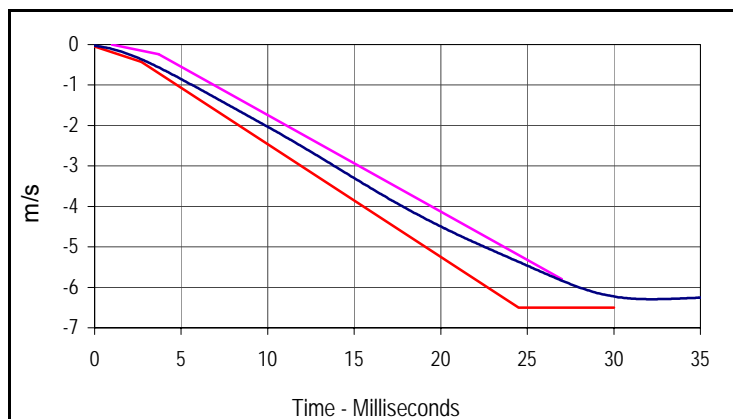
Tested Parameter	Units	Specification	Result	Pass/Fail
Lumbar Spine Assembly Soak Time	Minutes	≥240	370	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	32.1	Pass
Pendulum Velocity	m/s	5.95 to 6.15	6.10	Pass
Headform Rotation	Max	45 to 55	50.6	Pass
	Time	39 to 53	42.6	Pass
Time of Decay to Zero Angle from Peak	msec	37 to 57	40.7	Pass
Overall Test Results				Pass



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-2.0	-6.9	200.0



Curve Description			
Headform Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	180	Degrees
Max	Time	Min	Time
50.6	42.6	-26.4	107.0



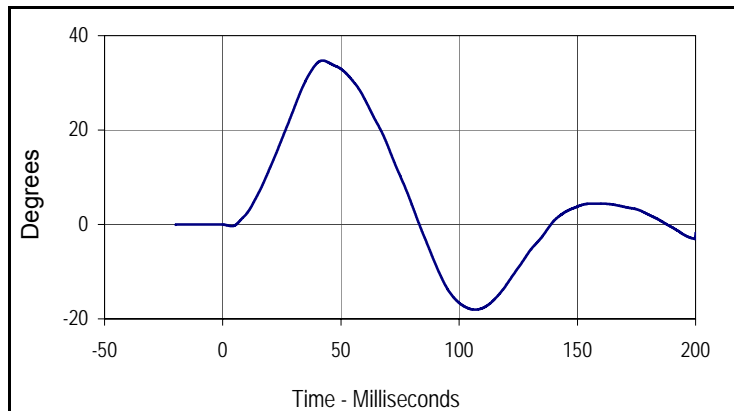
Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	60	m/s
Max	Time	Min	Time
0.0	-2.0	-6.9	200.0

Velocity Corridors

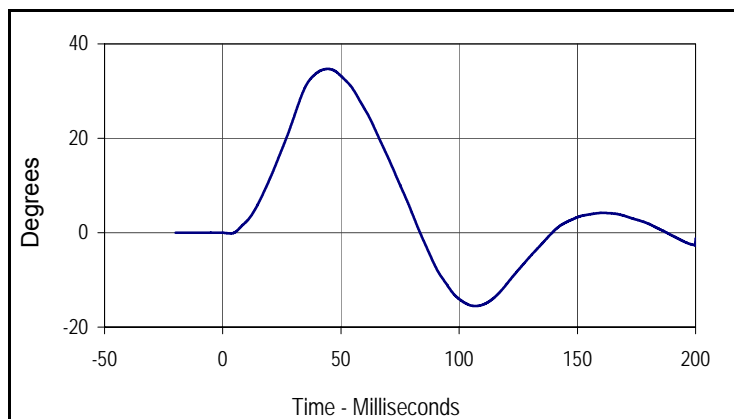
Upper Boundary		Lower Boundary	
Time (msec)	Velocity (m/s)	Time (msec)	Velocity (m/s)
1.0	0.00	0.0	-0.05
3.7	-0.24	2.7	-0.425
27.0	-5.80	24.5	-6.50
		30.0	-6.50

Test Program: ES2re Lumbar Flexion Test  
 ATD Serial No.: F035

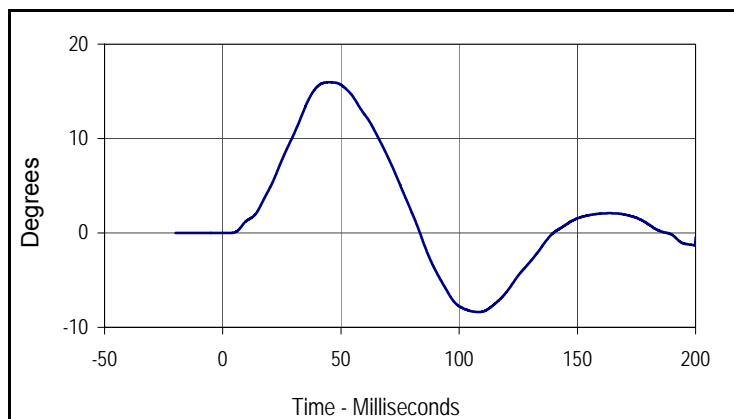
Test Date: 2/13/12  
 Test I.D.: F035LB026



Curve Description			
Potentiometer A			
Plot No.	Type	SAE Class	Units
003	FIL	180	Degrees
Max	Time	Min	Time
34.7	42.3	-18.1	106.7



Curve Description			
Potentiometer B			
Plot No.	Type	SAE Class	Units
004	FIL	180	Degrees
Max	Time	Min	Time
34.7	44.3	-15.5	106.8



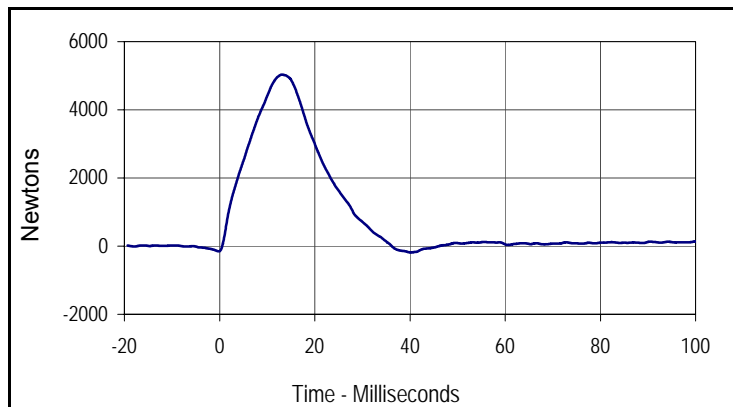
Curve Description			
Potentiometer C			
Plot No.	Type	SAE Class	Units
005	FIL	180	Degrees
Max	Time	Min	Time
16.0	45.1	-8.4	108.3

Test Program: ES2re Pelvis Impact Test  
 ATD Serial No.: F035

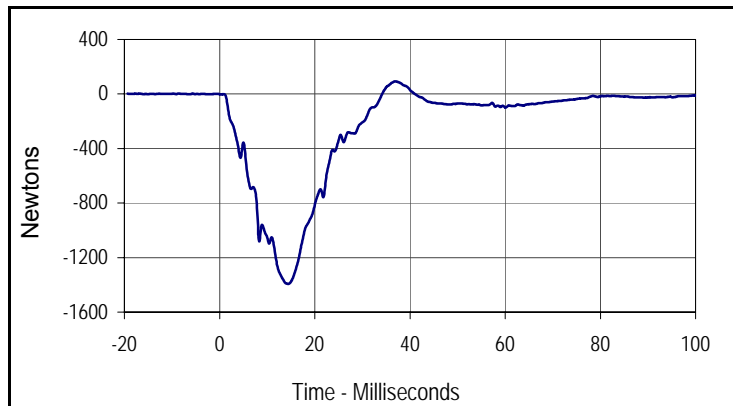
Test Date: 2/13/12  
 Test I.D.: F035PL026



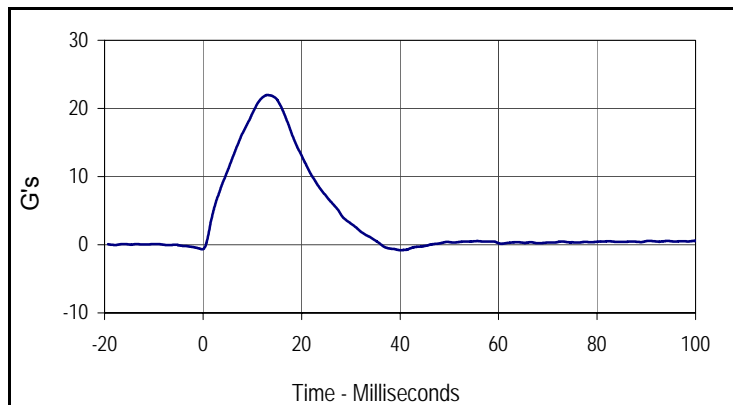
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	480	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.1	Pass
Pendulum Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Impactor Force	N	4700 to 5400	5034.1	Pass
	msec	11.8 to 16.1	13.1	Pass
Peak Pubic Symphysis Load	N	-1230 to -1590	-1393.7	Pass
	msec	12.2 to 17.0	14.4	Pass
Overall Test Results				Pass



Curve Description			
Impactor Force			
Plot No.	Type	SAE Class	Units
001	FIL	180	Newtons
Max	Time	Min	Time
5034.1	13.1	-184.4	40.2



Curve Description			
Pubic Symphysis Force Y			
Plot No.	Type	SAE Class	Units
002	FIL	600	Newtons
Max	Time	Min	Time
93.6	36.9	-1393.7	14.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
22.0	13.1	-0.8	40.2

Test Program: SID IIs External Measurements

Test Date: 2/13/12

ATD Serial No.: 307

Test I.D.: N/A



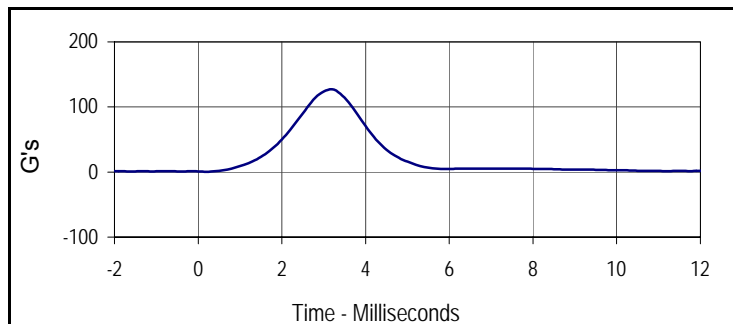
Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	33	Pass
A Sitting Height	mm	772 - 788	779	Pass
B Shoulder Pivot Height	mm	437 - 453	445	Pass
C H-Point Height	mm	79 - 89	83	Pass
D H-Point from Seatback	mm	141 - 151	145	Pass
E Shoulder Pivot from Backline	mm	97 - 107	103	Pass
F Thigh Clearance	mm	119 - 135	125	Pass
G Head Breadth	mm	140 - 148	145	Pass
H Head Back from Backline	mm	40 - 46	43	Pass
I Head Depth	mm	178 - 188	183	Pass
J Head Circumference	mm	541 - 551	546	Pass
K Buttock to Knee Length	mm	514 - 540	527	Pass
L Popliteal Height	mm	343 - 369	349	Pass
M Knee Pivot to Floor Height	mm	392 - 409	400	Pass
N Buttock Popliteal Length	mm	416 - 442	430	Pass
O Chest Depth w/o Jacket	mm	195 - 211	205	Pass
P Foot Length	mm	216 - 232	221	Pass
Q Hip Breadth with Pelvic Plug	mm	313 - 323	318	Pass
R Arm Length	mm	249 - 259	252	Pass
S Knee Joint to Seatback	mm	477 - 493	482	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	873	Pass
Z Waist Circumference	mm	760 - 791	774	Pass
Overall Test Results				Pass

Test Program: SID IIs Head Drop Test  
 ATD Serial No.: 307

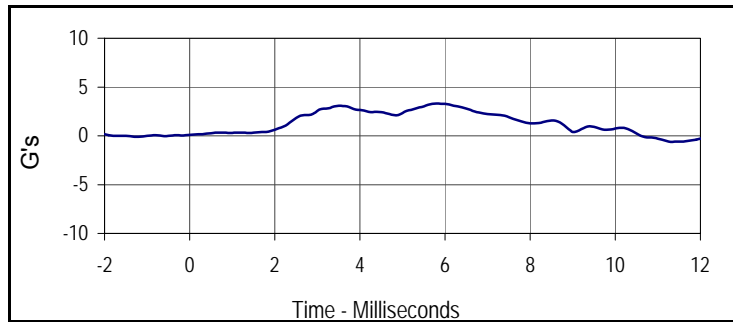
Test Date: 2/13/12  
 Test I.D.: 307HD031



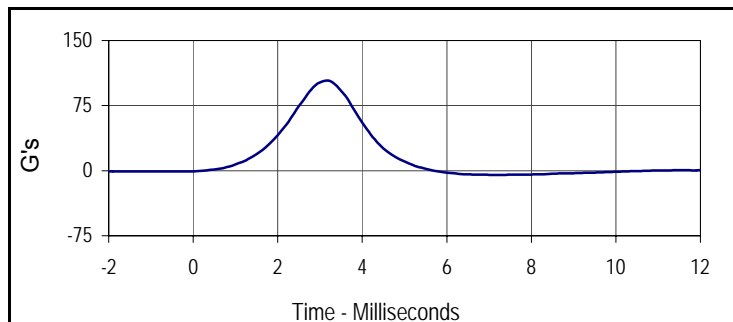
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	250	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.2	Pass
Peak Head Resultant Acceleration	G's	115 to 137	127.1	Pass
Peak Head X Acceleration	G's	<15	3.3	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
Oscillations After Main Pulse	%	<15	12.6	Pass
<b>Overall Test Results</b>				<b>Pass</b>



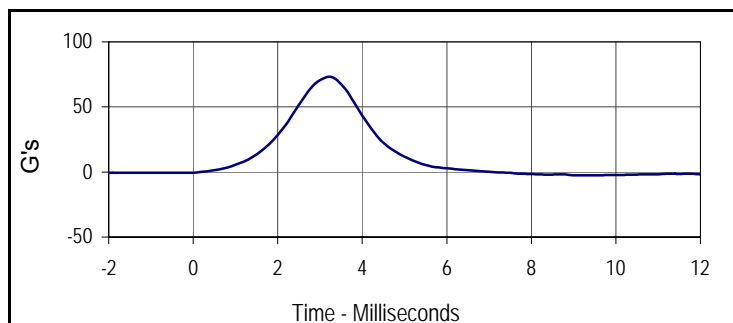
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
127.1	3.2	0.2	0.2



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
3.3	5.8	-0.1	-1.2



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
103.9	3.2	-4.8	7.1



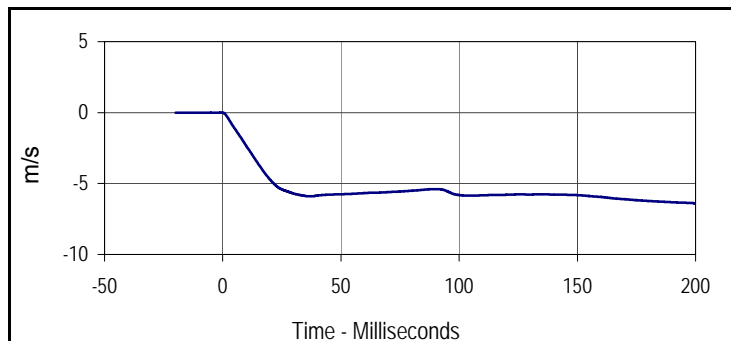
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
73.1	3.2	-2.6	9.2

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

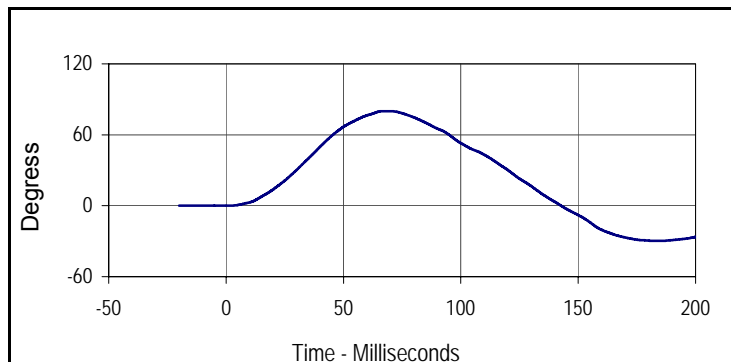
Test Date: 2/13/12  
 Test I.D.: 307NB031



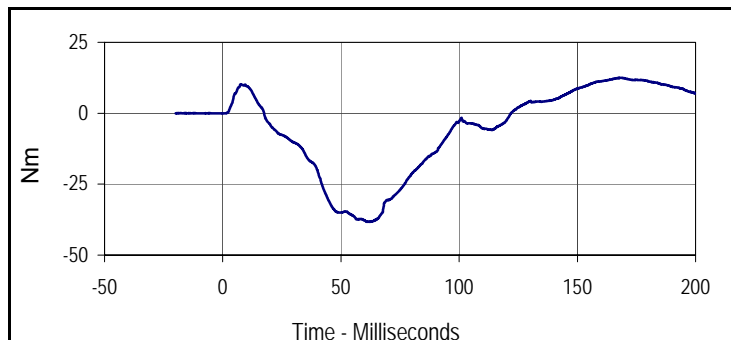
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	340	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass	
	Min		29.8	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	33.7	Pass	
Pendulum Velocity	m/s	5.51 to 5.63	5.60	Pass	
Pendulum Deceleration	10 msec	m/s	-2.20 to -2.80	-2.37	Pass
	15 msec	m/s	-3.30 to -4.10	-3.61	Pass
	20 msec	m/s	-4.40 to -5.40	-4.73	Pass
	25 msec	m/s	-5.40 to -6.10	-5.42	Pass
	25-100 msec	m/s	-5.50 to -6.20	-5.90	Pass
D-Plane Rotation	Max	Degrees	71 to 81	80.1	Pass
	Time	msec	50 to 70	67.2	Pass
Peak Occipital Condyle Moment	Nm	-36 to -44	-38.3	Pass	
Decaying Moment Time to Cross 0 Nm	msec	102 to 126	121.9	Pass	
Overall Test Results			Pass	Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
0.0	-0.6	-6.4	200.0



Curve Description			
Maximum Translation Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degress
Max	Time	Min	Time
80.1	67.2	-29.8	183.4



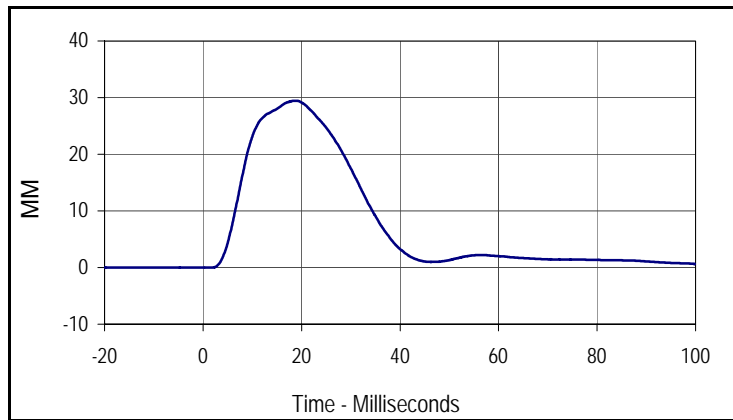
Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
12.5	168.5	-38.3	62.0

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

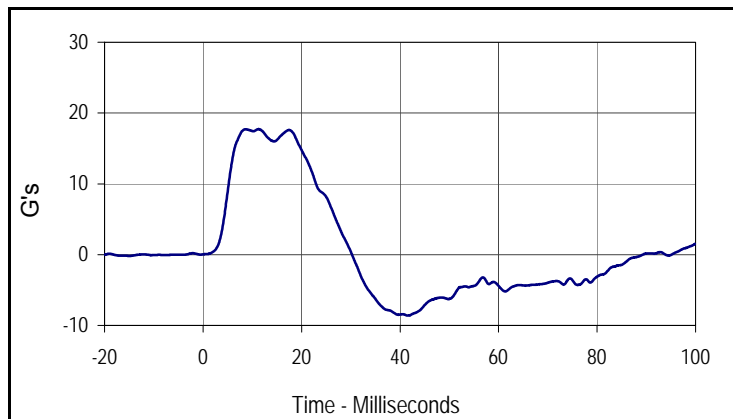
Test Date: 2/13/12  
 Test I.D.: 307SH031



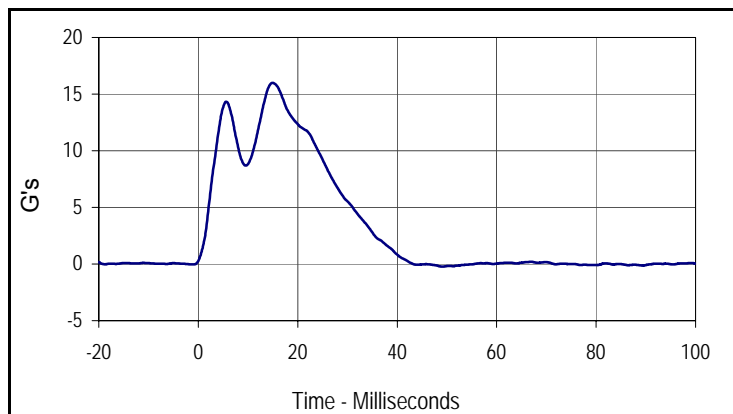
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	210	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.9	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass
Impactor Velocity	m/s	4.20 to 4.40	4.29	Pass
Peak Shoulder Deflection	mm	28 to 37	29.4	Pass
Peak Lateral Spine Acceleration Y	G's	17 to 22	17.7	Pass
Peak Impactor Acceleration	G's	13 to 18	16.0	Pass
Overall Test Results			Pass	Pass



Curve Description			
Shoulder Acceleration			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
29.4	18.6	0.0	-19.7



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
17.7	11.3	-8.6	41.6



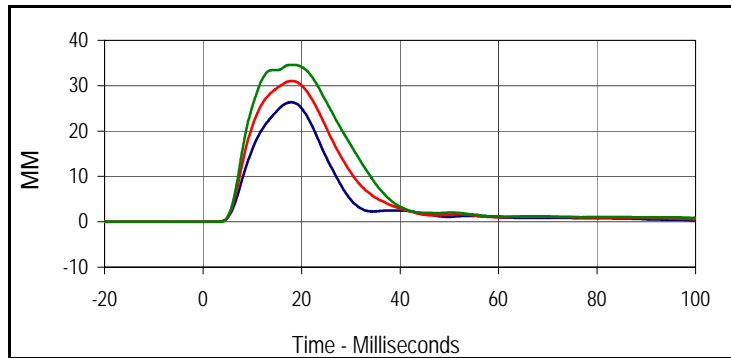
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
16.0	14.9	-0.2	49.1

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

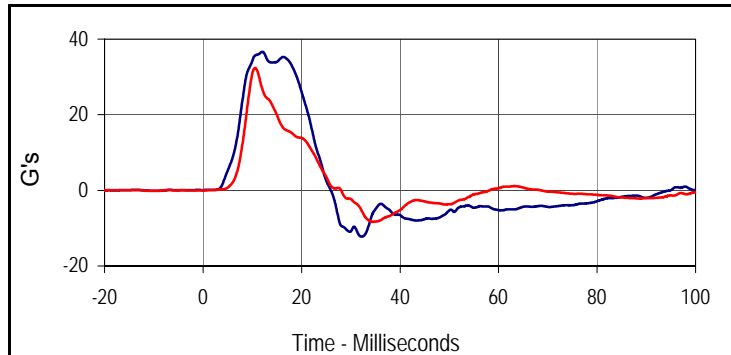
Test Date: 2/13/12  
 Test I.D.: 307TWA031



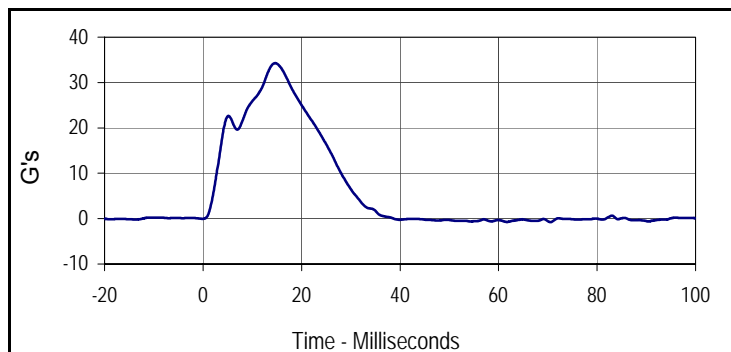
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	240	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.5	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Shoulder Deflection	mm	31 to 40	32.4	Pass
Peak Upper Thorax Rib Deflection	mm	25 to 32	26.4	Pass
Peak Middle Thorax Rib Deflection	mm	30 to 36	31.0	Pass
Peak Lower Thorax Rib Deflection	mm	32 to 38	34.6	Pass
Peak Upper Spine Y Acceleration	G's	34 to 43	36.6	Pass
Peak Lower Spine Y Acceleration	G's	29 to 37	32.3	Pass
Peak Impactor Acceleration	G's	30 to 36	34.3	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
26.4	17.9	0.0	-13.9
Middle Thorax Deflection			
Max	Time	Min	Time
31.0	18.1	0.0	-16.8
Lower Thorax Deflection			
Max	Time	Min	Time
34.6	17.6	0.0	2.4



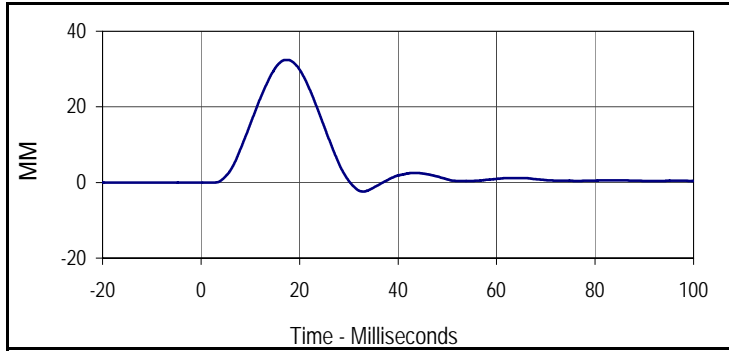
Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
36.6	12.0	-12.3	32.2
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
32.3	10.6	-8.4	34.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
34.3	14.6	-0.8	70.5

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

Test Date: 2/13/12  
 Test I.D.: 307TWA031



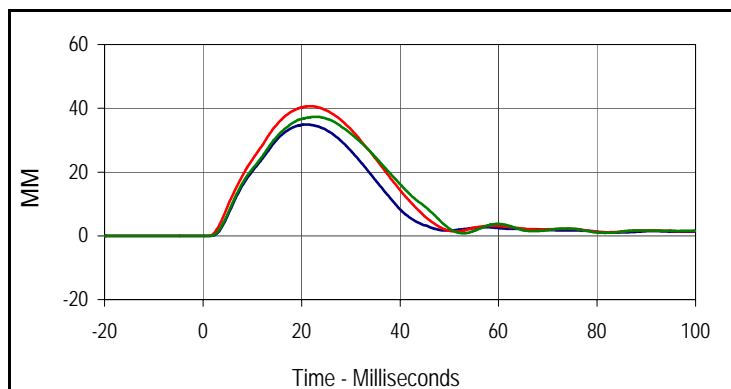
Curve Description			
Shoulder Deflection			
Plot No.	Type	SAE Class	Units
007	FIL	600	MM
Max	Time	Min	Time
32.4	17.7	-2.4	32.9

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

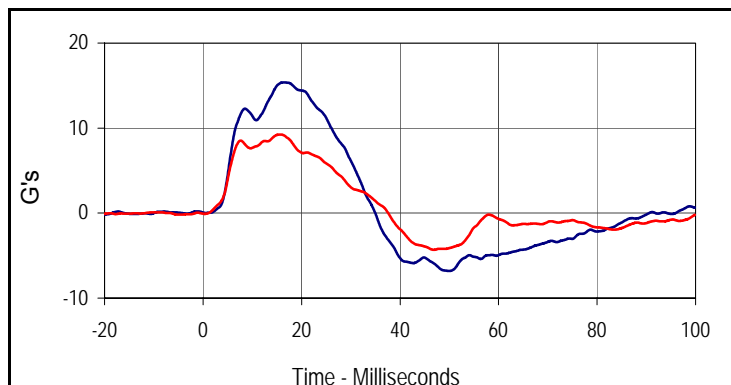
Test Date: 2/13/12  
 Test I.D.: 307TWOA031



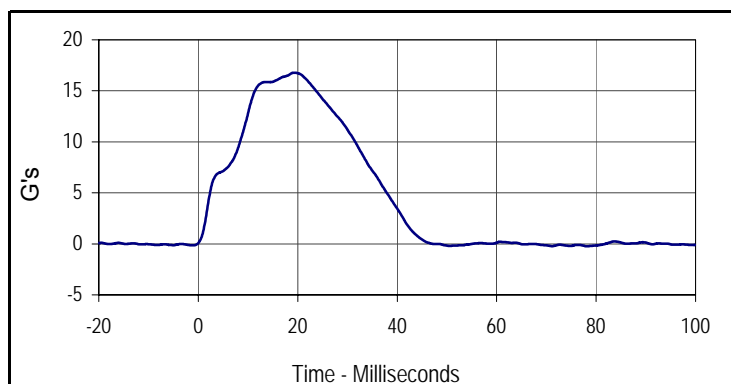
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	260	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.5	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Thorax Rib Deflection	mm	32 to 40	34.9	Pass
Peak Middle Thorax Rib Deflection	mm	39 to 45	40.6	Pass
Peak Lower Thorax Rib Deflection	mm	35 to 43	37.3	Pass
Peak Upper Spine Y Acceleration	G's	13 to 17	15.4	Pass
Peak Lower Spine Y Acceleration	G's	7 to 11	9.3	Pass
Peak Impactor Acceleration	G's	14 to 18	16.8	Pass
Overall Test Results				Pass



Curve Description			
Upper Thorax Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
34.9	20.9	0.0	-11.1
Middle Thorax Deflection			
Max	Time	Min	Time
40.6	21.8	0.0	-11.8
Lower Thorax Deflection			
Max	Time	Min	Time
37.3	22.9	0.0	-0.5



Curve Description			
Upper Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.4	16.3	-6.8	50.0
Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
005	FIL	180	G's
Max	Time	Min	Time
9.3	15.7	-4.3	46.8



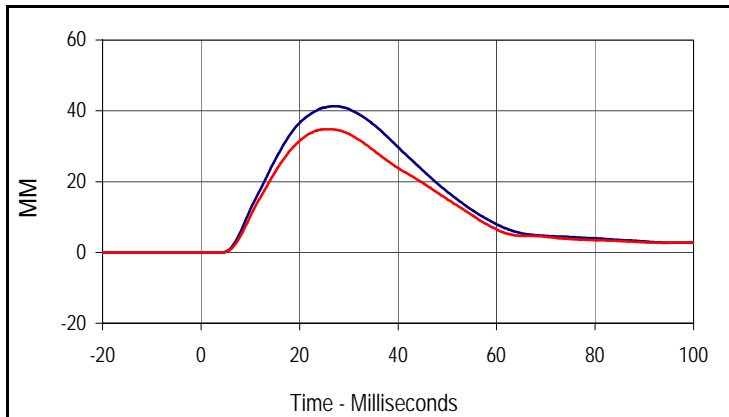
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
16.8	19.4	-0.2	78.1

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

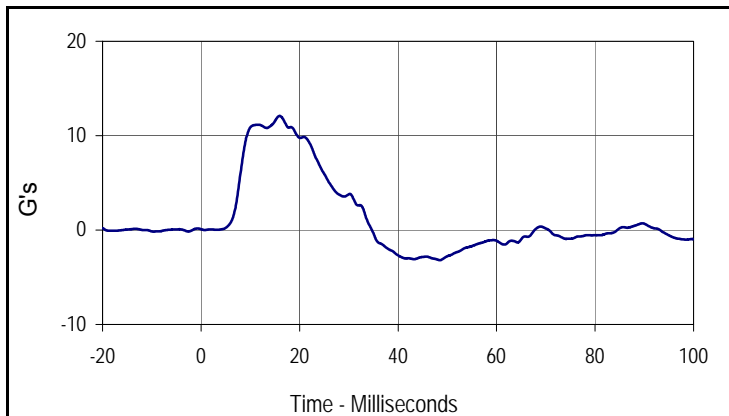
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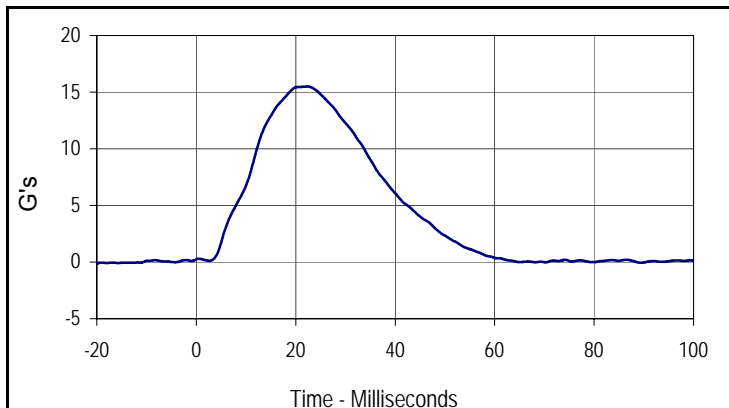
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	270	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	35.0	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.3	Pass
Peak Upper Abdominal Rib Deflection	mm	36 to 47	41.3	Pass
Peak Lower Abdominal Rib Deflection	mm	33 to 44	34.8	Pass
Peak Lower Spine Y Acceleration	G's	9 to 14	12.1	Pass
Peak Impactor Acceleration	G's	12 to 16	15.5	Pass
Overall Test Results				Pass



Curve Description			
Upper Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
001	FIL	600	MM
Max	Time	Min	Time
41.3	26.8	0.0	4.2
Curve Description			
Lower Abdominal Rib Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	600	MM
Max	Time	Min	Time
34.8	25.4	0.0	-13.3



Curve Description			
Lower Spine Y Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
12.1	15.9	-3.2	48.5



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
15.5	22.3	-0.1	-20.0

# Resultant Data - SIDIIS Plug Compression



ATD Calibration Lab

<u>Test ID</u>	<u>Part Serial Number</u>	<u>Test Date</u>	<u>Test Time</u>
	46793	10/4/2011	6:07 PM
<u>Cert ID</u>	<u>ATD Serial Number</u>	<u>ATD Type</u>	
	N/A	SIDIIS	

Current Date : 10/4/2011

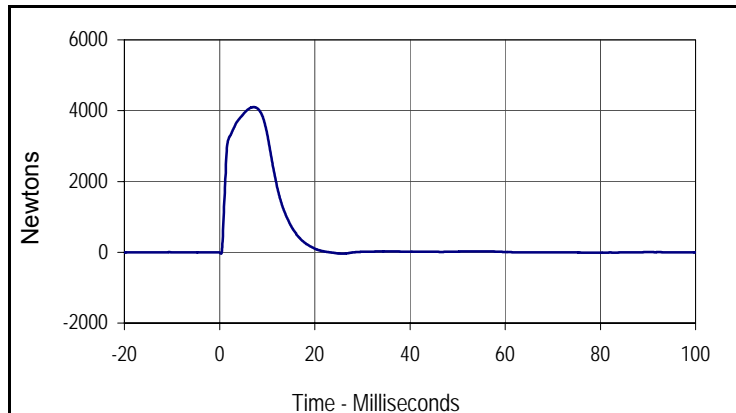
Current Time : 18:08:00

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

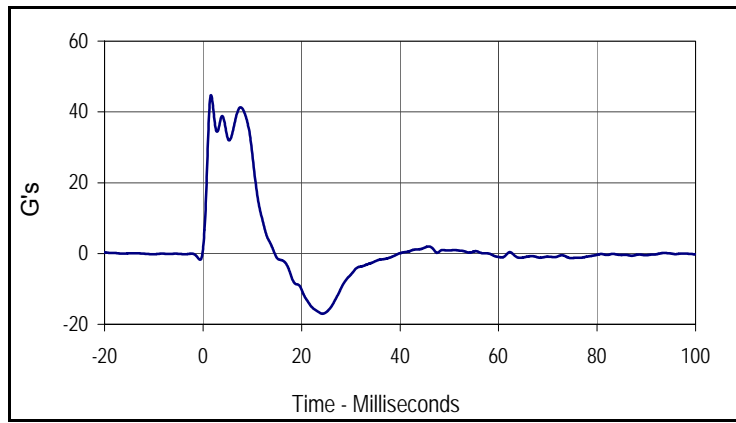
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 Test I.D.: 307ACET031



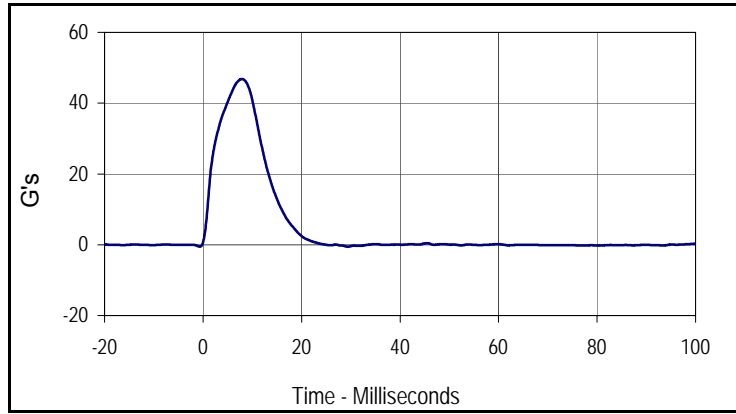
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	300	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	34.0	Pass
Impactor Velocity	m/s	6.6 to 6.8	6.7	Pass
Peak Acetabulum Force Y	Newtons	3600 to 4300	4098.2	Pass
Peak Pelvis Y Acceleration After 6 msec.	G's	34 to 42	41.3	Pass
Peak Impactor Acceleration	G's	38 to 47	46.8	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Acetabulum Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4098.2	7.2	-41.0	0.3



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
44.7	1.6	-17.0	24.2



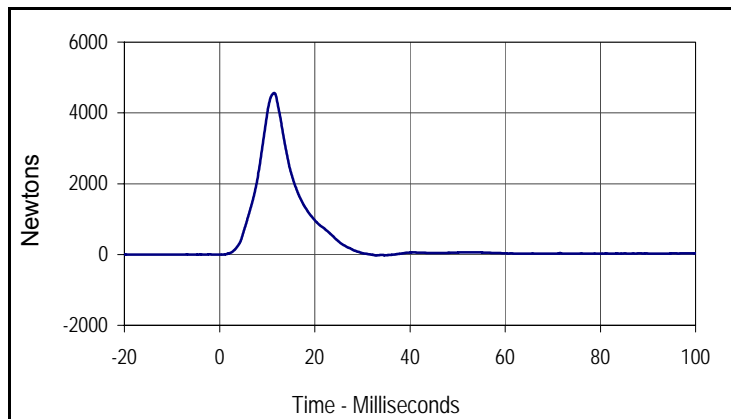
Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
46.8	7.8	-0.6	29.4

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

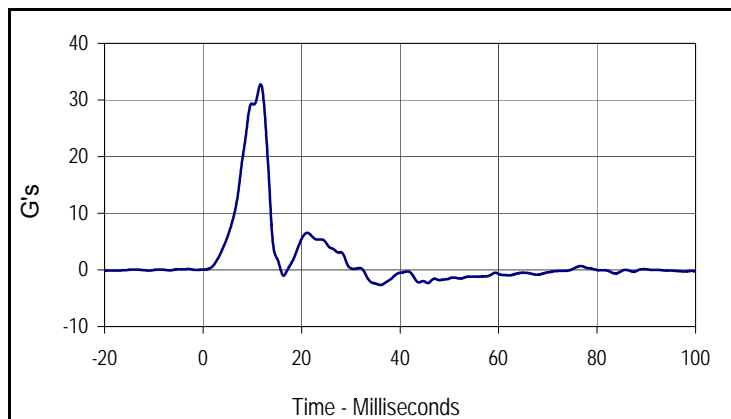
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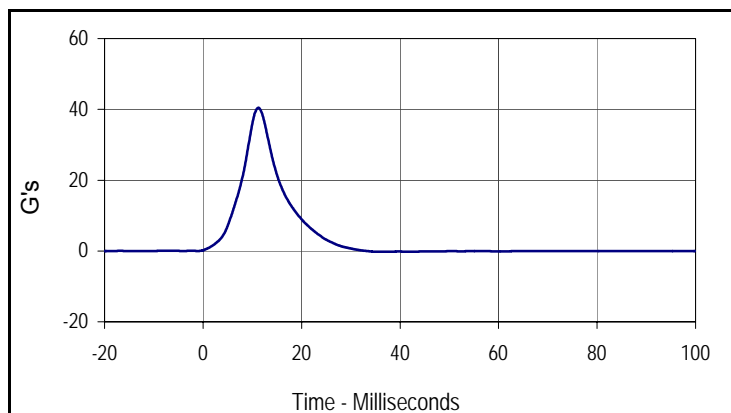
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥180	320	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	35.2	Pass
	Min		29.8	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	33.9	Pass
Impactor Velocity	m/s	4.2 to 4.4	4.2	Pass
Peak Iliac Force	Newtons	4100 to 5100	4566.8	Pass
Peak Pelvis Y Acceleration	G's	28 to 39	32.8	Pass
Peak Impactor Acceleration	G's	36 to 45	40.5	Pass
Overall Test Results				Pass



Curve Description			
Pelvis Iliac Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4566.8	11.5	-26.2	32.9



Curve Description			
Pelvis Y Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	180	G's
Max	Time	Min	Time
32.8	11.7	-2.7	36.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
40.5	11.2	-0.2	37.1

**APPENDIX D**  
**TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA**

**TABLE 1 – Dummy Instrumentation (ES-2re)**

			ES-2re S/N		
			Serial Number	Manufacturer	Calibration
Head Accelerometers		X			
		Y			
		Z			
Thorax Rib Displacement Potentiometers	Upper	Y			
	Middle	Y			
	Lower	Y			
Abdomen Load Cells	Forward	Y			
	Middle	Y			
	Rear	Y			
Lower Spine Accelerometers (T12)		X			
		Y			
		Z			
Pubic Symphysis Load Cell		Y			

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

			SID-IIs S/N		
			Serial Number	Manufacturer	Calibration
Head Accelerometers		X			
		Y			
		Z			
Displacement Potentiometers	Shoulder		Y		
	Thoracic Rib	Upper	Y		
		Middle	Y		
		Lower	Y		
	Abdominal Rib	Upper	Y		
		Lower	Y		
Lower Spine Accelerometers (T12)		X			
		Y			
		Z			
Acetabulum Load Cell		Y			
Iliac Wing Load Cell		Y			
Pelvis Plug (Struck Side)					
Pelvis Plug (Non-Struck Side)					

**TABLE 3 – Vehicle Instrumentation**

Vehicle Instrumentation			Serial Number	Manufacturer	Calibration Date
1	Vehicle Center of Gravity	X			
	Vehicle Center of Gravity	Y			
	Vehicle Center of Gravity	Z			
2	Right Sill at Front Seat	X			
	Right Sill at Front Seat	Y			
	Right Sill at Front Seat	Z			
3	Right Sill at Rear Seat	X			
	Right Sill at Rear Seat	Y			
	Right Sill at Rear Seat	Z			
4	Left Sill at Front Door	Y			
5	Left Sill at Rear Door	Y			
6	Left A-Post Lower	Y			
7	Left A-Post Middle	Y			
8	Left B-Post Lower	Y			
9	Left B-Post Middel	Y			
10	Front Seat Track	Y			
11	Rear Seat Structure	Y			
12	Right Rear Occ. Compartment	Y			
13	Engine Block	X			
	Engine Block	Y			
14	Rear Floorpan Above Axle	X			
	Rear Floorpan Above Axle	Y			
	Rear Floorpan Above Axle	Z			

**TABLE 4 – MDB Instrumentation**

		Serial Number	Manufacturer	Calibration Date
MDB Center of Gravity	X			
MDB Center of Gravity	Y			
MDB Center of Gravity	Z			
Left Frame at Rear Axle Centerline	X			
Left Frame at Rear Axle Centerline	Y			