

**REPORT NUMBER: NCAP-KAR-13-003**

**NEW CAR ASSESSMENT PROGRAM (NCAP)  
FRONTAL BARRIER IMPACT TEST**

**TOYOTA MOTOR MANUFACTURING CANADA INC.  
2013 LEXUS RX350 AWD 5-DOOR MPV**

**NHTSA NUMBER: MD5100**

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




**JUNE 26, 2012**


**FINAL REPORT**

**U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
SAFETY PERFORMANCE STANDARDS  
OFFICE OF CRASHWORTHINESS STANDARDS  
1200 NEW JERSEY AVE, SE  
ROOM W43-410  
WASHINGTON, DC 20590**

This publication is distributed by the U.S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By:   
Mr. Kelsey A. Chiu, Engineering Department Supervisor  
KARCO Engineering, LLC.

Reviewed By:   
Mr. Michael L. Dunlap, Director of Operations  
KARCO Engineering, LLC.

Approved By:   
Mr. Frank D. Richardson, Program Manager  
KARCO Engineering, LLC.

Approval Date: June 26, 2012

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: \_\_\_\_\_

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

Date: \_\_\_\_\_

**TECHNICAL REPORT DOCUMENTATION PAGE**

<b>1. Report No.</b> NCAP-KAR-13-003		<b>2. Government Accession No.</b>		<b>3. Recipient's Catalog No.</b>																																																					
<b>4. Title and Subtitle</b> Final Report of New Car Assessment Program Testing of a 2013 Lexus RX350 AWD 5-Door MPV NHTSA No. MD5100				<b>5. Report Date</b> June 26, 2012																																																					
				<b>6. Performing Organization Code</b> KAR																																																					
<b>7. Authors</b> Mr. Kelsey A. Chiu, Engineering Department Supervisor, KARCO Mr. Frank Richardson, Program Manager, KARCO				<b>8. Performing Organization Report No.</b> TR-P32001-08-NC																																																					
<b>9. Performing Organization Name and Address</b> KARCO Engineering, LLC. 9270 Holly Rd. Adelanto, CA 92301				<b>10. Work Unit No.</b>																																																					
				<b>11. Contract or Grant No.</b> DTNH22-06-D-00027																																																					
<b>12. Sponsoring Agency Name and Address</b> U. S. Department of Transportation National Highway Traffic Safety Administration Office of Crashworthiness Standards 1200 New Jersey Ave., SE, Room W43-410 Washington, D.C. 20590				<b>13. Type of Report and Period Covered</b> Final Test Report, Jun. 12 - 26, 2012																																																					
				<b>14. Sponsoring Agency Code</b> NVS-111																																																					
<b>15. Supplementary Notes</b>																																																									
<b>16. Abstract</b> A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2013 Lexus RX350 AWD 5-Door MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on June 12, 2012.  The impact velocity of the vehicle was 56.08 km/h and the ambient temperature at the barrier face at the time of impact was 36.7 deg. C. The target vehicle's post-test maximum crush was 482 mm at the vehicle's centerline. The test vehicle's performance is as follows:																																																									
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td>N/A</td> <td>700.0</td> <td>150.0</td> <td>700.0</td> <td>122.2</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-28</td> <td>52</td> <td>-17</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.43</td> <td>1</td> <td>0.50</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1329.5</td> <td>2620</td> <td>910.8</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-335.0</td> <td>2520</td> <td>-293.5</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>-1516.7</td> <td>6805</td> <td>-1385.9</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>-1938.5</td> <td>6805</td> <td>-1765.1</td> </tr> </tbody> </table>						Measurement Description	Units	Driver ATD		Passenger ATD		Threshold	Result	Threshold	Result	Head Injury Criteria (HIC <sub>15</sub> )	N/A	700.0	150.0	700.0	122.2	Maximum Chest Compression	mm	63	-28	52	-17	Nij	N/A	1	0.43	1	0.50	Neck Tension	N	4170	1329.5	2620	910.8	Neck Compression	N	4000	-335.0	2520	-293.5	Left Femur Force	N	10008	-1516.7	6805	-1385.9	Right Femur Force	N	10008	-1938.5	6805	-1765.1
Measurement Description	Units	Driver ATD		Passenger ATD																																																					
		Threshold	Result	Threshold	Result																																																				
Head Injury Criteria (HIC <sub>15</sub> )	N/A	700.0	150.0	700.0	122.2																																																				
Maximum Chest Compression	mm	63	-28	52	-17																																																				
Nij	N/A	1	0.43	1	0.50																																																				
Neck Tension	N	4170	1329.5	2620	910.8																																																				
Neck Compression	N	4000	-335.0	2520	-293.5																																																				
Left Femur Force	N	10008	-1516.7	6805	-1385.9																																																				
Right Femur Force	N	10008	-1938.5	6805	-1765.1																																																				
<b>17. Key Words</b> 35 mph Frontal Barrier Impact Test New Car Assessment Program (NCAP)				<b>18. Distribution Statement</b> Copies of this report are available from: National Highway Traffic Safety Admin. Technical Reference Division 1200 New Jersey Ave., SE Washington, DC 20590																																																					
<b>19. Security Classification of this report</b> UNCLASSIFIED		<b>20. Security Classification of this page</b> UNCLASSIFIED		<b>21. No. of Pages</b> 134	<b>22. Price</b>																																																				

## TABLE OF CONTENTS

<u>Section</u>		<u>Page No.</u>
1	Purpose and Summary of the Test	1
2	Occupant and Vehicle Information / Data Sheets	3
<u>Data Sheet No.</u>		<u>Page No.</u>
1	General Test and Vehicle Parameter Data	4
2	Seat Adjustment, Fuel Systems, and Steering Wheel Data	8
3	Dummy Longitudinal Clearance Dimensions	10
4	Dummy Lateral Clearance Dimensions	11
5	Seat Belt Positioning Data	12
6	High-Speed Camera Locations and Data	13
7	Vehicle Accelerometer Locations	15
8	Photographic Reference Target Locations	16
9	Load Cell Locations on Fixed Barrier	17
10	Test Vehicle Camera and Instrumentation Summary	18
11	Post-Test Observations	19
12	Vehicle Profile Measurements	20
13	Accident Investigation Division Data	22
14	Vehicle Intrusion Measurements	23
15	Summary of FMVSS 212 and FMVSS 219 (Partial) Data	25
16	FMVSS 301 Fuel Static Rollover Data	27
17	Dummy / Vehicle Temperature Stabilization	28
<u>Appendix</u>		<u>Page No.</u>
A	Photographs	A
B	Dummy Response Data Traces	B
C	Dummy Calibration and Performance Verification Data	C

## **SECTION 1**

### **PURPOSE AND SUMMARY OF TEST**

#### **PURPOSE**

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program, sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-D-00027. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure, dated May, 2012.

#### **SUMMARY**

A load cell barrier consisting of 36 load cells was impacted by a 2013 Lexus RX350 AWD 5-door MPV at a velocity of 56.08 km/h. The test was performed at KARCO Engineering, LLC. on June 12, 2012. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

Three (3) real-time cameras and sixteen (16) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One Part 572E 50<sup>th</sup> percentile male anthropomorphic test device (ATD) was placed in the driver seating position and one Part 572O 5<sup>th</sup> percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck force transducers, right / left femur load cells, and lower leg instrumentation. Seat belt load cells were installed on the driver's and the passenger's shoulder belts to measure the dummy torso section loading. The driver (position 1) ATD (Serial No. 035) and the right-front passenger (position 2) ATD (Serial No. 141) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 134 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces.

There was 100% windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the test vehicle was 482 mm located at the vehicle's centerline. Both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver ATD's head contacted the airbag and the headrest. The upper torso contacted the airbag. Both the left and right knees contacted the knee airbag.

The passenger's visible contact points were as follows: The passenger ATD's head contacted the airbag and the headrest. The upper torso contacted the airbag. Both the left and right knees contacted the knee airbag.

The occupant data is summarized below:

ATD Position	HIC <sub>15</sub>	T <sup>1</sup>	T <sup>2</sup>	Chest Disp. (mm)	Nij	Neck Tension (N)	Neck Comp. (N)	Left Femur (N)	Right Femur (N)
Driver (50th)	150.0	79.6	94.6	-28	0.43	1329.5	-335.0	-1516.7	-1938.5
Passenger (5th)	122.2	69.0	84.0	-17	0.50	910.8	-293.5	-1385.9	-1765.1

**SECTION 2**  
**DATA SHEETS**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**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: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA Number	MD5100
Model Year	2013
Make	Lexus
Model	RX350 AWD
Body Style	5-Door MPV
VIN	2T2BK1BA7DC154467
Body Color	Nebula Grey Pearl
Odometer Reading (km / mi)	77 / 48
Engine Displacement (L)	3.5
Type / No. of Cylinders	V6
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	6
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof / T-Top	Yes
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
All Wheel Drive (AWD)	Yes
Traction Control System	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	Yes
Pass. Front Airbag	Yes
Pass. Curtain Airbag	Yes
Pass. Head/Torso Airbag	No
Pass. Torso Airbag	No
Pass. Torso/Pelvis Airbag	Yes
Pass. Pelvis Airbag	No
Pass. Knee Airbag	Yes
Driver Seat Belt Pretensioner	Yes
Pass. Seat Belt Pretensioner	Yes
Driver Load Limiter	Yes
Pass. Load Limiter	Yes
Other Safety Restraint	None

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

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Toyota Motor Manufacturing Canada Inc.
Date of Manufacture	Apr-12

GVWR (kg)	2560
GAWR Front (kg)	1360
GAWR Rear (kg)	1385

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Bench			
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				395.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				54.8	A-B

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

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12



### VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	220	220
Recommended Tire Size	P235/60R18	P235/60R18
Tire Size on Vehicle	P235/60R18	P235/60R18
Tire Manufacturer	Bridgestone	Bridgestone
Tire Model	Dueler H/L	Dueler H/L
Treadwear	260	260
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	2 Ply Polyester	2 Ply Polyester
Tire Plies Body	2 Ply Polyester, 2 Steel, 1 Nylon	2 Ply Polyester, 2 Steel, 1 Nylon
Load Index / Speed Symbol	102V	102V
Tire Material	Plyester, Steel, Nylon	Plyester, Steel, Nylon
DOT Safety Code Left	0B7A 702 0612	0B7A 702 0612
DOT Safety Code Right	0B7A 702 0612	0B7A 702 0612

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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**TEST VEHICLE WEIGHTS**

	Units	As Delivered Weights (UVW)			As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total	Front Axle	Rear Axle	Total
Left	kg	580.0	440.0		609.5	501.5	
Right	kg	560.0	420.5		594.0	483.5	
Ratio	%	57.0%	43.0%	100.0%	55.0%	45.0%	100.0%
Total	kg	1140.0	860.5	2000.5	1203.5	985.0	2188.5

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	2000.5	A
Weight of 1 P572E ATD & 1 P572O ATD	kg	141.0	B
Rated Cargo/Luggage Weight (RCLW)	kg	54.8	C
Calculated Vehicle Target Weight (TVTW)	kg	2196.3	A+B+C

**TEST VEHICLE ATTITUDES**

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	804	814	820	814	1181
As Tested	mm	795	794	802	805	1235
Post-Test	mm	822	824	799	809	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2745
Total Vehicle Length at Left Side	mm	4065
Total Vehicle Length at Centerline	mm	4740
Total Vehicle Length at Right Side	mm	4055
Weight of Ballast in Cargo Area	kg	72.6
Weight of Vehicle Components Removed	kg	49.5
Amount of Stoddard Solvent in Fuel Tank	L	67.58

**VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:**

Rear Bumper Cover (6.5 kg), Rear Bumper Beam (5.5 kg), Trunk Liner (12.0 kg), Spare Tire (19.5 kg), Spare Tire Tools (6.0 kg)

---



---

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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**TARGET VEHICLE STRUCTURAL MEASUREMENTS**

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length	4740	4258	-482
2	Total Width	1885	2062	177
3	Bumper Top Height	705	703	-2
4	Bumper Bottom Height	470	335	-135
5	Longitudinal Member Top Height	540	645	105
6	Distance Between Longitudinal Members	940	910	-30
7	Longitudinal Member Width	85	1005	920
8	Engine Top Height	925	974	49
9	Engine Bottom Height	188	199	11
10	Engine and Gearbox Width	725	725	0
11	Front Bumper to Engine Distance	500	340	-160
12	Front Shock Absorber Fixing Height	960	1014	54
13	Bonnet Leading Edge Height	900	951	51
14	Front Shock Absorber Fixing Width	1210	1133	-77
15	Front Bumper to Front Axle Distance	970	546	-424
16	Front Axle to A-Pillar Distance	515	507	-8
17	A-Pillar to B-Pillar Distance	998	1005	7
18	B-Pillar to Rear Axle Distance	1130	1129	-1
19	B-Pillar to C-Pillar Distance	973	962	-11
20	Roof Sill Bottom Height	1517	1530	13
21	Roof Sill Top Height	1636	1650	14
22	Floor Sill Bottom Height	278	282	4
23	Floor Sill Top Height	420	421	1

All measurements in millimeters.

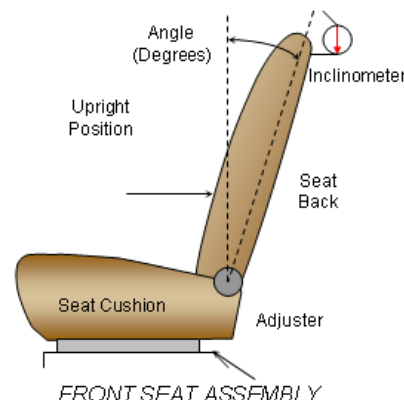
## DATA SHEET NO. 2

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

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

#### NOMINAL DESIGN RIDING POSITION

The procedure for the driver is as follows: the seat back is set to the manufacturer's designated angle. The procedure for the passenger is as follows: the seat back is set to position the transverse instrumentation platform of the dummy's head at  $0^\circ \pm 0.5^\circ$ . Seat back angle is measured at the headrest post using a digital inclinometer.

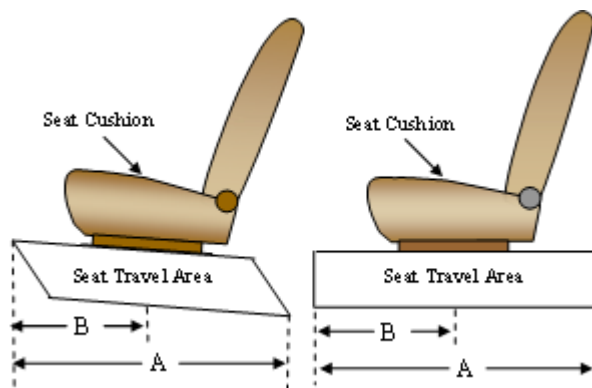


#### SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	0.2
Passenger Seat Back Angle	1.6

#### SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rear most possible position. The driver's seat is set to the middle of the fore-aft travel. The passenger's seat is set to the forward most position where the ATD will not contact any interior panels.



#### SEAT FORE/AFT POSITIONS

Seating Position	Total Fore-Aft Travel	Placed in Position
Driver Seat	317 mm	159 mm
Passenger Seat	280 mm	0 mm

#### SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position for a 50<sup>th</sup> percentile adult male ATD for the driver, and a 5<sup>th</sup> percentile adult female ATD for the passenger. Position "H" is the uppermost position, followed by position "M1". Position "L" is the lowermost position.

#### SEAT BELT UPPER ANCHORAGES

Seating Position	Total No. of Positions	Placed in Position
Driver Seat	4	H
Passenger Seat	4	H

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

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

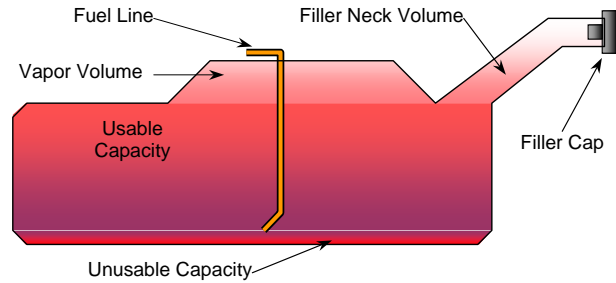
Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**FUEL TANK CAPACITY**

Description	Liters
Usable Capacity of "Standard Tank"	72.67
Usable Capacity of "Optional Tank"	
92 - 94% of Usable Capacity	66.86 to 68.31
Actual Amount of Stoddard Solvent Used	67.58
1/3 of Usable Capacity	24.22

**FUEL PUMP**

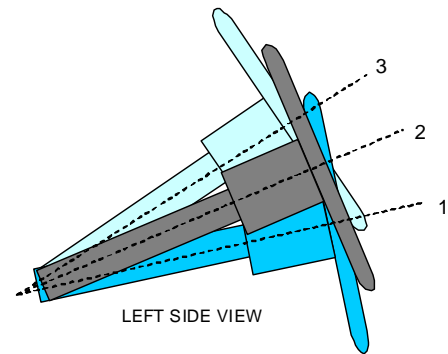
The vehicle is equipped with an electric fuel pump. The fuel pump is activated when the ignition is turned on.



VEHICLE FUEL TANK ASSEMBLY

**STEERING COLUMN ADJUSTMENT**

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used to measure telescoping steering wheel travel.



STEERING COLUMN ASSEMBLY

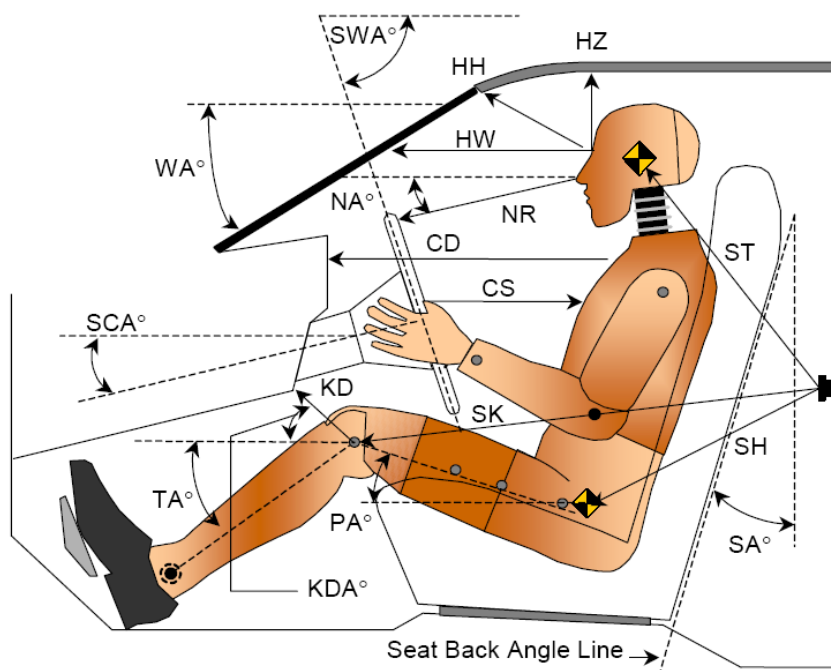
**STEERING COLUMN POSITIONING**

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	24.1	85
Geometric Center Position, No. 2	26.2	105
Uppermost Position, No. 3	28.4	125
Telescoping Steering Wheel Travel		40
Test Position	26.2	105

### DATA SHEET NO. 3

### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12



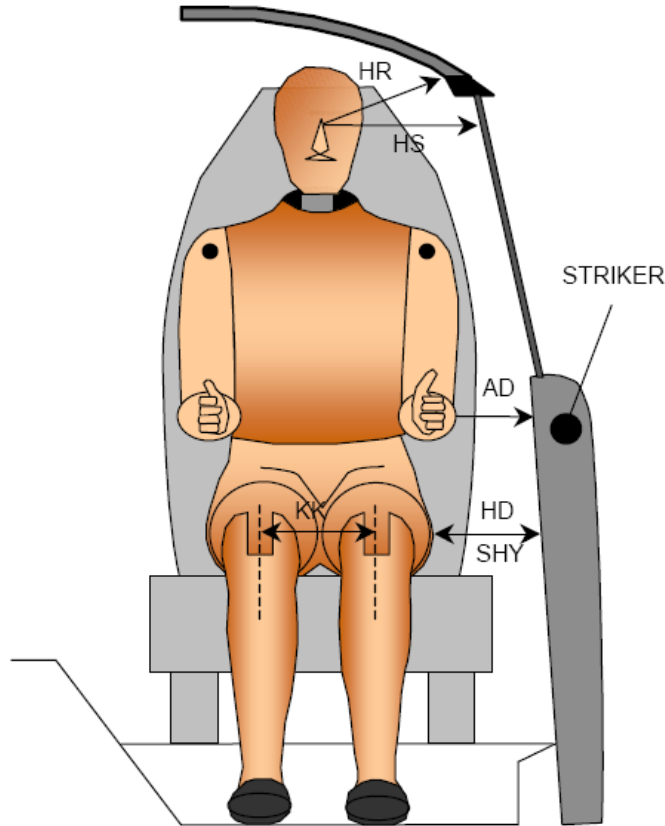
**LEFT SIDE VIEW**

Code	Measurement Description	Driver		Passenger	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		25.0		
SWA°	Steering Wheel Angle		63.7		
SCA°	Steering Column Angle		26.2		
SA°	Seat Back Angle (On Headrest Post)		0.2		1.6
HZ	Head to Roof	205	90.0	245	90.0
HH	Head to Header	355	28.9	300	48.5
HW	Head to Windshield	742	0.0	661	0.0
NR	Nose to Rim	359	9.4	452	30.5
CD	Chest to Dash	498	11.6	408	1.3
CS	Chest to Steering Hub	295	9.9		
RA	Rim to Abdomen	165	0.0		
KDL	Left Knee to Dash	163	29.6	80	
KDR	Right Knee to Dash	156		83	44.0
PA°	Pelvic Angle		20.4		21.5
TA°	Tibia Angle		51.6		57.1
SK	Striker to Knee	618	6.1	761	6.2
ST	Striker to Head	503	75.5	507	54.3
SH	Striker to H-Point	288	40.3	427	9.3

## DATA SHEET NO. 4

### DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV      NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test      Test Date: 06/12/12



Code	Description	Driver (mm)	Passenger (mm)
AD	Arm to Door	24	70
HD	H-Point to Door	149	254
HR	Head to Side Header	228	250
HS	Head to Side Window	350	365
KK	Knee to Knee	355	230
SHY	Striker to H-Point (Y-Direction)	260	305
AA	Ankle to Ankle	360	170

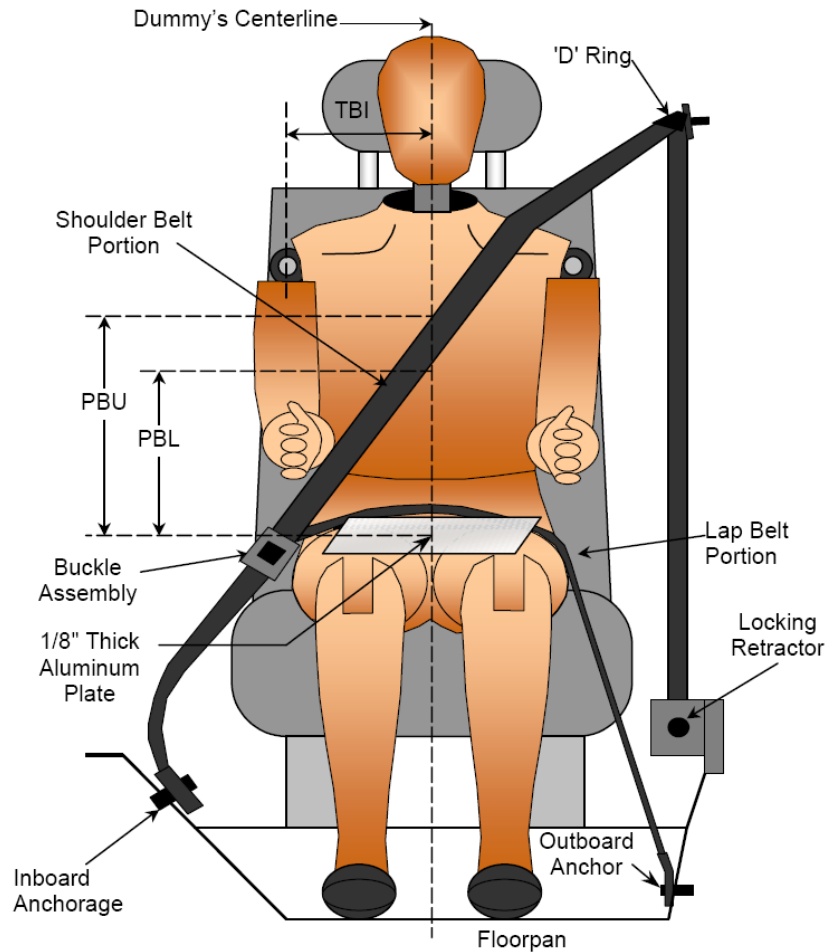
**DATA SHEET NO. 5**  
**SEAT BELT POSITIONING DATA**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV

NHTSA No.: MD5100

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 06/12/12



**FRONT VIEW OF DUMMY**

**SEAT BELT POSITIONING MEASUREMENTS**

Code	Measurement Description	Units	Driver	Passenger
PBU	Top Surface of Aluminum Plate to Belt Upper Edge	mm	375	335
PBL	Top Surface of Aluminum Plate to Belt Lower Edge	mm	305	260

**BELT LENGTH DATA**

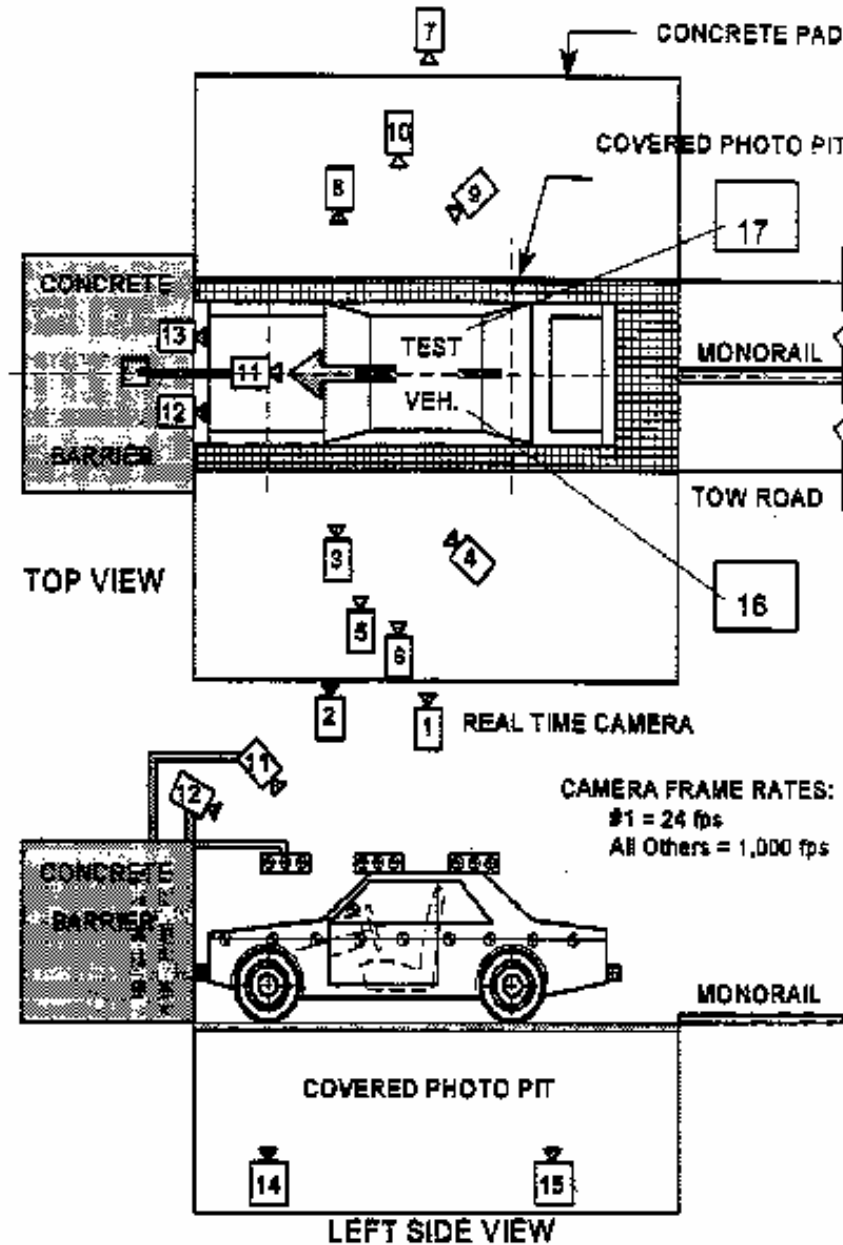
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as Measured on ATD	mm	907	1020
Lap Belt Length as Measured on ATD	mm	894	999
Remainder of Belt on Reel	mm	745	546
Total Belt Length for Continuous Webbing Systems	mm	2546	2565

DATA SHEET NO. 6

HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

CAMERA POSITIONS FOR FRONTAL IMPACTS



**DATA SHEET NO. 6 ... (CONTINUED)**

**HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**CAMERA LOCATIONS**

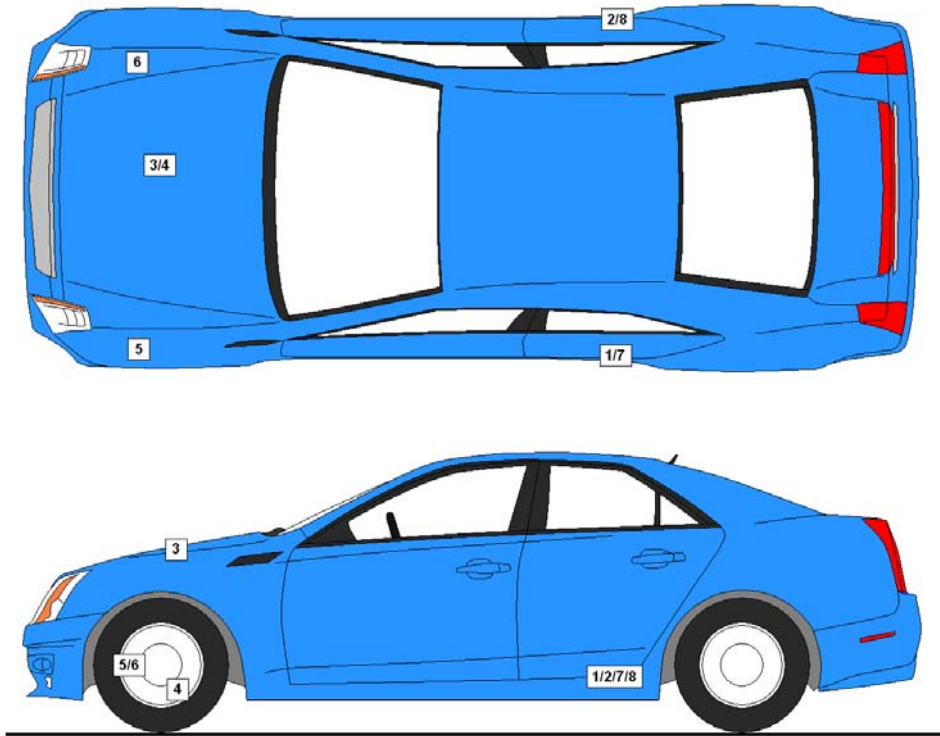
No.	Description	Location (mm)			Lens (mm)	Speed (fps)
		X	Y	Z		
1	Real-Time Left Overall	-11412	-8150	-1484		30
2	Driver Close-Up	-2590	-7950	-1371	24	1000
3	Left Front Half	-1701	-6197	-1701	50	1000
4	Left Angle	-6696	-10308	-3211	ZOOM	1000
5	Steering Column - Top	-1966	-10412	-3688	50	1000
6	Steering Column - Bottom	-1972	-10412	-3379	50	1000
7	Right Overall	-2336	7569	-1012	24	1000
8	Passenger Close-Up	-1733	7581	-1408	50	1000
9	Right Front Half	-1600	8214	-1811	ZOOM	1000
10	Right Angle	-6217	9516	-4830	ZOOM	1000
11	Windshield	-354	0	-5749	12	1000
12	Driver Windshield	297	-366	-2460	12	1000
13	Passenger Windshield	297	366	-2460	24	1000
14	Pit Front	-756	0	1495	12	1000
15	Pit Rear	-3398	0	1495	8	1000
16	Onboard Driver Airbag (Optional)	-1600	250	-1540	12	1000
17	Onboard Passenger Airbag (Optional)	-1600	-250	-1540	12	1000
18	Real-Time Left View of Impact					
19	Real-Time Right View of Impact					

Coordinates:      +X = forward impact plane  
                       +Y = right of monorail center  
                       +Z = into ground

**DATA SHEET NO. 7**

**VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

No.	Description	Location		
		X	Y	Z
1	Left Rear Accelerometer X-Direction	1806	-743	-428
2	Right Rear Accelerometer X-Direction	1806	743	-428
3	Engine Top X	3920	45	-820
4	Engine Bottom X	3810	209	-180
5	Left Brake Caliper X	3770	-775	-302
6	Right Brake Caliper X	3770	775	-302
7	Left Rear Accelerometer Z-Direction	1806	-743	-428
8	Right Rear Accelerometer Z-Direction	1806	743	-428

Reference Points: X – Rear Surface of Vehicle (+ forward)  
 Y – Vehicle Centerline (+ to right)  
 Z – Ground Plane (+ down)

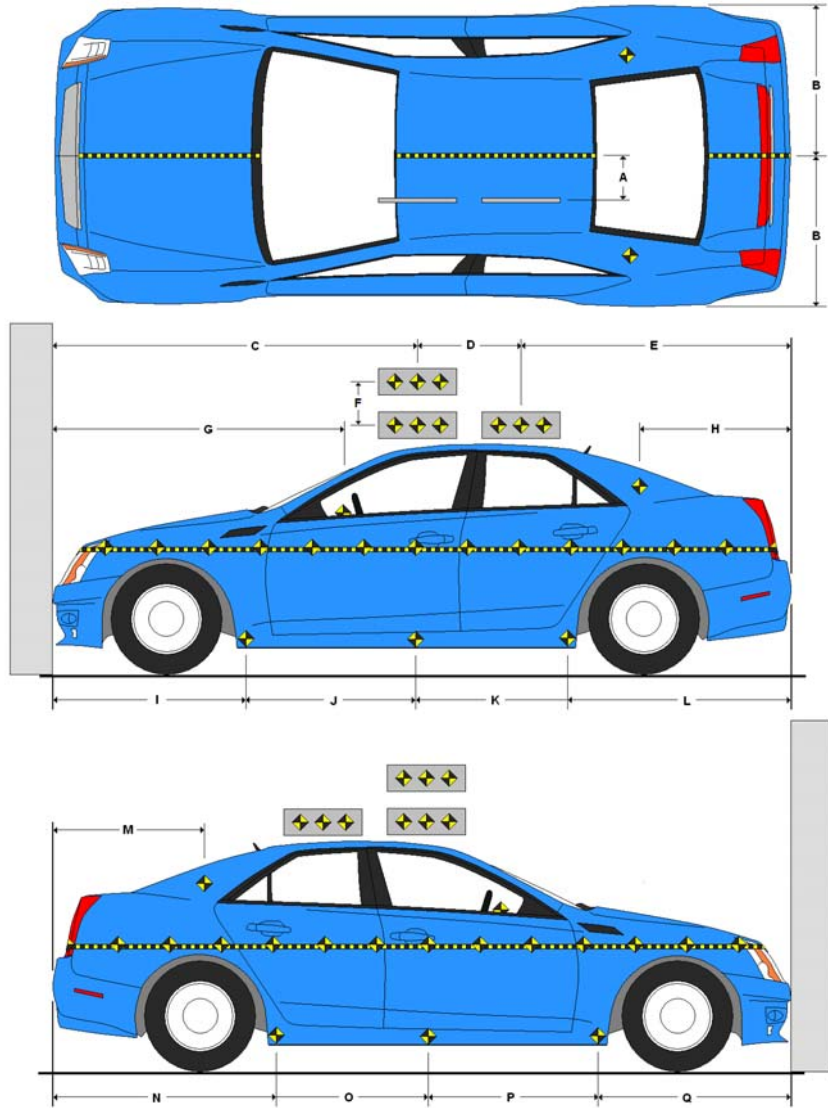
**DATA SHEET NO. 8**

**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

Item	Value
A	
B	943
C	2235
D	610
E	1900
F	305
G	1777
H	681
I	1468
J	875
K	875
L	1517
M	693
N	1503
O	878
P	878
Q	1474



All measurements in millimeters.

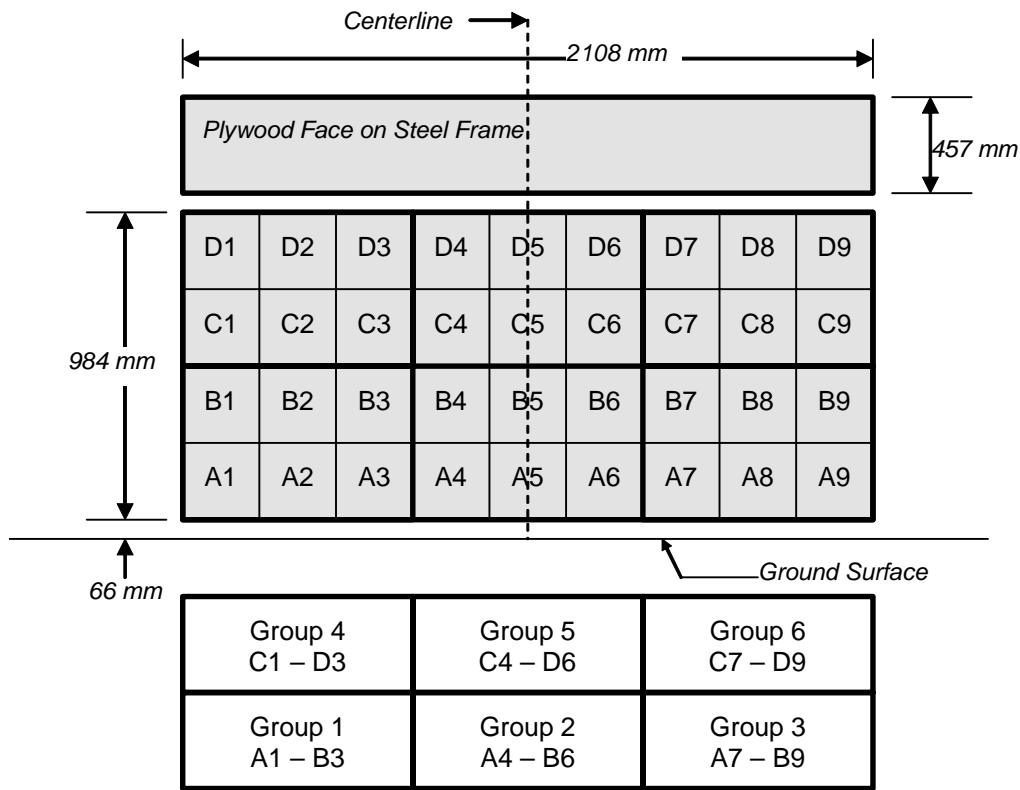
**DATA SHEET NO. 9**

**LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**36 Load Cell Rigid Barrier (NHTSA Standard)  
Load Cell Locations on Fixed Barrier**



6 Groups of 6 Load Cells Each

**DATA SHEET NO. 10**

**TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**INSTRUMENTATION**

Driver Dummy Accelerometers	44
Passenger Dummy Accelerometers	44
Vehicle Structure Accelerometers	8
Seat Belt Load Cells	2
Load Cell Barrier	36
Total	134

**CAMERA COVERAGE**

High-Speed Vehicle On Board	2
High-Speed Off board	14
Real Time	3
Total	19

**DATA SHEET NO. 11**  
**POST-TEST OBSERVATIONS**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**TEST DUMMY INFORMATION AND CONTACT**

Description	Driver	Passenger
Dummy Type/Serial No.	P572E 50th Percentile Male ATD / 035	P572O 5th Percentile Female ATD / 141
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag	Knee Airbag
Right Knee Contact	Knee Airbag	Knee Airbag

**DOOR OPENING AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Locked / Unlocked Doors	Unlocked	Unlocked
Front Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Rear Door Opening	Remained closed and latched, operational	Remained closed and latched, operational
Seat Track Shift (mm)	17	5
Seat Back Failure	None	None
Glazing Damage	None	None

**POST TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Cracked
Window Damage	None
Other Notable Effects	None

**VEHICLE REBOUND FROM BARRIER**

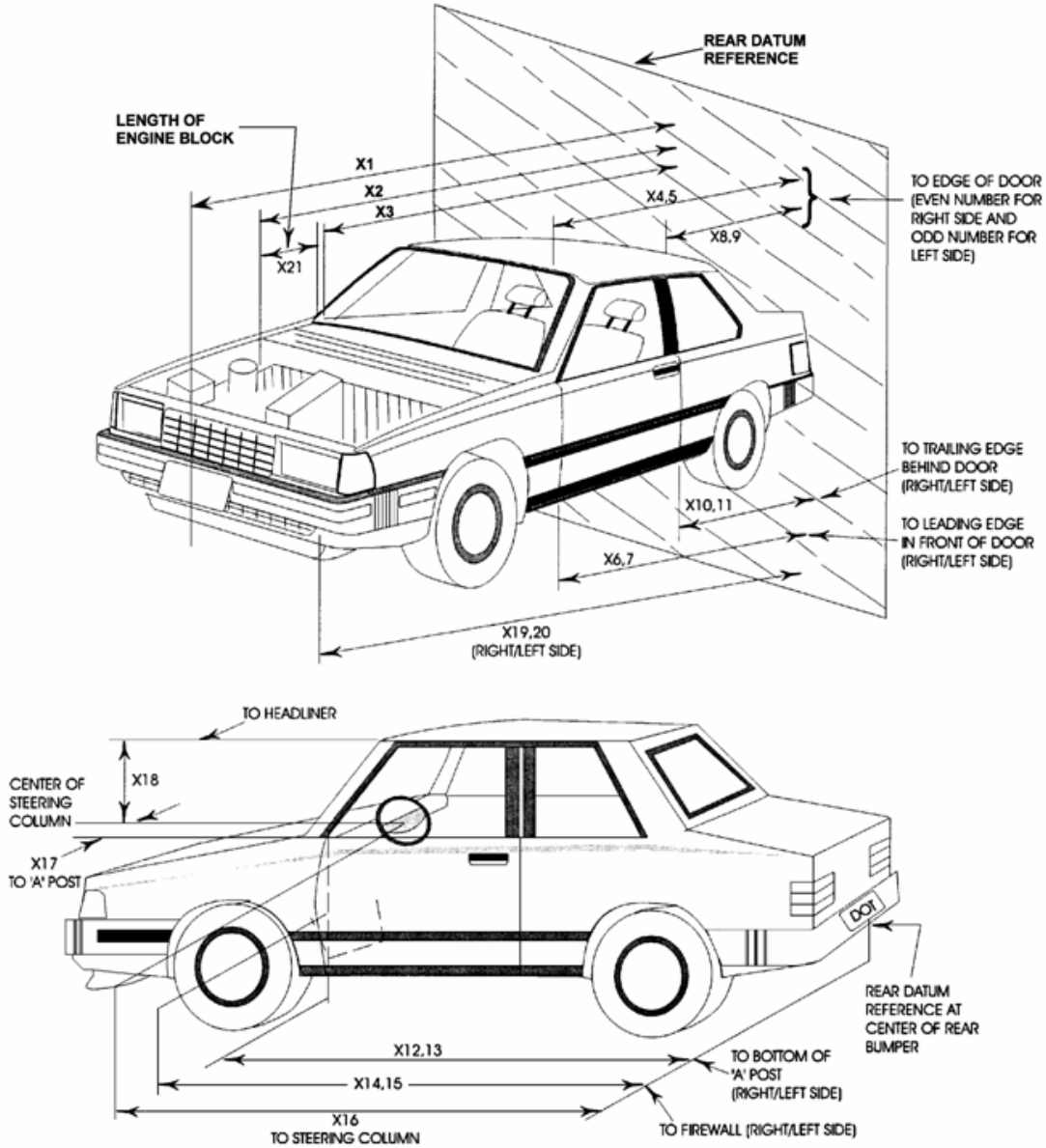
Measured Parameter	Units	Value
Left Side	mm	539
Center	mm	462
Right Side	mm	503
Average	mm	501

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Type	Driver		Passenger	
	Installed	Operated	Installed	Operated
Front Airbag	Yes	Yes	Yes	Yes
Side Airbag 1 (Curtain)	Yes	No	Yes	No
Side Airbag 2 (Torso/Pelvis)	Yes	No	Yes	No
Knee Airbag	Yes	Yes	Yes	Yes
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes	Yes	Yes	Yes
Other				

**DATA SHEET NO. 12**  
**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12



**DATA SHEET NO. 12 ... (CONTINUED)**

**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	4740	4258	-482
2	Rear Surface of Vehicle to Front of Engine	4240	3918	-322
3	RSOV to Firewall	3535	3588	53
4	RSOV to Upper Leading Edge of Right Door	3274	3271	-3
5	RSOV to Upper Leading Edge of Left Door	3278	3272	-6
6	RSOV to Lower Leading Edge of Right Door	3252	3255	3
7	RSOV to Lower Leading Edge of Left Door	3260	3261	1
8	RSOV to Upper Trailing Edge of Right Door	2164	2173	9
9	RSOV to Upper Trailing Edge of Left Door	2176	2169	-7
10	RSOV to Lower Trailing Edge of Right Door	2162	2167	5
11	RSOV to Lower Trailing Edge of Left Door	2169	2152	-17
12	RSOV to Bottom of A-Pillar, Right Side	3238	3221	-17
13	RSOV to Bottom of A-Pillar, Left Side	3243	3230	-13
14	RSOV to Firewall, Right Side	3550	3490	-60
15	RSOV to Firewall, Left Side	3635	3675	40
16	RSOV to Steering Column	2795	2783	-12
17	Center of Steering Column to A-Pillar	435	432	-3
18	Center of Steering Column to Headliner	455	451	-4
19	RSOV to Right Side of Front Bumper	4055	3879	-176
20	RSOV to Left Side of Front Bumper	4065	3807	-258
21	Length of Engine Block	505	505	0
RD	RSOV to Right Side of Dash Panel	2990	3026	36
CD	RSOV to Center of Dash Panel	2860	3000	140
LD	RSOV to Left Side of Dash Panel	3005	3007	2

All measurements in millimeters.

**DATA SHEET NO. 13**  
**ACCIDENT INVESTIGATION DATA**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

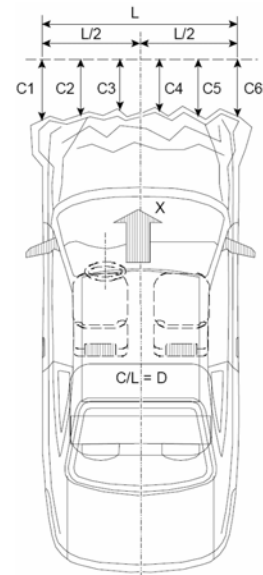
**VEHICLE INFORMATION**

VIN: 2T2BK1BA7DC154467 Wheelbase (mm): 2745  
 Vehicle Size Category: 5-Door MPV Test Weight (kg): 2188.5

**ACCELEROMETER DATA**

Accelerometer Locations: Left Rear Crossmember  
 Cal. Procedure/Interval: Drop Test / 6 months  
 Integration Algorithm: NHTSA Standard  
 Impact Velocity (km/h): 56.08  
 Velocity Change (km/h): 63.3  
 Time of Separation (msec): 65.8

Linearity: Good



**CRUSH PROFILE**

Collision Deformation Classification: 12FDEW2  
 Midpoint of Damage: Vehicle Centerline  
 Damage Region Length (mm): 1630  
 Impact Mode: Full Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush Zone 1 at Left Side	mm	259	571	312
C2	Crush Zone 2 at Left Side	mm	71	518	447
C3	Crush Zone 3 at Left Side	mm	2	466	464
C4	Crush Zone 4 at Right Side	mm	2	467	465
C5	Crush Zone 5 at Right Side	mm	71	493	422
C6	Crush Zone 6 at Right Side	mm	259	521	262
L	C1 to C6	mm	1630		

**DATA SHEET NO. 14**

**VEHICLE INTRUSION MEASUREMENTS**

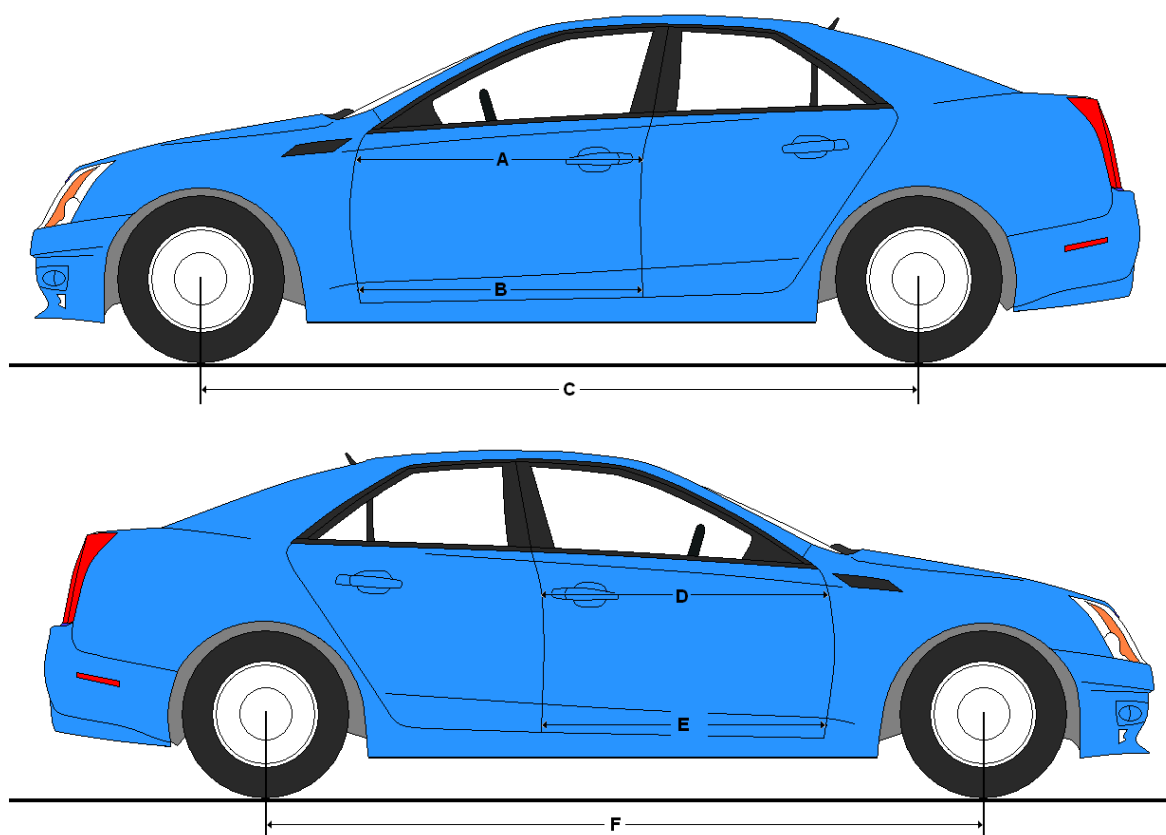
Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	998	1002	-4
B	Left Side Lower	mm	881	889	-8
D	Right Side Upper	mm	1000	995	5
E	Right Side Lower	mm	887	908	-21

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2745	2727	18
F	Right Side Wheelbase	mm	2745	2703	42



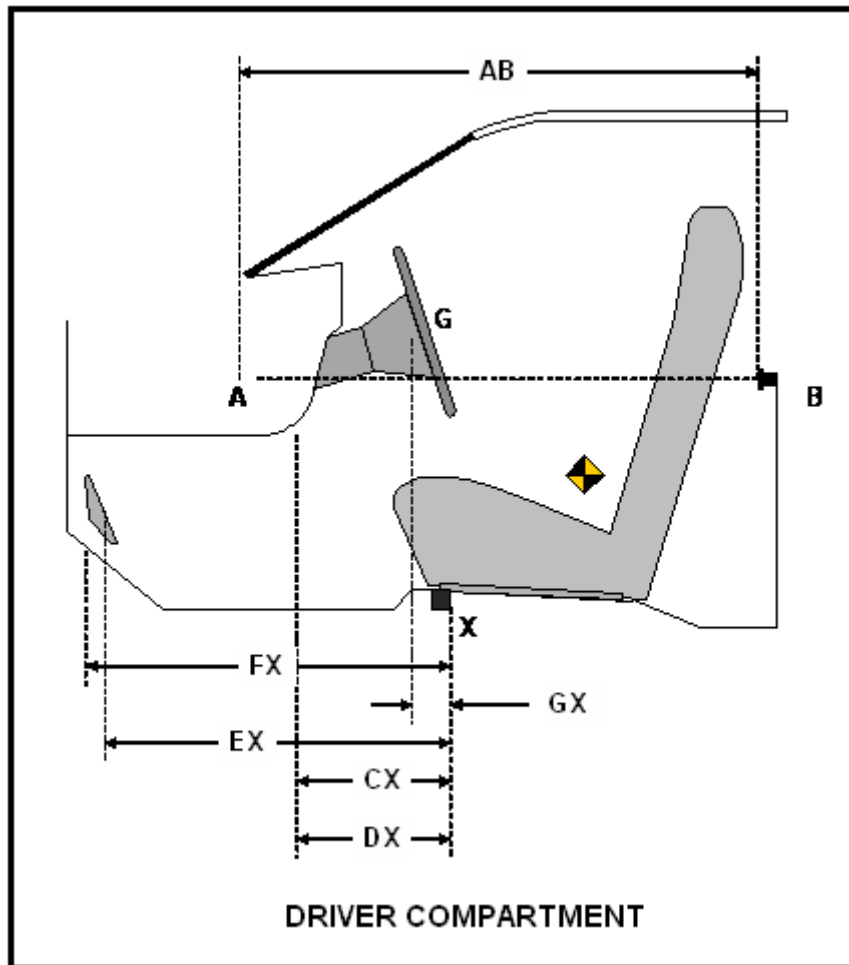
**DATA SHEET NO. 14 ... (CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside Window Jam)	mm	843	841	2
CX	Left Knee Bolster to X	mm	240	308	-68
DX	Right Knee Bolster to X	mm	240	299	-59
EX	Brake Pedal to X	mm	500	575	-75
FX	Foot Rest to X	mm	530	512	18
GX	Center of Steering Wheel Hub to X	mm	40	39	1

X = Front of Seat Track (Stationary)



**DATA SHEET NO. 15**

**SUMMARY OF FMVSS 212 AND 219 (PARTIAL) DATA**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

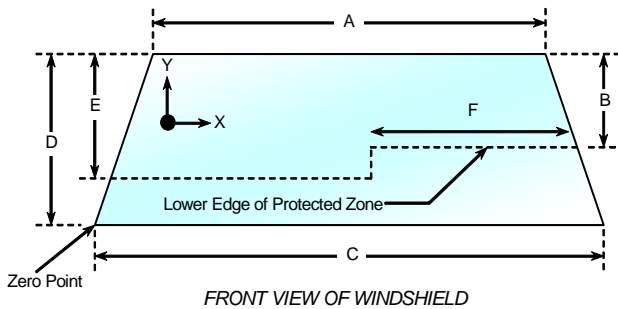
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with rubber cement.

The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicles not equipped with occupant passive restraints and 50% for each side of the windshield for vehicles which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.0 ° C

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% Retention
Left Side	2343	2343	100.0%
Right Side	2343	2343	100.0%
Total	4686	4686	100.0%



Item	Units	Value
A	mm	1233
B	mm	480
C	mm	1463
D	mm	995
E	mm	530
F	mm	470

**AREAS OF PROTECTED ZONE FAILURES**

A. Provide Coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield.

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component.

X	Y

**DATA SHEET NO. 15 ... (CONTINUED)**

**SUMMARY OF FMVSS 212 AND 219 (PARTIAL) DATA**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 36.7° C Test Time: 3:20 PM

**Stoddard Solvent Spillage Measurements**

- 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: There was no Stoddard solvent spillage.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

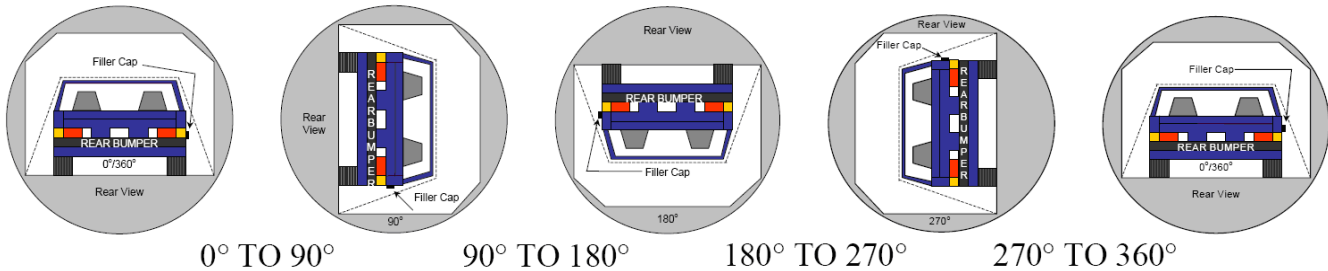
**DATA SHEET NO. 16**  
**FMVSS 301 STATIC ROLLOVER**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV

NHTSA No.: MD5100

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 06/12/12



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard solvent spillage: There was no Stoddard solvent spillage.

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	83	300	383
90° To 180°	82	300	382
180° To 270°	78	300	378
270° To 360°	80	300	380

**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**

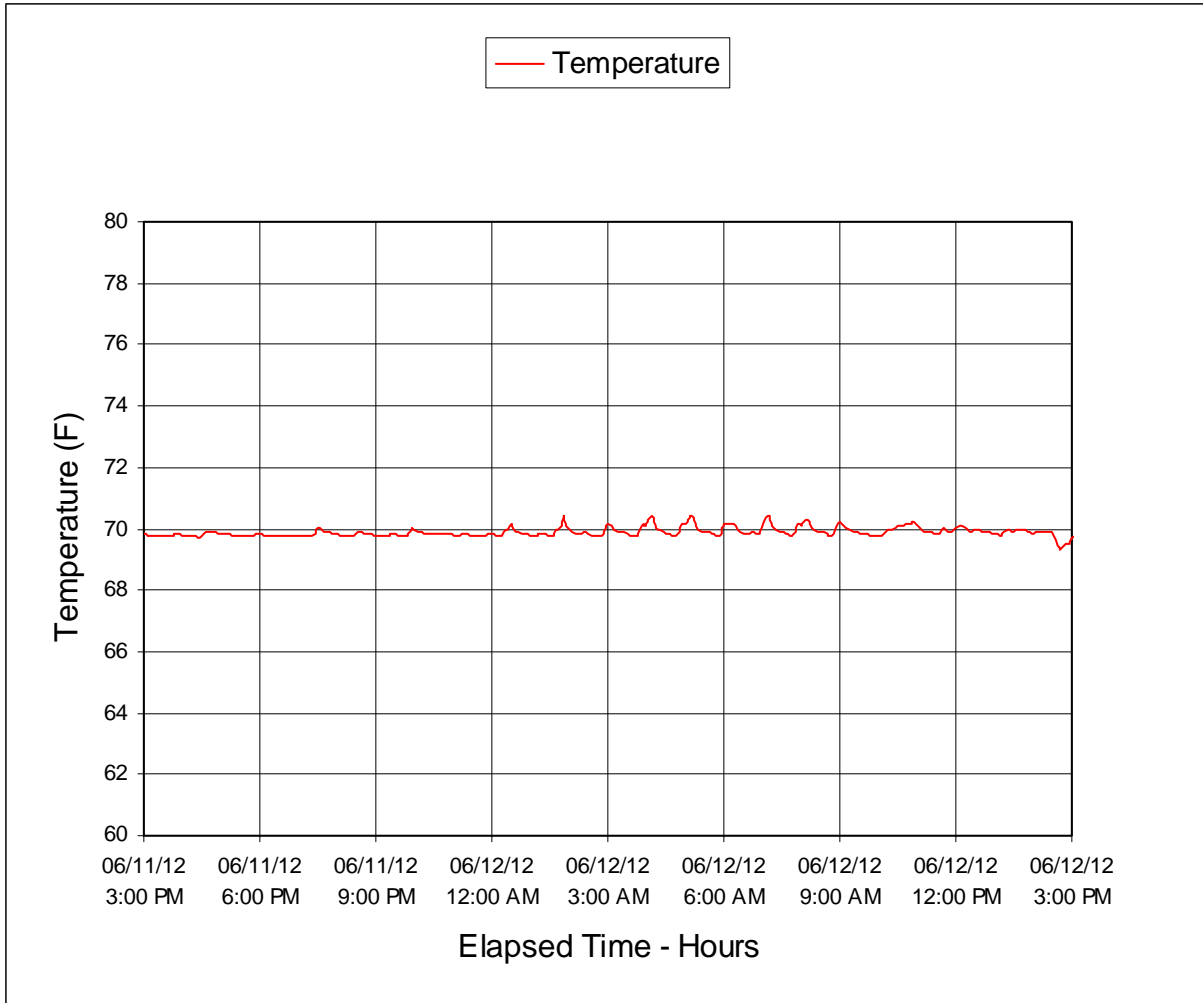
Test Phase	Spillage Location
0° To 90°	
90° To 180°	
180° To 270°	
270° To 360°	

**DATA SHEET NO. 17**

**DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART**

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV NHTSA No.: MD5100

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 06/12/12



**APPENDIX A  
PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

Figure		Page
1	Load Cell Location	A-1
2	Load Cell Wall	A-1
3	Manufacturer's Label	A-2
4	Tire Placard	A-2
5	2013 Lexus RX350 AWD Frontal, as Delivered	A-3
6	Left Rear 3-4 View, as Received	A-3
7	Pre-Test Front View of Test Vehicle	A-4
8	Post-Test Front View of Test Vehicle	A-4
9	Pre-Test Left View of Test Vehicle	A-5
10	Post-Test Left View of Test Vehicle	A-5
11	Pre-Test Right View of Test Vehicle	A-6
12	Post-Test Right View of Test Vehicle	A-6
13	Pre-Test Right Front 3-4 View	A-7
14	Post-Test Right Front 3-4 View	A-7
15	Pre-Test Left Rear 3-4 View	A-8
16	Post-Test Left Rear 3-4 View	A-8
17	Pre-Test Windshield View	A-9
18	Post-Test Windshield View	A-9
19	Pre-Test Engine Compartment View	A-10
20	Post-Test Engine Compartment View	A-10
21	Pre-Test Fuel Filler Cap View	A-11
22	Post-Test Fuel Filler Cap View	A-11
23	Pre-Test Front Underbody View	A-12
24	Post-Test Front Underbody View	A-12
25	Pre-Test Rear Underbody View	A-13
26	Post-Test Rear Underbody View	A-13
27	Pre-Test Dummy Cable Routing	A-14
28	Post-Test Dummy Cable Routing	A-14
29	Pre-Test Driver Dummy Front View	A-15
30	Post-Test Driver Dummy Front View	A-15
31	Pre-Test Driver Dummy Window View	A-16
32	Post-Test Driver Dummy Window View	A-16
33	Pre-Test Driver Dummy and Vehicle Interior View	A-17
34	Post-Test Driver Dummy and Vehicle Interior View	A-17
35	Pre-Test Driver's Seat Fore-Aft Markings	A-18

## TABLE OF PHOTOGRAPHS ... (CONTINUED)

<u>Figure</u>		<u>Page</u>
36	Post-Test Driver's Seat Fore-Aft Markings	A-18
37	Pre-Test Belt Anchorage for Driver Dummy	A-19
38	Post-Test Belt Anchorage for Driver Dummy	A-19
39	Pre-Test Driver Dummy Feet	A-20
40	Post-Test Driver Dummy Feet	A-20
41	Pre-Test Driver's Side Knee Bolster	A-21
42	Post-Test Driver's Side Knee Bolster	A-21
43	Pre-Test Driver's Side Floorpan	A-22
44	Post-Test Driver's Side Floorpan	A-22
45	Post-Test Driver Dummy Face	A-23
46	Post-Test Driver Dummy Contact With Airbag	A-23
47	Post-Test Driver Dummy Contact With Headrest	A-24
47a	Post-Test Driver Dummy Contact With Knee Airbag	A-24
48	Pre-Test View of the Steering Wheel	A-25
49	Post-Test View of the Steering Wheel	A-25
50	Pre-Test Passenger Dummy Front View	A-26
51	Post-Test Passenger Dummy Front View	A-26
52	Pre-Test Passenger Dummy Window View	A-27
53	Post-Test Passenger Dummy Window View	A-27
54	Pre-Test Passenger Dummy and Vehicle Interior View	A-28
55	Post-Test Passenger Dummy and Vehicle Interior View	A-28
56	Pre-Test Passenger's Seat Fore-Aft Markings	A-29
57	Post-Test Passenger's Seat Fore-Aft Markings	A-29
58	Pre-Test Belt Anchorage for Passenger Dummy	A-30
59	Post-Test Belt Anchorage for Passenger Dummy	A-30
60	Pre-Test Passenger Dummy Feet	A-31
61	Post-Test Passenger Dummy Feet	A-31
62	Pre-Test Passenger's Side Knee Bolster	A-32
63	Post-Test Passenger's Side Knee Bolster	A-32
64	Pre-Test Passenger's Side Floorpan	A-33
65	Post-Test Passenger's Side Floorpan	A-33
66	Post-Test Passenger Dummy Contact With Airbag	A-34
66a	Post-Test Passenger Dummy Contact With Headrest	A-34
66b	Post-Test Passenger Dummy Contact With Knee Airbag	A-35
67	Photograph of Ballast Installed in Vehicle	A-35

## TABLE OF PHOTOGRAPHS ... (CONTINUED)

<u>Figure</u>		<u>Page</u>
68	Post-Test Stoddard Solvent Spillage Location View	A-36
69	Post-Test Speed Trap Read-Out	A-36
70	Vehicle at 0° on Static Rollover Device	A-37
71	Vehicle at 90° on Static Rollover Device	A-37
72	Vehicle at 180° on Static Rollover Device	A-38
73	Vehicle at 270° on Static Rollover Device	A-38
74	Vehicle at 360° on Static Rollover Device	A-39
75	2013 Lexus RX350 AWD Frontal Impact Event	A-39
76	Monroney Label Photograph	A-40



FIGURE 1. Load Cell Location



FIGURE 2. Load Cell Wall



FIGURE 3. Manufacturer's Label

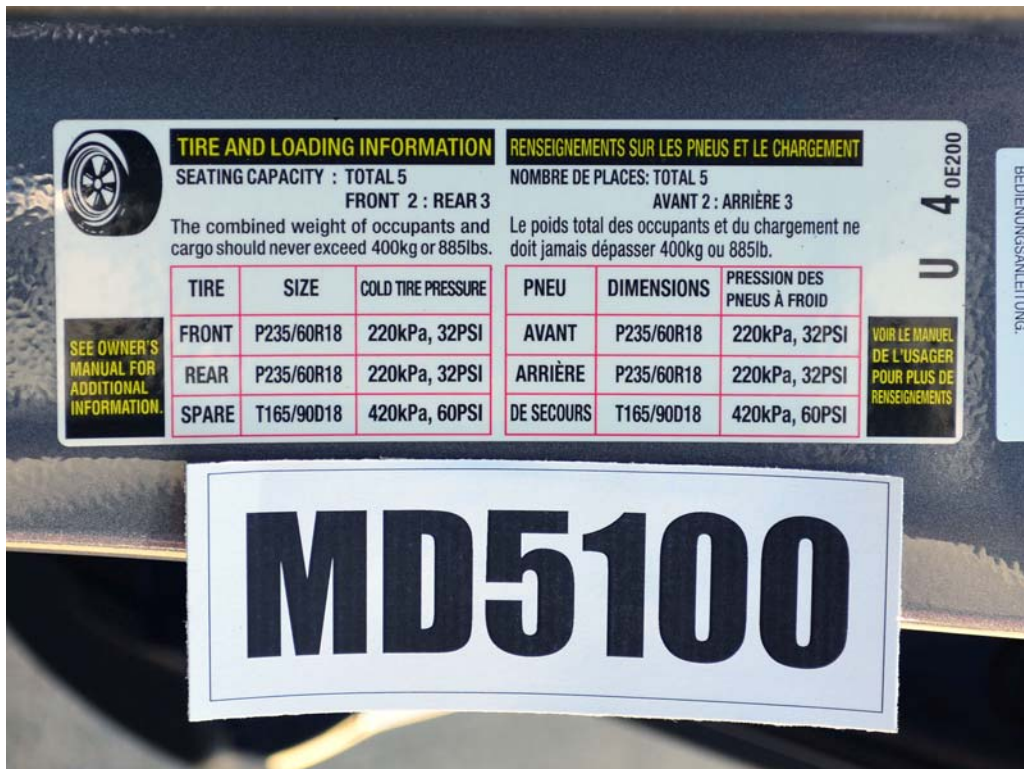


FIGURE 4. Tire Placard



FIGURE 5. 2013 Lexus RX350 Frontal, As Delivered



FIGURE 6. Left Rear ¾ View, As Received



FIGURE 7. Pre-Test Front View of Test Vehicle

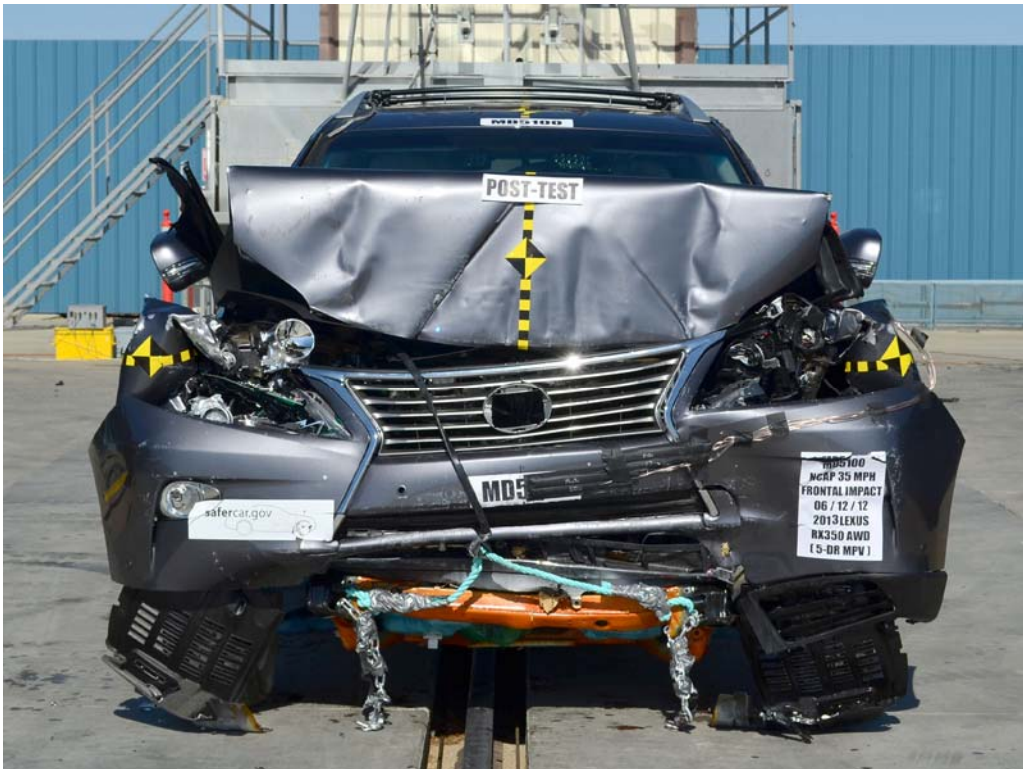


FIGURE 8. Post-Test Front View of Test Vehicle



FIGURE 9. Pre-Test Left View of Test Vehicle



FIGURE 10. Post-Test Left View of Test Vehicle



FIGURE 11. Pre-Test Right View of Test Vehicle



FIGURE 12. Post-Test Right View of Test Vehicle



FIGURE 13. Pre-Test Right Front  $\frac{3}{4}$  View



FIGURE 14. Post-Test Right Front  $\frac{3}{4}$  View



FIGURE 15. Pre-Test Left Rear  $\frac{3}{4}$  View



FIGURE 16. Post-Test Left Rear  $\frac{3}{4}$  View

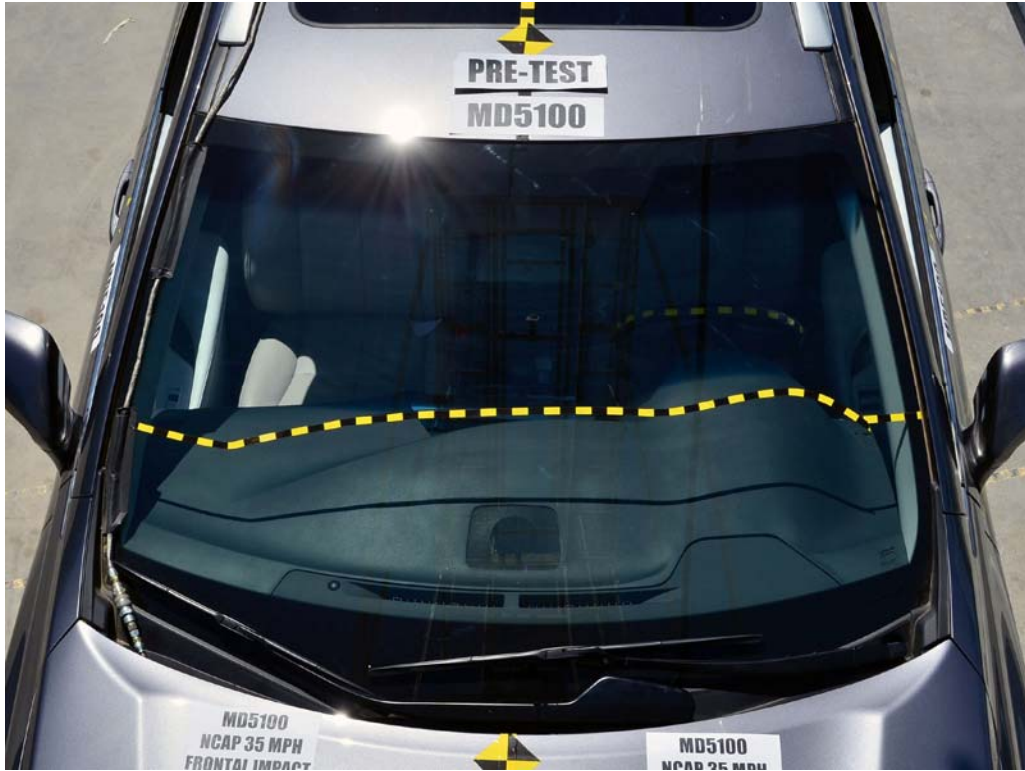


FIGURE 17. Pre-Test Windshield View

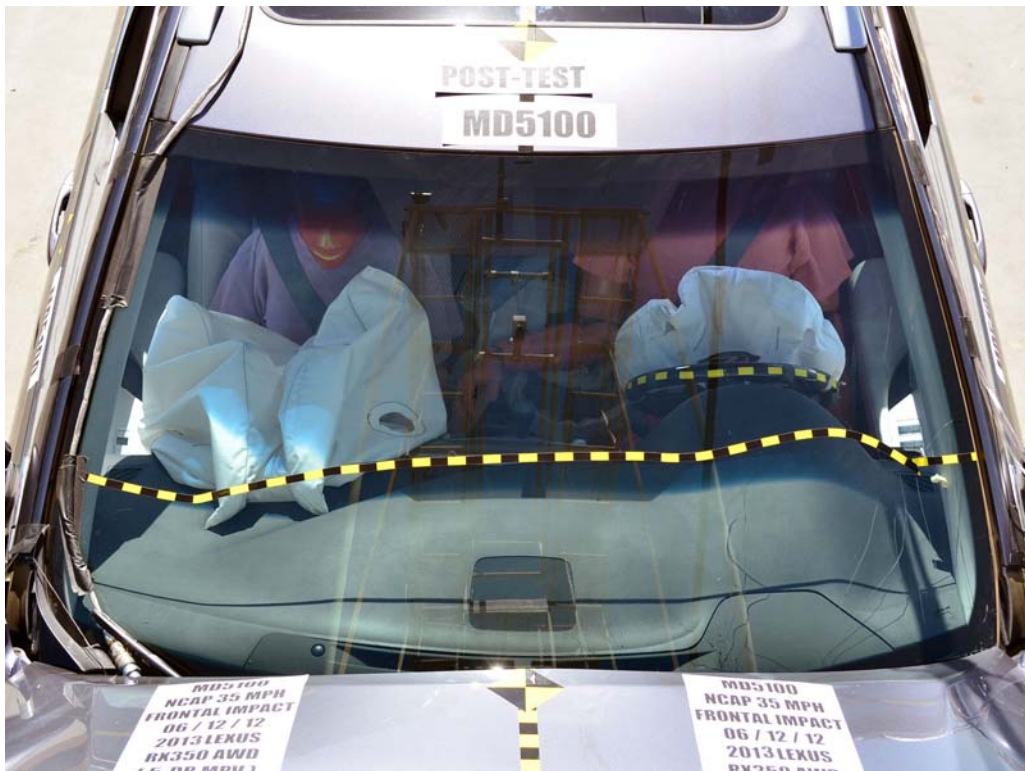


FIGURE 18. Post-Test Windshield View



FIGURE 19. Pre-Test Engine Compartment View



FIGURE 20. Post-Test Engine Compartment View



FIGURE 21. Pre-Test Fuel Filler Cap View



FIGURE 22. Post-Test Fuel Filler Cap View

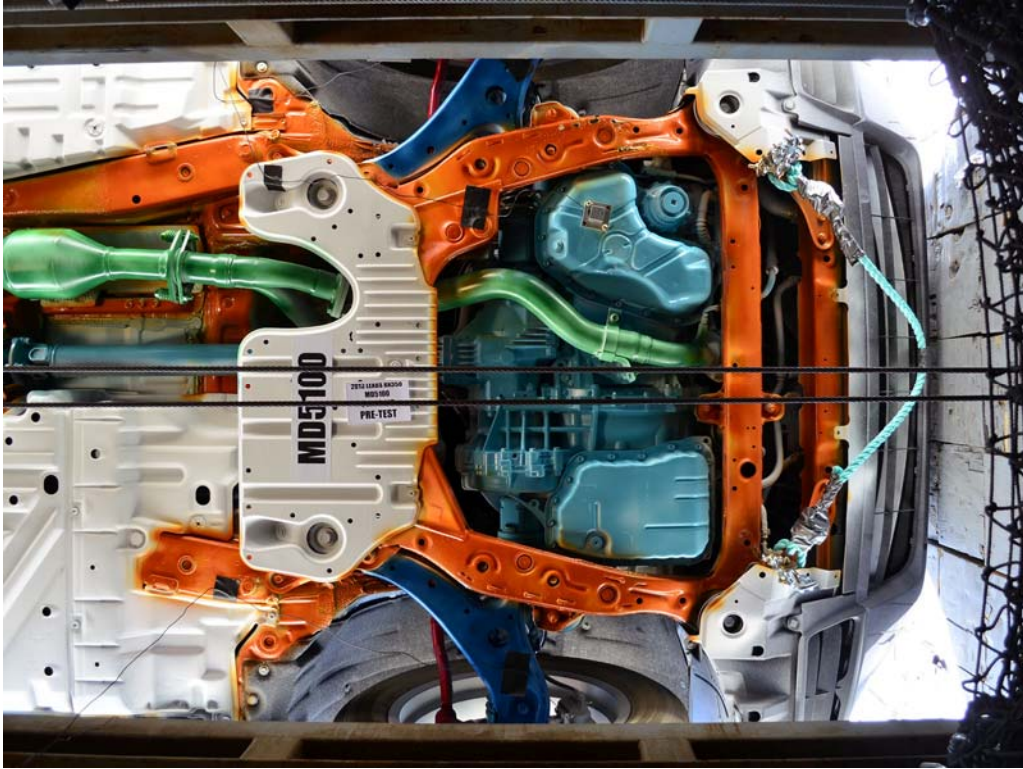


FIGURE 23. Pre-Test Front Underbody View

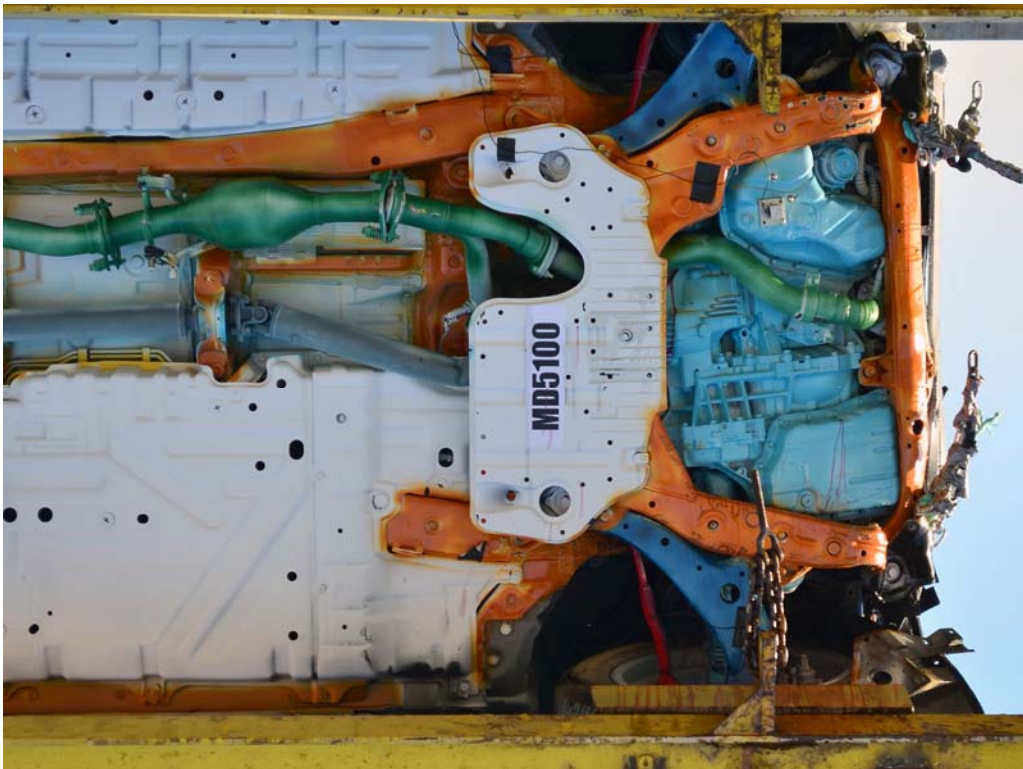


FIGURE 24. Post-Test Front Underbody View

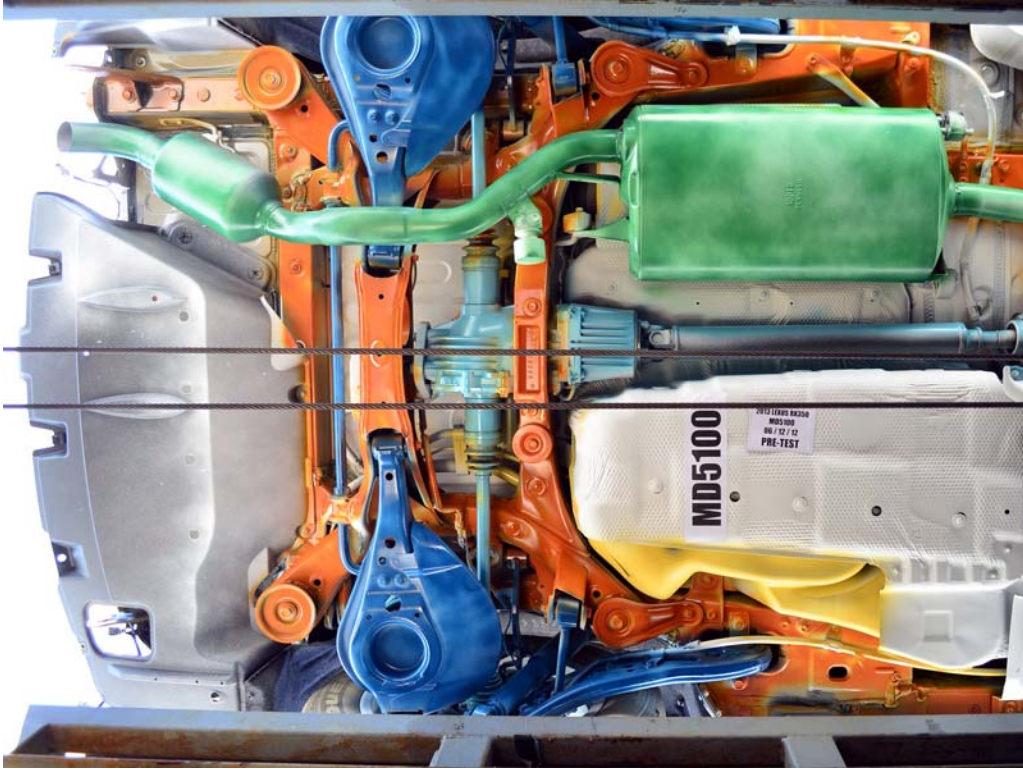


FIGURE 25. Pre-Test Rear Underbody View

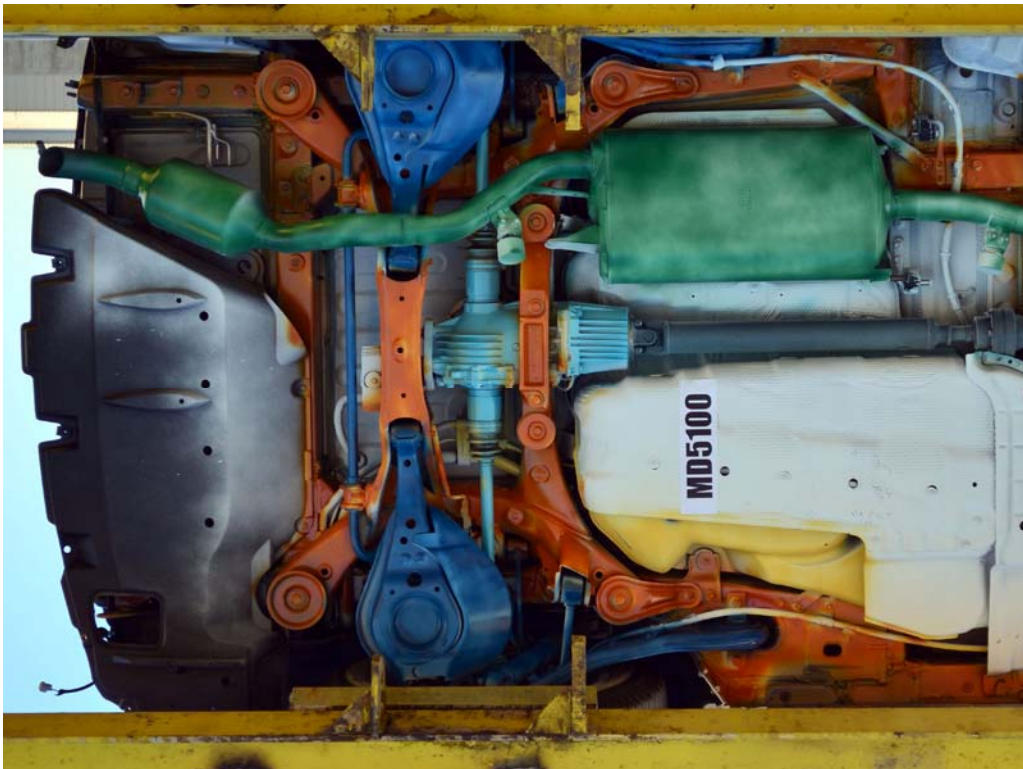


FIGURE 26. Post-Test Rear Underbody View



FIGURE 27. Pre-Test Dummy Cable Routing



FIGURE 28. Post-Test Dummy Cable Routing



FIGURE 29. Pre-Test Driver Dummy Front View



FIGURE 30. Post-Test Driver Dummy Front View



FIGURE 31. Pre-Test Driver Dummy Window View



FIGURE 32. Post-Test Driver Dummy Window View



FIGURE 33. Pre-Test Driver Dummy and Vehicle Interior View



FIGURE 34. Post-Test Driver Dummy and Vehicle Interior View



FIGURE 35. Pre-Test Driver's Seat Fore-Aft Markings



FIGURE 36. Post-Test Driver's Seat Fore-Aft Markings



FIGURE 37. Pre-Test View of Belt Anchorage for Driver Dummy



FIGURE 38. Post-Test View of Belt Anchorage for Driver Dummy



FIGURE 39. Pre-Test Driver Dummy Feet



FIGURE 40. Post-Test Driver Dummy Feet



FIGURE 41. Pre-Test Driver's Side Knee Bolster



FIGURE 42. Post-Test Driver's Side Knee Bolster

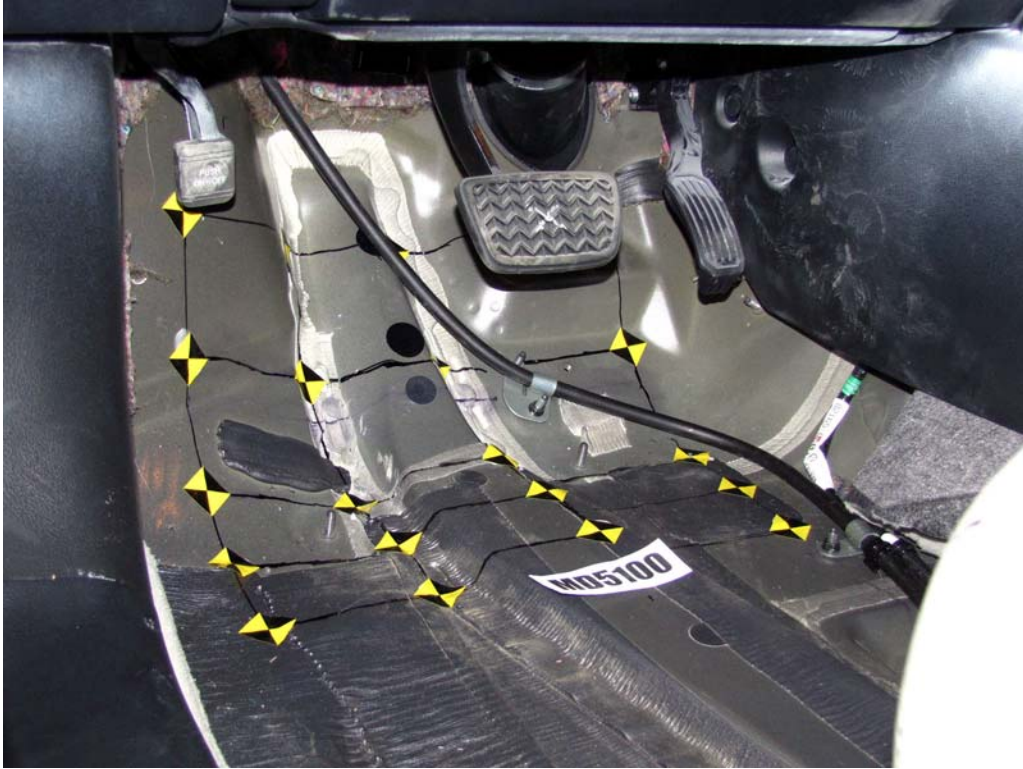


FIGURE 43. Pre-Test Driver's Side Floorpan



FIGURE 44. Post-Test Driver's Side Floorpan



FIGURE 45. Post-Test Driver Dummy Face



FIGURE 46. Post-Test Driver Dummy Contact With Airbag



FIGURE 47. Post-Test Driver Dummy Contact With Headrest



FIGURE 47a. Post-Test Driver Dummy Contact With Knee Airbag



FIGURE 48. Pre-Test View Of Steering Wheel

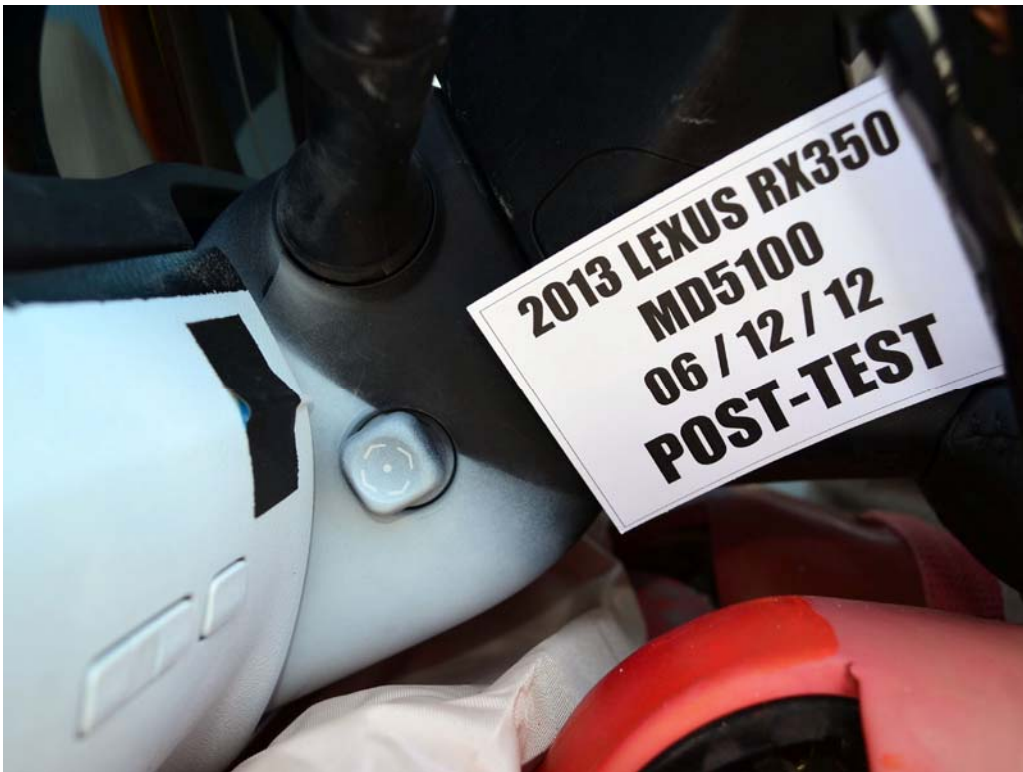


FIGURE 49. Post-Test View Of Steering Wheel



FIGURE 50. Pre-Test Passenger Dummy Front View



FIGURE 51. Post-Test Passenger Dummy Front View



FIGURE 52. Pre-Test Passenger Dummy Window View



FIGURE 53. Post-Test Passenger Dummy Window View



FIGURE 54. Pre-Test Passenger Dummy and Vehicle Interior View



FIGURE 55. Post-Test Passenger Dummy and Vehicle Interior View



FIGURE 56. Pre-Test Passenger's Seat Fore-Aft Markings



FIGURE 57. Post-Test Passenger's Seat Fore-Aft Markings



FIGURE 58. Pre-Test View of Belt Anchorage for Passenger Dummy



FIGURE 59. Post-Test View of Belt Anchorage for Passenger Dummy



FIGURE 60. Pre-Test Passenger Dummy Feet



FIGURE 61. Post-Test Passenger Dummy Feet



FIGURE 62. Pre-Test Passenger's Side Knee Bolster



FIGURE 63. Post-Test Passenger's Side Knee Bolster



FIGURE 64. Pre-Test Passenger's Side Floorpan



FIGURE 65. Post-Test Passenger's Side Floorpan



FIGURE 66. Post-Test Passenger Dummy Contact With Airbag



FIGURE 66a. Post-Test Passenger Dummy Contact With Headrest



FIGURE 66b. Post-Test Passenger Dummy Contact With Knee Airbag

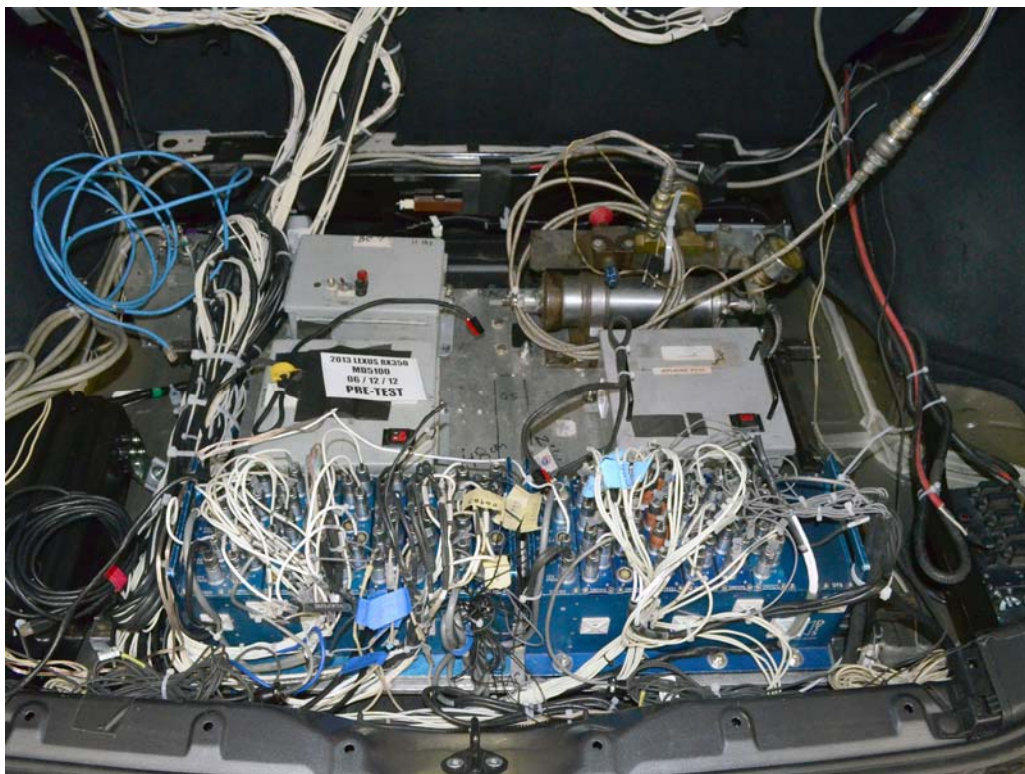


FIGURE 67. Pre-Test of Ballast Installed in Vehicle

# Photograph Not Applicable No Stoddard Solvent Spillage

FIGURE 68. Post-Test Stoddard Solvent Spillage Location



FIGURE 69. Post-Test Speed Trap Read Out

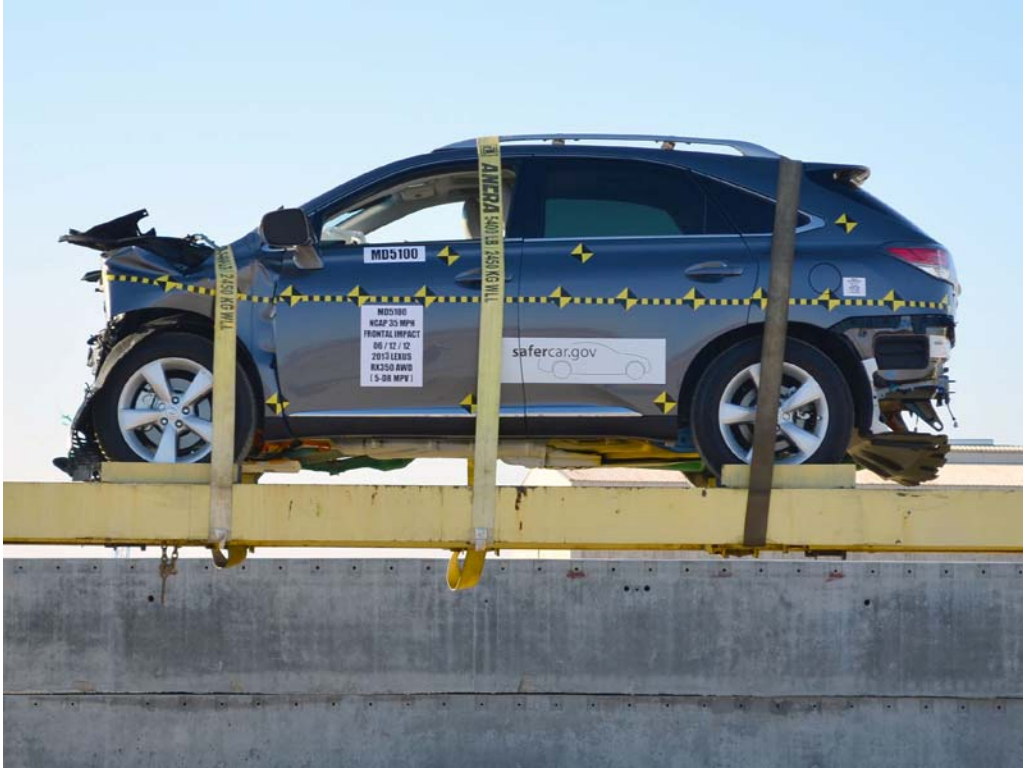


FIGURE 70. Vehicle at 0°on Static Rollover Device



FIGURE 71. Vehicle at 90°on Static Rollover Device






FIGURE 74. Vehicle at 360° on Static Rollover Device



FIGURE 75. 2013 Lexus RX350 Frontal Impact Event



**LEXUS**  
The Pursuit of Perfection

DESCRIPTION: 2013 / 9414A RX 350 5-DR SUV  
 COLOR: NEBLA GRAY PEARL  
 VIN: 2T2BK1BA3DC154467  
 PORTPLANT: Detroit, MI/TMMC

Dealer Name / Address:  
 NEWPORT LEXUS  
 3901 MACARTHUR BLVD.  
 NEWPORT BEACH CA 92660

Ship to (Dealer, unless otherwise indicated)

**STANDARD EQUIPMENT & INSTALLED OPTIONS** **\$ 40,710.00**

**PERFORMANCE FEATURES**

- \* 3.5 Liter 270HP Four Cam 24-Valve V8 Engine with Variable Valve Timing (VVT-i)
- \* 8-Sp Automatic Transmission w/ "Snow Mode"
- \* Full Time Active Torque Control All-Wheel Drive
- \* Electric Power Rack-and-Pinion Steering
- \* 4-Wheel Power Assisted Ventilated Front & Solid Rear Disc Brakes
- \* 18" Aluminum Alloy Wheels

**SAFETY FEATURES**

- \* Dual Advanced Front Airbags, Driver & Passenger
- \* Knee Airbag, Front & Rear Side Curtain Airbags
- \* Front & Rear Seat Mounted Side Airbags
- \* Smart Stop Technology
- \* 3-Point Safety Belts for All Seating Positions
- \* Front & Rear Outboard Seat Belt Pretensioners w/ Force Limiters, Fr Manual Height Adj, Anchors
- \* Front Active Headrests
- \* 4-Wheel Anti-Lock Braking System (ABS) with Electronic Brakeforce Distribution (EBD), Brake Assist (BA) / Vehicle Stability Control (VSC)
- \* Energy Managing Crumple Zones, Side Door Beams
- \* Vehicle Theft-Deterrent Sys w/Engine Immobilizer
- \* Automatic On/Off Headlamps / Integrated Fog Lamps
- \* LED Daytime Running Lamps (DRL)
- \* Variable intermittent Front Wipers
- \* Safety Connect with: Automatic Collision Notification, Stolen Vehicle Location, Emergency

**ASSIST BUTTON (SOS), and Enhanced Roadside Assistance (1-year trial subscription included)**

- \* Tire Pressure Monitoring System
- \* Tool Kit and First Aid Kit

**LUXURY AND CONVENIENCE FEATURES**

- \* Lexus Premium Audio System, Automatic Sound Levelizer (ASL) & In-Dash Single Feed 6-Disc CD Auto-Change, In-Glass Antenna w/ FM Diversity System, USB iPod/iMP3 Control, Bluetooth Technology, SiriusXM Satellite Radio (90-day trial subscription included)
- \* Auto Dual Zone Climate Control Sys w/ Rear Vents
- \* 10-Way Power Driver's & Front Passenger's Seats
- \* Power Tilt-and-Telescopic Steering Column
- \* Height Adjustable Headrests for All Seats
- \* Reclining/Sliding 40/20/40 Split Rear Seat
- \* 3-Spoke Steering Wheel with Audio Controls
- \* Power Windows w/One-Touch Auto Open/Close Feature
- \* Power Back Door / Cruise Control
- \* Lexus Homelink Universal Transceiver
- \* SmartAccess Passive Entry System
- \* Rear Black Privacy Glass/Integrated Rear Spoiler
- \* Genuine Wood Interior Trim
- \* LCD Screen for Ventilation, Audio Settings
- \* Multi-Information Display with Lexus Personalized Settings, Trip Computer & Outside Temp Display
- \* Tannetna Cover
- \* Carpeted Floor Mats

**MANUFACTURER'S SUGGESTED RETAIL PRICE**

- \*\* Lexus Display Audio Package includes: 7-inch Display Screen, HD Radio with iTunes Tagging, Advanced Bluetooth technology, Backup Camera, Single CD player, 12-speaker Premium Audio System
- \*\* Heated and Ventilated Front Seats
- \*\* Intuitive Parking Assist
- \*\* Premium Package Includes: Leather Trim Interior, One-Touch Open/Close Moonroof, Power-folding Electrochromic Heated Outside Mirrors, Driver's Seat/Steering/Mirror Memory-3 settings
- \*\* Towing Prep Pkg: Transmission Cooler, Heavy Duty Alternator/Radiator (Does not include ball mount)
- \*\* Wood & Leather Trimmed Steering Wheel & Shift Knob
- \*\* Cross Bars
- \*\* Cargo Mat, Cargo Net, Wheel Locks & Key Cloves

**\$ 46,059.00**

**DELIVERY, PROCESSING AND HANDLING FEE** **875.00**

**TOTAL** **\$ 46,934.00**

**Fuel Economy and Environment**

**Fuel Economy**

**20** MPG Small SUV range from 16 to 32 MPG. The test vehicle rate: 17.0 MPG.

18 24  
combined city/hwy city highway

5.0 gallons per 100 miles

**You spend \$1,650 more in fuel costs over 5 years compared to the average new vehicle.**

**Annual fuel COST \$2,650**

[fuelconomy.gov](http://fuelconomy.gov)

**Gasoline Vehicle**

**GOVERNMENT 5-STAR SAFETY RATINGS**

\*This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Star ratings range from 1 to 5 stars (★ ★ ★ ★ ★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA)

**APPLICABLE FEDERAL TAXES NOT INCLUDED**

Manufacturer's suggested retail price includes manufacturer's recommended pre-delivery service. License and title fees, taxes, and applicable dealer fees, and dealer-installed options and accessories are not included in the manufacturer's suggested retail price.

**LEXUS NEW VEHICLE LIMITED WARRANTY**

- \* Limited warranty coverage highlights include:
  - 4 yr / 50,000-mile basic coverage
  - 4 yr / 70,000-mile powertrain coverage
  - 4 yr / Unlimited-mile corrosion perforation warranty

See your Warranty and Service Guide for details.

**LEXUS IS PLEASED TO OFFER THE FOLLOWING DRIVER SUPPORT PACKAGE WITH EACH NEW LEXUS:**

- \* 24-hour 24/7 emergency roadside assistance plan
- \* Complimentary 1st and 2nd scheduled maintenance services
- \* Lifetime 24-hour emergency breakdown 100 miles from home.

An extended service contract may be available for this vehicle. Ask dealer for details.

120423 717 ML1

FIGURE 76. Monroney Label Photograph

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

## TABLE OF DATA PLOTS

<u>Plot</u>		<u>Page</u>
1	Driver Head X Acceleration vs. Time Primary	B-1
2	Driver Head Y Acceleration vs. Time Primary	B-1
3	Driver Head Z Acceleration vs. Time Primary	B-1
4	Driver Head Resultant Acceleration vs. Time Primary	B-1
5	Driver Chest X Deflection vs. Time	B-2
6	Driver Chest X Acceleration vs. Time Primary	B-3
7	Driver Chest Y Acceleration vs. Time Primary	B-3
8	Driver Chest Z Acceleration vs. Time Primary	B-3
9	Driver Chest Resultant Acceleration vs. Time Primary	B-3
10	Driver Upper Neck Force X vs. Time Primary	B-4
11	Driver Upper Neck Force Z vs. Time Primary	B-4
12	Driver Upper Neck Moment Y vs. Time Primary	B-4
13	Driver Nij vs. Time Primary	B-4
14	Driver Left Femur Force vs. Time	B-5
15	Driver Right Femur Force vs. Time	B-5
16	Passenger Head X Acceleration vs. Time Primary	B-6
17	Passenger Head Y Acceleration vs. Time Primary	B-6
18	Passenger Head Z Acceleration vs. Time Primary	B-6
19	Passenger Head Resultant Acceleration vs. Time Primary	B-6
20	Passenger Chest X Deflection vs. Time	B-7
21	Passenger Chest X Acceleration vs. Time Primary	B-8
22	Passenger Chest Y Acceleration vs. Time Primary	B-8
23	Passenger Chest Z Acceleration vs. Time Primary	B-8
24	Passenger Chest Resultant Acceleration vs. Time Primary	B-8
25	Passenger Upper Neck Force X vs. Time Primary	B-9
26	Passenger Upper Neck Force Z vs. Time Primary	B-9
27	Passenger Upper Neck Moment Y vs. Time Primary	B-9
28	Passenger Nij vs. Time Primary	B-9
29	Passenger Left Femur Force vs. Time	B-10
30	Passenger Right Femur Force vs. Time	B-10

The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)

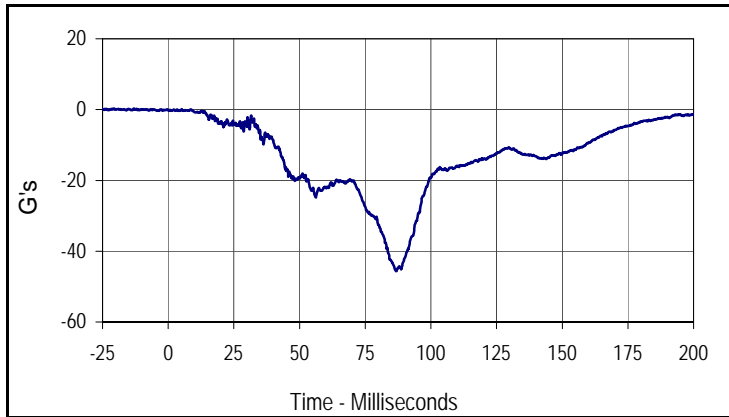
Driver Head X Acceleration Redundant  
Driver Head Y Acceleration Redundant  
Driver Head Z Acceleration Redundant  
Driver Upper Neck Force Y  
Driver Upper Neck Moment X  
Driver Upper Neck Moment Z  
Driver Chest X Acceleration Redundant  
Driver Chest Y Acceleration Redundant  
Driver Chest Z Acceleration Redundant  
Driver Pelvis X  
Driver Pelvis Y  
Driver Pelvis Z  
Driver Left Femur Force Z Redundant  
Driver Right Femur Force Z Redundant  
Driver Shoulder Belt Force  
Driver Lap Belt Force  
Driver Left Upper Tibia Moment X  
Driver Left Upper Tibia Moment Y  
Driver Left Upper Tibia Force Z  
Driver Left Lower Tibia Moment X  
Driver Left Lower Tibia Moment Y  
Driver Left Lower Tibia Force Z  
Driver Right Upper Tibia Moment X  
Driver Right Upper Tibia Moment Y  
Driver Right Upper Tibia Force Z  
Driver Right Lower Tibia Moment X  
Driver Right Lower Tibia Moment Y  
Driver Right Lower Tibia Force Z  
Driver Left Foot Fore Z  
Driver Left Foot Aft X  
Driver Left Foot Aft Z  
Driver Right Foot Fore Z  
Driver Right Foot Aft X

Driver Right Foot Aft Z  
Passenger Head X Acceleration Redundant  
Passenger Head Y Acceleration Redundant  
Passenger Head Z Acceleration Redundant  
Passenger Upper Neck Force X  
Passenger Upper Neck Force Z  
Passenger Upper Neck Moment Y  
Passenger Chest X Acceleration Redundant  
Passenger Chest Y Acceleration Redundant  
Passenger Chest Z Acceleration Redundant  
Passenger Pelvis X  
Passenger Pelvis Y  
Passenger Pelvis Z  
Passenger Left Femur Force Z Redundant  
Passenger Right Femur Force Z Redundant  
Passenger Shoulder Belt Force  
Passenger Lap Belt Force  
Passenger Left Upper Tibia Moment X  
Passenger Left Upper Tibia Moment Y  
Passenger Left Upper Tibia Force Z  
Passenger Left Lower Tibia Moment X  
Passenger Left Lower Tibia Moment Y  
Passenger Left Lower Tibia Force Z  
Passenger Right Upper Tibia Moment X  
Passenger Right Upper Tibia Moment Y  
Passenger Right Upper Tibia Force Z  
Passenger Right Lower Tibia Moment X  
Passenger Right Lower Tibia Moment Y  
Passenger Right Lower Tibia Force Z  
Passenger Left Foot Fore Z  
Passenger Left Foot Aft X  
Passenger Left Foot Aft Z  
Passenger Right Foot Fore Z  
Passenger Right Foot Aft X  
Passenger Right Foot Aft Z  
Left Rear Seat Crossmember X

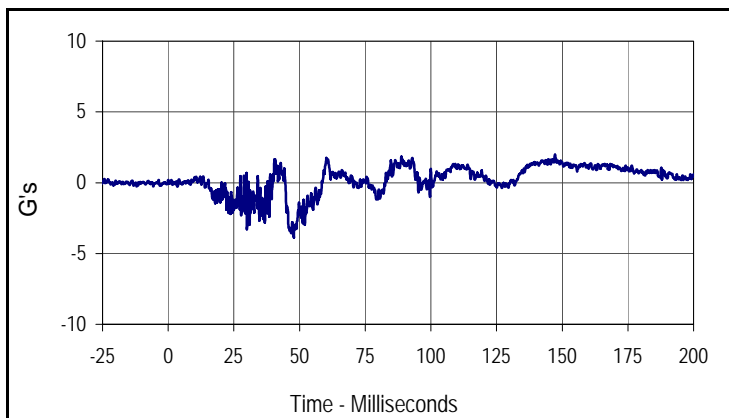
Left Rear Seat Crossmember Z  
Right Rear Seat Crossmember X  
Right Rear Seat Crossmember Z  
Vehicle Engine Top X  
Vehicle Engine Bottom X  
Vehicle Left Brake Caliper X  
Vehicle Right Brake Caliper X  
Load Cell Barrier A1-A9  
Load Cell Barrier B1-B9  
Load Cell Barrier C1-C9  
Load Cell Barrier D1-D9

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

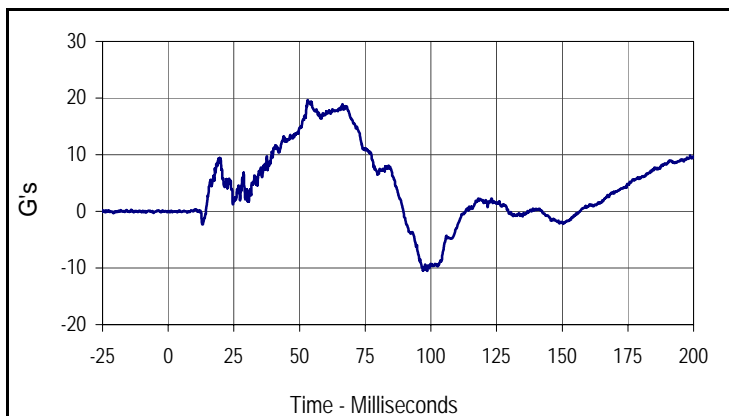
NHTSA No.: MD5100  
 Test Date: 6/12/12



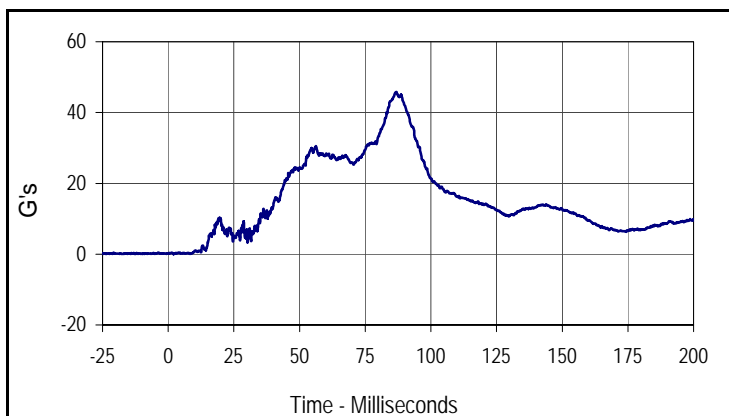
Curve Description			
Driver Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
001	FIL	1000	G's
Max	Time	Min	Time
0.1	5.1	-45.6	86.8



Curve Description			
Driver Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.0	147.2	-3.9	47.8



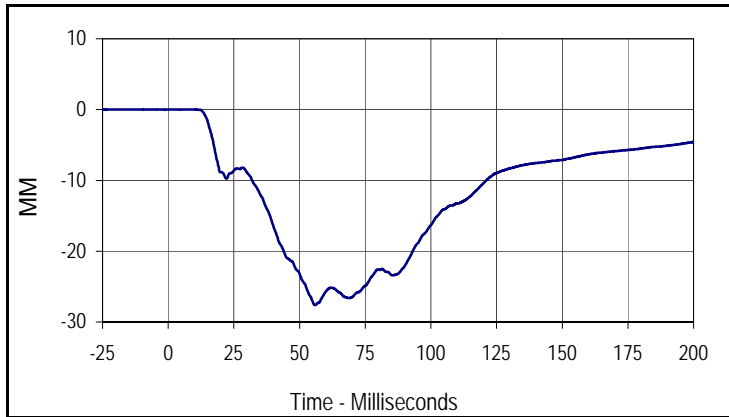
Curve Description			
Driver Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
19.7	53.1	-10.5	98.5



Curve Description			
Driver Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
004	RES	1000	G's
Max	Time	Min	Time
45.8	86.8	0.0	2.0

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

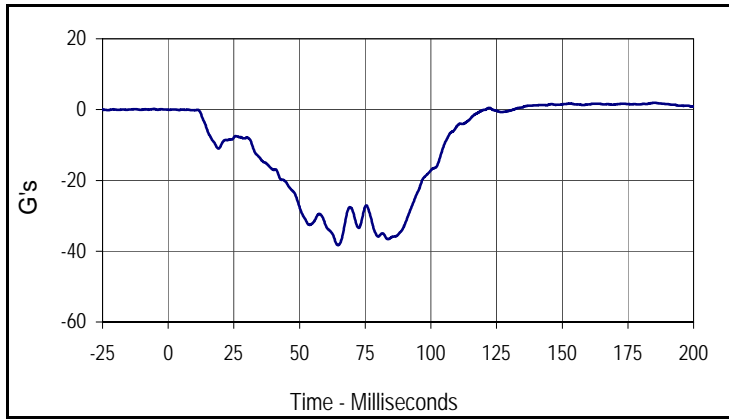
NHTSA No.: MD5100  
 Test Date: 6/12/12



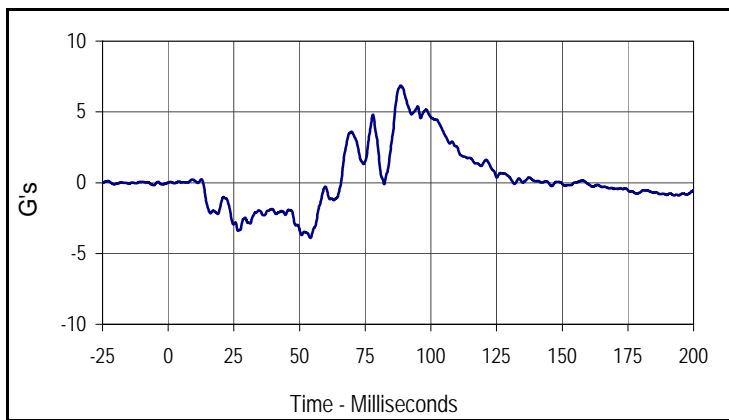
Curve Description			
Driver Chest Deflection			
Plot No.	Type	SAE Class	Units
005	FIL	600	MM
Max	Time	Min	Time
0.0	1.1	-27.6	56.0

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

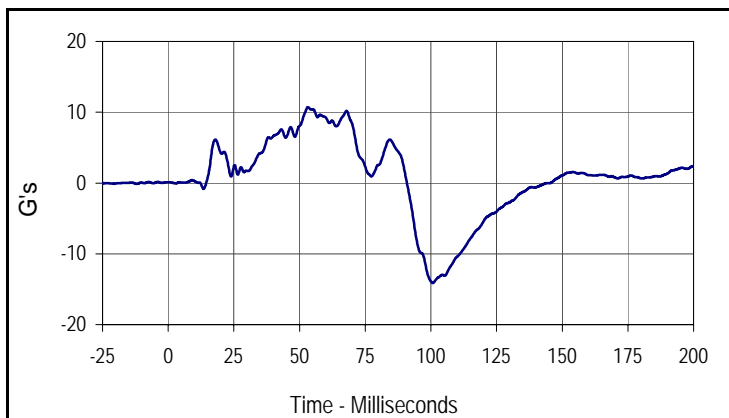
NHTSA No.: MD5100  
 Test Date: 6/12/12



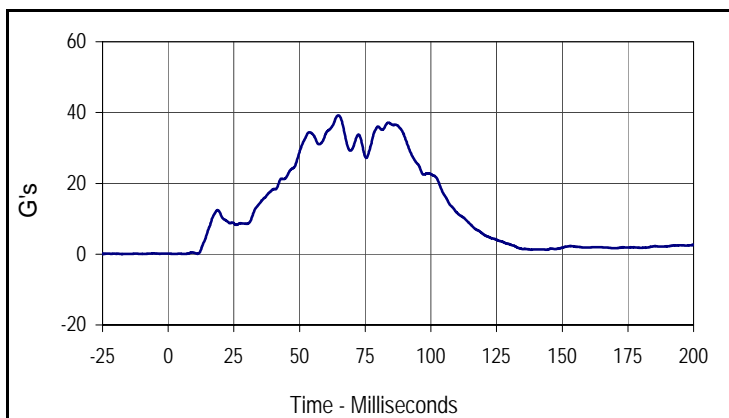
Curve Description			
Driver Chest Acceleration X Primary			
Plot No.	Type	SAE Class	Units
006	FIL	180	G's
Max	Time	Min	Time
2.0	185.3	-38.3	64.6



Curve Description			
Driver Chest Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
007	FIL	180	G's
Max	Time	Min	Time
6.9	88.5	-3.9	54.1



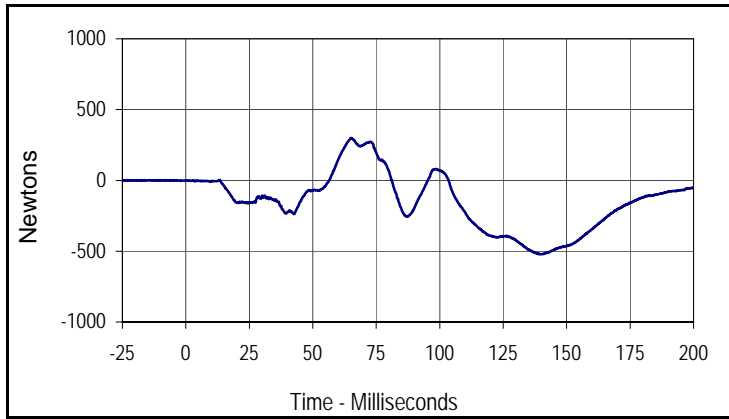
Curve Description			
Driver Chest Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
008	FIL	180	G's
Max	Time	Min	Time
10.7	53.2	-14.1	100.7



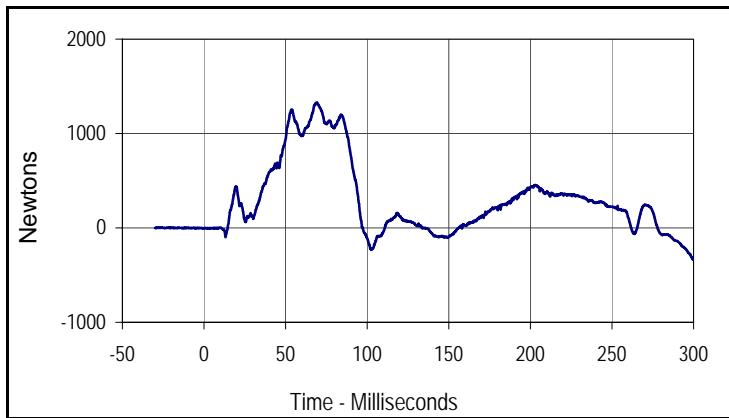
Curve Description			
Driver Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
009	RES	180	G's
Max	Time	Min	Time
39.2	64.7	0.0	3.2

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

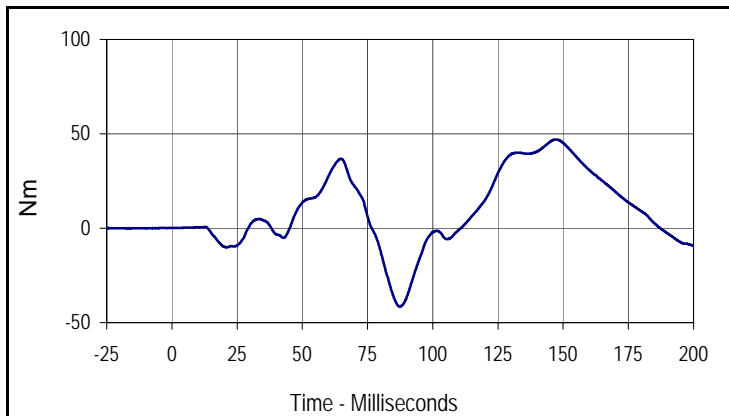
NHTSA No.: MD5100  
 Test Date: 6/12/12



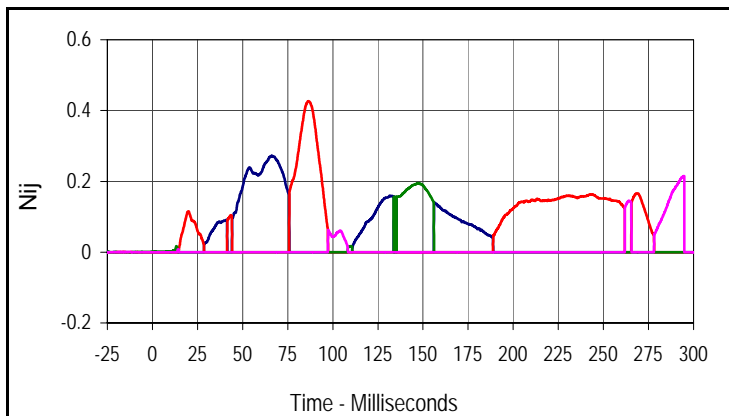
Curve Description			
Driver Upper Neck Force X			
Plot No.	Type	SAE Class	Units
010	FIL	1000	Newtons
Max	Time	Min	Time
299.2	65.1	-521.4	140.4



Curve Description			
Driver Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
011	FIL	1000	Newtons
Max	Time	Min	Time
1329.5	69.1	-335.0	299.9



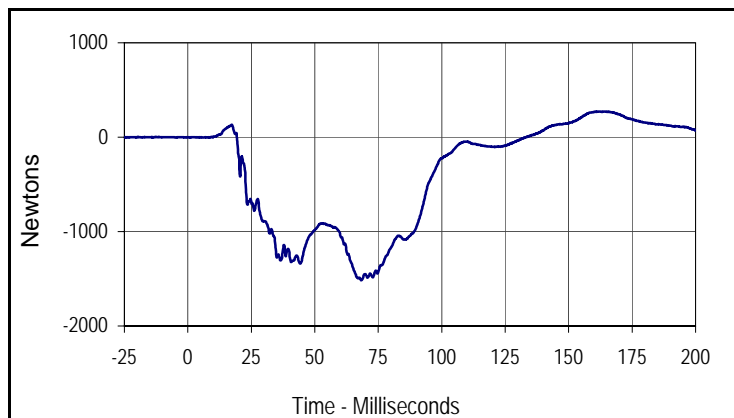
Curve Description			
Driver Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
012	FIL	600	Nm
Max	Time	Min	Time
47.0	147.2	-41.5	87.4



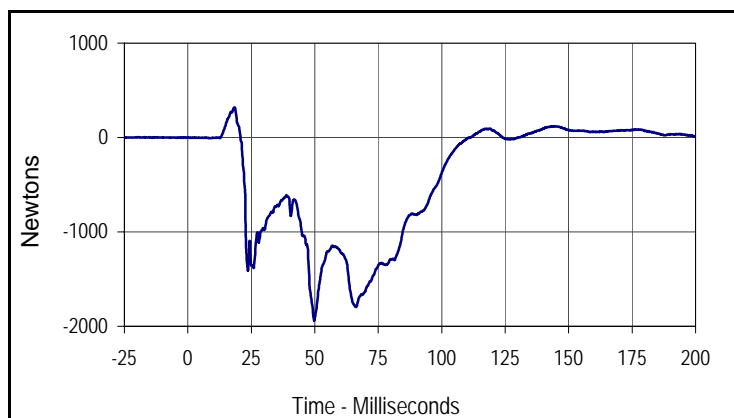
Curve Description			
Driver Nij			
Units	Type	Max	Time
Ntf	FIL	0.27	66.2
Units	Type	Max	Time
Nte	FIL	0.43	86.5
Units	Type	Max	Time
Ncf	FIL	0.20	147.4
Units	Type	Max	Time
Nce	FIL	0.22	294.8

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: MD5100  
 Test Date: 6/12/12



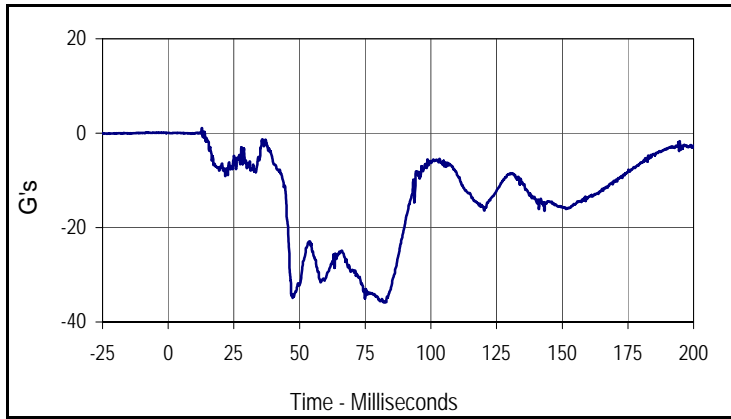
Curve Description			
Driver Left Femur Force Z			
Plot No.	Type	SAE Class	Units
013	FIL	600	Newtons
Max	Time	Min	Time
272.0	161.7	-1516.7	68.3



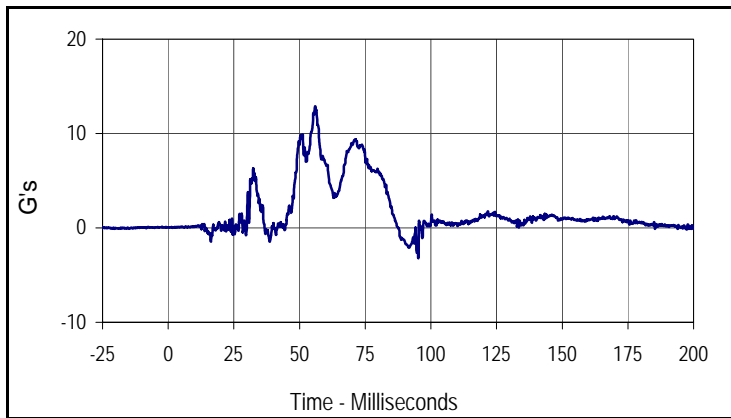
Curve Description			
Driver Right Femur Force Z			
Plot No.	Type	SAE Class	Units
014	FIL	600	Newtons
Max	Time	Min	Time
319.7	18.4	-1938.5	49.8

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

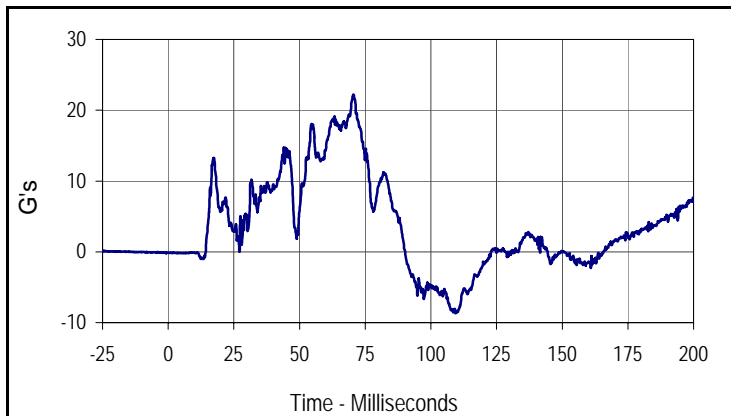
NHTSA No.: MD5100  
 Test Date: 6/12/12



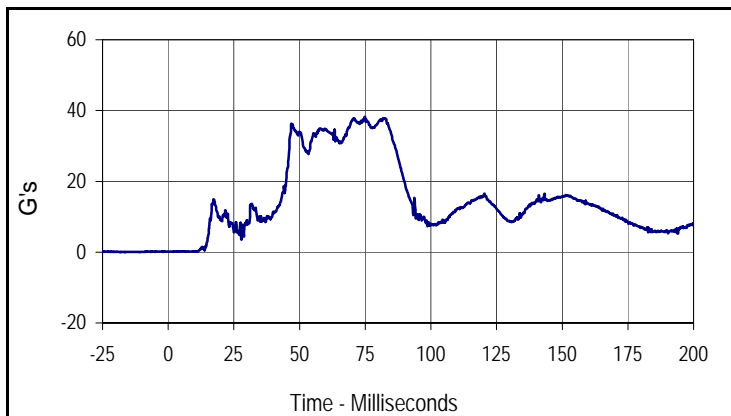
Curve Description			
Passenger Head Acceleration X Primary			
Plot No.	Type	SAE Class	Units
015	FIL	1000	G's
Max	Time	Min	Time
1.1	12.9	-35.9	82.4



Curve Description			
Passenger Head Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
016	FIL	1000	G's
Max	Time	Min	Time
12.9	56.0	-3.2	95.2



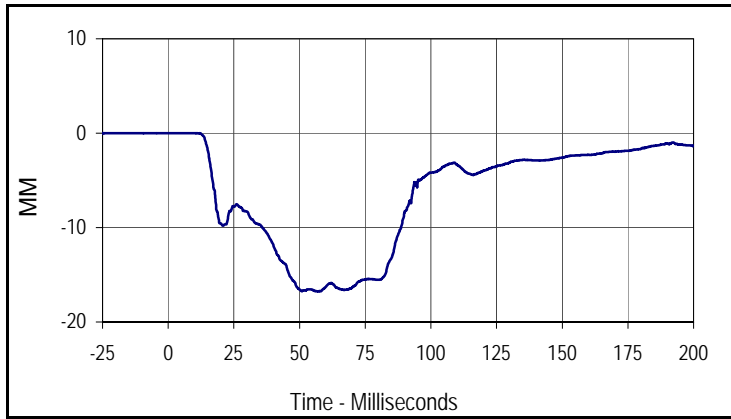
Curve Description			
Passenger Head Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
017	FIL	1000	G's
Max	Time	Min	Time
22.2	70.5	-8.7	109.4



Curve Description			
Passenger Head Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
018	RES	1000	G's
Max	Time	Min	Time
38.2	74.9	0.1	2.1

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

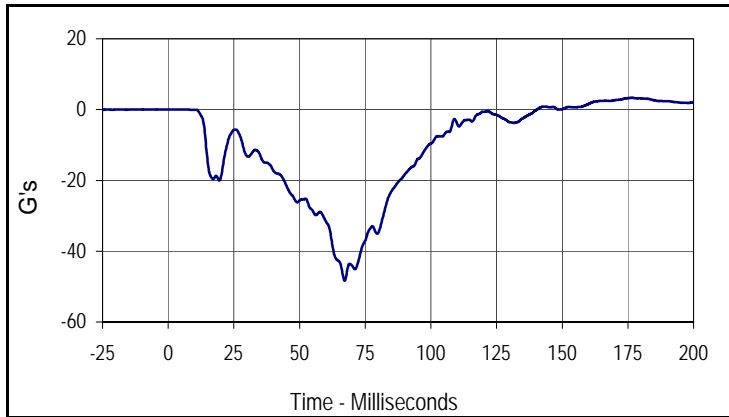
NHTSA No.: MD5100  
 Test Date: 6/12/12



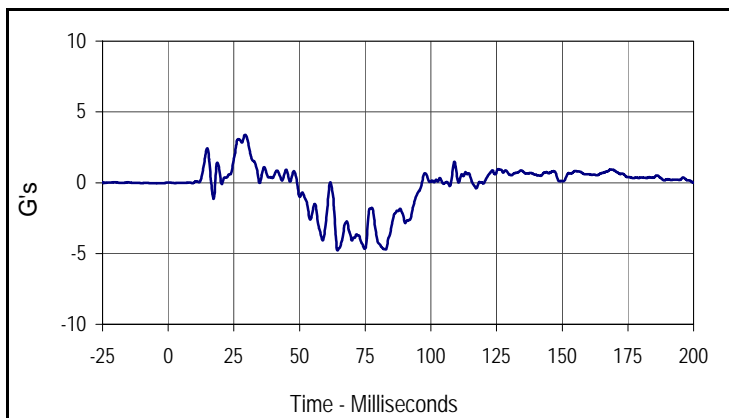
Curve Description			
Passenger Chest Deflection			
Plot No.	Type	SAE Class	Units
019	FIL	600	MM
Max	Time	Min	Time
0.0	1.8	-16.8	57.1

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

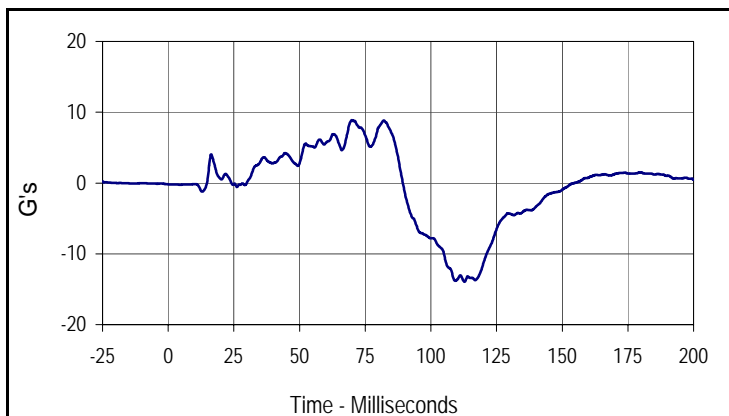
NHTSA No.: MD5100  
 Test Date: 6/12/12



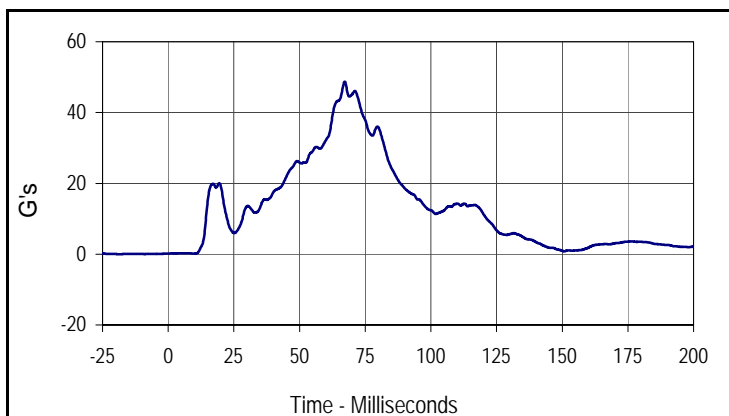
Curve Description			
Passenger Chest Acceleration X Primary			
Plot No.	Type	SAE Class	Units
020	FIL	180	G's
Max	Time	Min	Time
3.3	176.6	-48.3	67.2



Curve Description			
Passenger Chest Acceleration Y Primary			
Plot No.	Type	SAE Class	Units
021	FIL	180	G's
Max	Time	Min	Time
3.4	29.3	-4.8	64.4



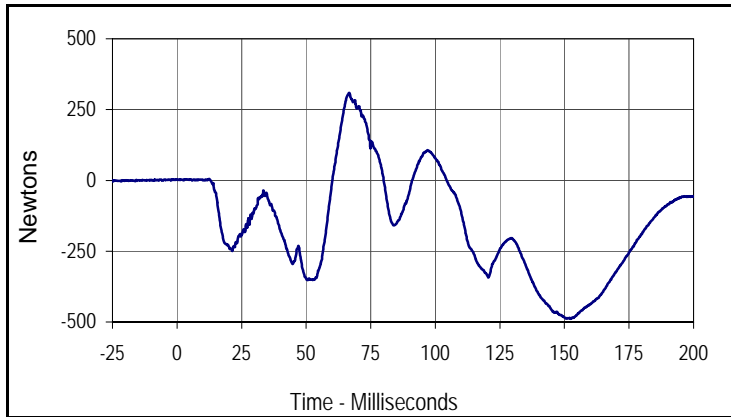
Curve Description			
Passenger Chest Acceleration Z Primary			
Plot No.	Type	SAE Class	Units
022	FIL	180	G's
Max	Time	Min	Time
8.9	69.9	-13.9	112.8



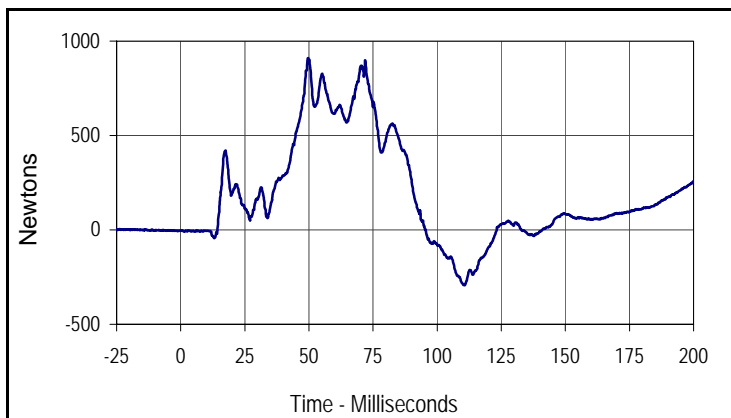
Curve Description			
Passenger Chest Resultant Acceleration Primary			
Plot No.	Type	SAE Class	Units
023	RES	180	G's
Max	Time	Min	Time
48.7	67.2	0.2	9.8

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

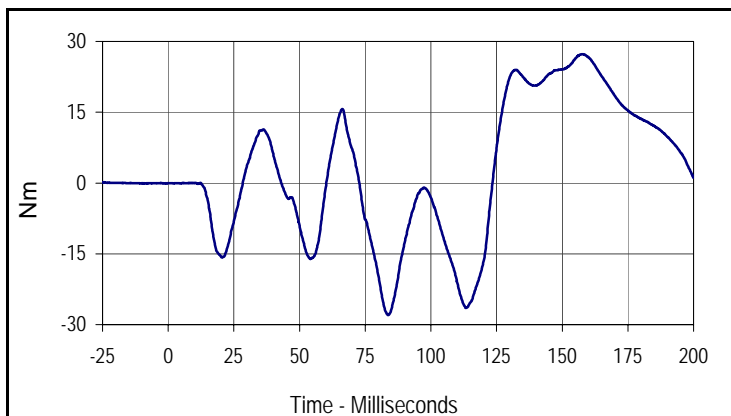
NHTSA No.: MD5100  
 Test Date: 6/12/12



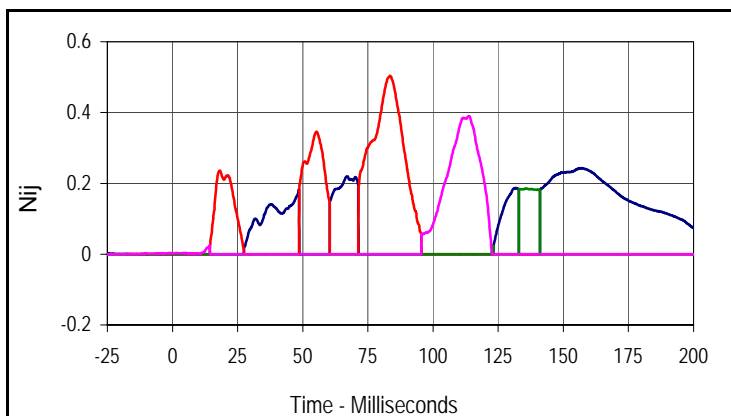
Curve Description			
Passenger Upper Neck Force X			
Plot No.	Type	SAE Class	Units
024	FIL	1000	Newtons
Max	Time	Min	Time
309.1	66.7	-488.2	152.4



Curve Description			
Passenger Upper Neck Force Z			
Plot No.	Type	SAE Class	Units
025	FIL	1000	Newtons
Max	Time	Min	Time
910.8	49.7	-293.5	110.8



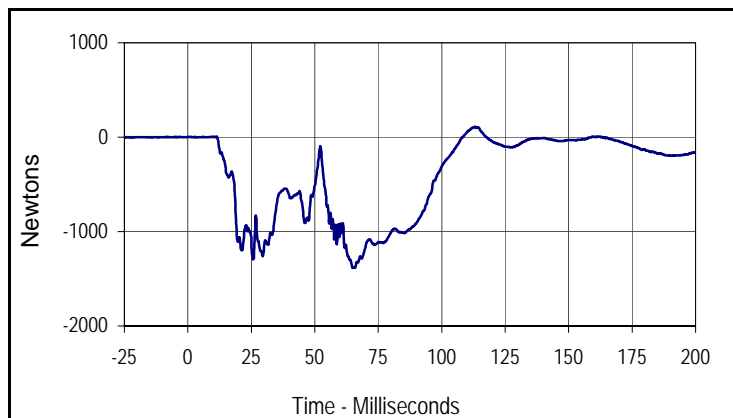
Curve Description			
Passenger Upper Neck Moment Y			
Plot No.	Type	SAE Class	Units
026	FIL	600	Nm
Max	Time	Min	Time
27.3	157.7	-28.0	83.8



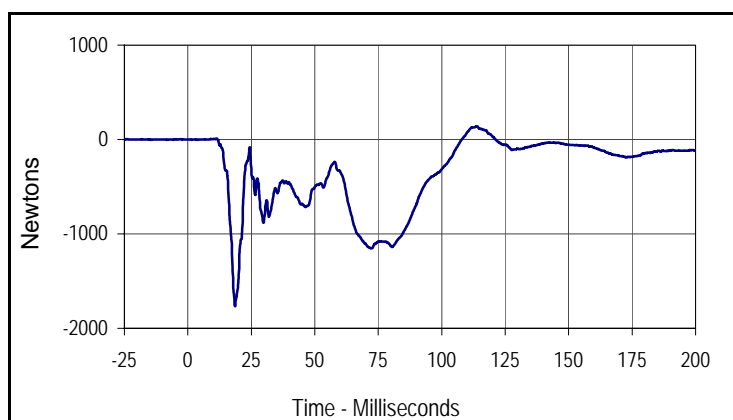
Curve Description			
Passenger Nij			
Units	Type	Max	Time
Ntf	FIL	0.24	157.0
Units	Type	Max	Time
Nte	FIL	0.50	83.5
Units	Type	Max	Time
Ncf	FIL	0.19	135.5
Units	Type	Max	Time
Nce	FIL	0.39	113.8

Test Vehicle: 2013 Lexus RX350 AWD 5-Door MPV  
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: MD5100  
 Test Date: 6/12/12



Curve Description			
Passenger Left Femur Force Z			
Plot No.	Type	SAE Class	Units
027	FIL	600	Newtons
Max	Time	Min	Time
111.9	113.1	-1385.9	64.9



Curve Description			
Passenger Right Femur Force Z			
Plot No.	Type	SAE Class	Units
028	FIL	600	Newtons
Max	Time	Min	Time
138.6	114.0	-1765.1	18.6

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

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

Test Program: Hybrid III 50th Percentile Male Dummy Damage Checklist

Test Date: 6/8/12

ATD Serial No.: 035

Test I.D.: N/A



Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

---



---



---

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 6/8/12

ATD Serial No.: 035

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.22	Pass
Laboratory Relative Humidity	%	10 to 70	29.7	Pass
A - Total sitting height	mm	879 to 889	884	Pass
B - Shoulder pivot height	mm	505 to 521	514	Pass
C - H point height	mm	84 to 89	86	Pass
D - H point location from backline	mm	135 to 140	138	Pass
E - Shoulder pivot from backline	mm	84 to 94	89	Pass
F - Thigh clearance	mm	140 to 155	148	Pass
G - Back of elbow to wrist pivot	mm	290 to 305	298	Pass
H - Head back to backline	mm	41 to 46	43	Pass
I - Shoulder to elbow length	mm	330 to 345	335	Pass
J - Elbow rest height	mm	190 to 211	200	Pass
K - Buttock to knee length	mm	579 to 604	586	Pass
L - Popliteal length	mm	429 to 455	438	Pass
M - Knee pivot height	mm	485 to 500	491	Pass
N - Buttock popliteal length	mm	452 to 477	472	Pass
O - Chest depth without jacket	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	260	Pass
V - Shoulder breadth	mm	422 to 437	433	Pass
W - Foot breadth	mm	91 to 107	99	Pass
Y - Chest circumference (with chest jacket)	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	865	Pass
AA - Location for chest circumference	mm	429 to 434	431	Pass
BB - Location for waist circumference	mm	226 to 231	230	Pass
Overall Test Results				Pass

Test Program: Hybrid III 50th Percentile Male Head Drop Test

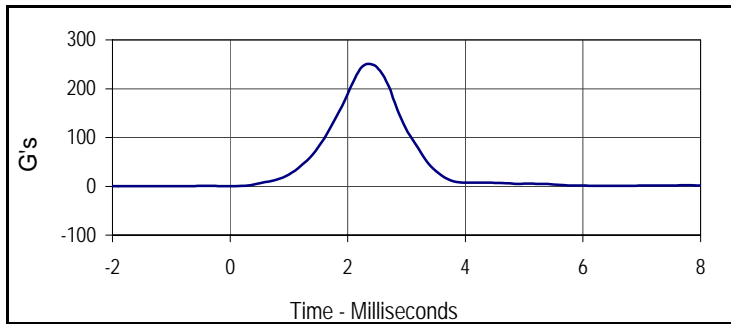
Test Date: 6/8/12

ATD Serial No.: 035

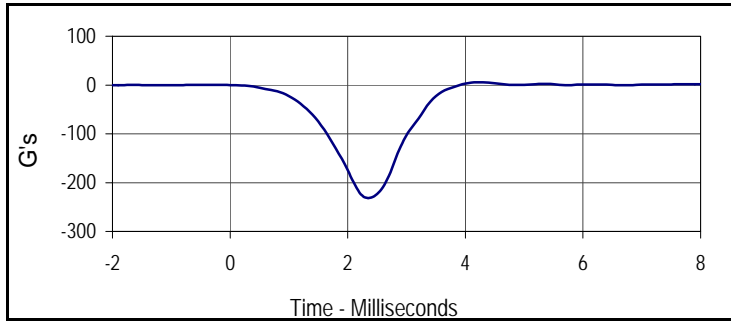
Test I.D.: M035HD040



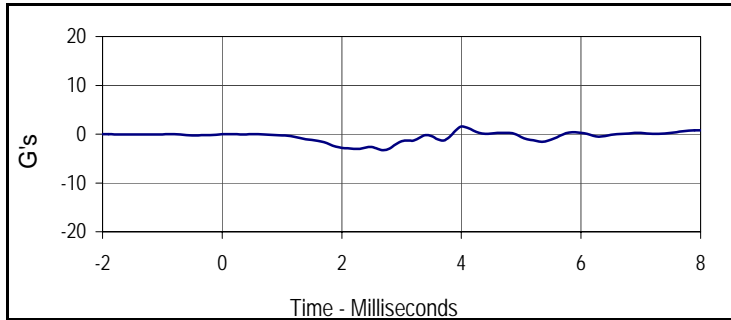
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	240	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.1	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	250.4	Pass
Peak Lateral Acceleration	G's	≤15.0	3.3	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	3.1	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



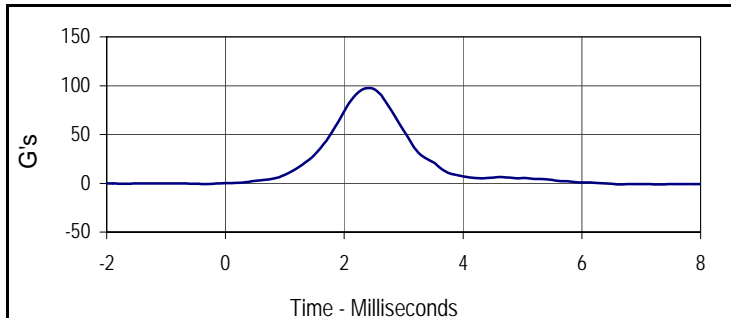
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
250.4	2.4	0.1	-0.8



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
5.5	4.3	-230.7	2.3



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
1.6	4.0	-3.3	2.7



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
97.7	2.4	-0.7	-0.4

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

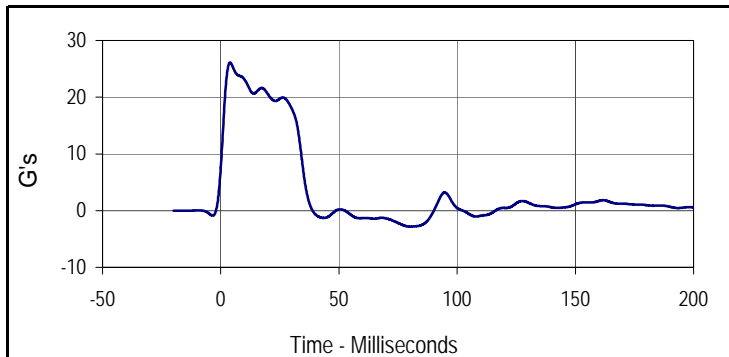
Test Date: 6/8/12

ATD Serial No.: 035

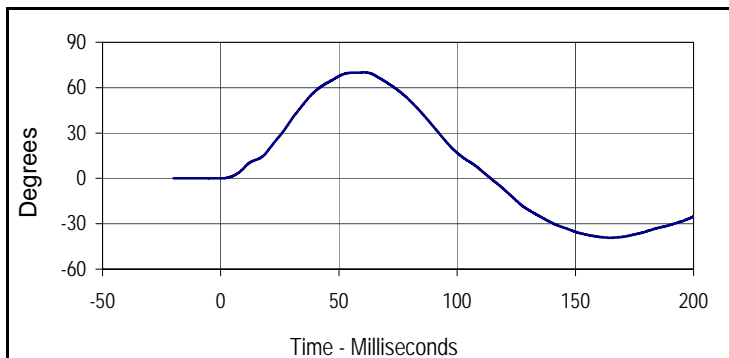
Test I.D.: M035NF040



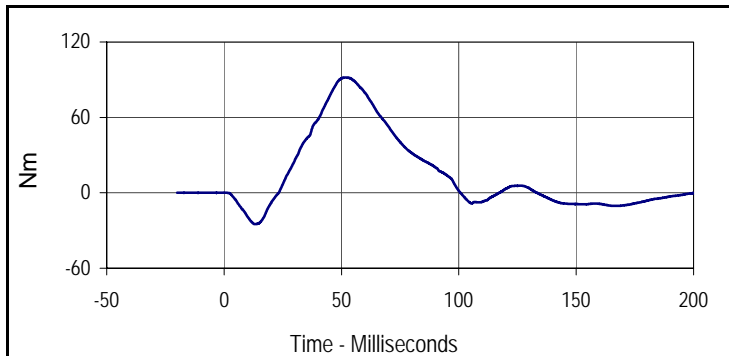
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	260	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.4	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	30.3	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	7.02	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	23.1	Pass
	20 Msec.	G's	17.6 to 22.6	20.5	Pass
	30 Msec.	G's	12.5 to 18.5	18.0	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	18.0	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	35.6	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	70.0	Pass
	Time	Msec.	57.0 to 64.0	60.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	114.2	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	91.8	Pass
	Time	Msec.	47.0 to 58.0	52.1	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	100.7	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
26.1	3.9	-2.8	80.2



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
70.0	60.8	-39.2	164.9



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
91.8	52.1	-24.9	13.6

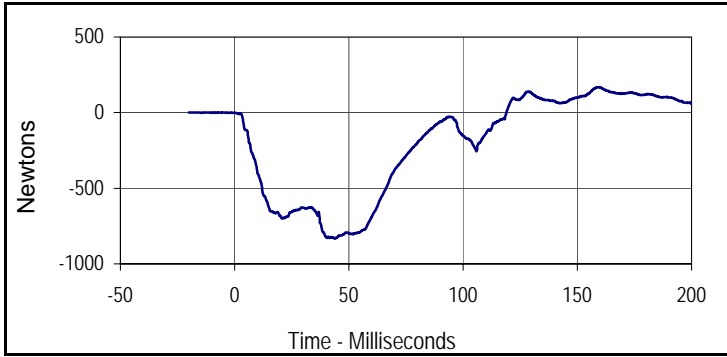
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 6/8/12

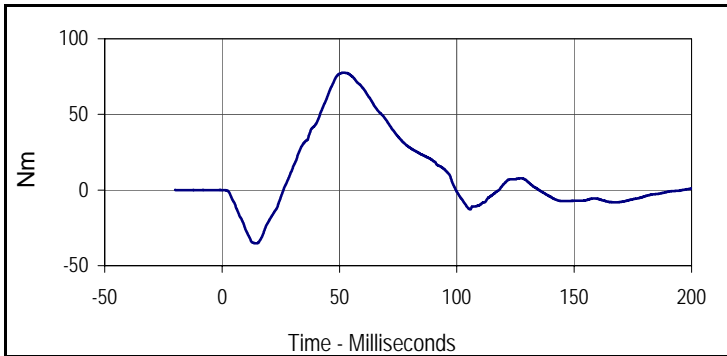


ATD Serial No.: 035

Test I.D.: M035NF040



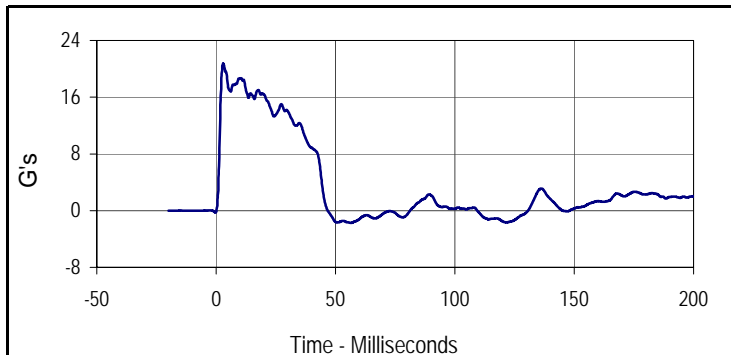
Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
168.2	159.5	-832.7	44.0



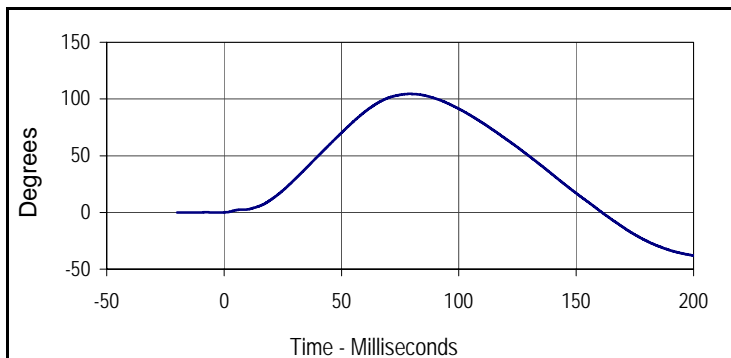
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
77.6	52.2	-35.2	14.6



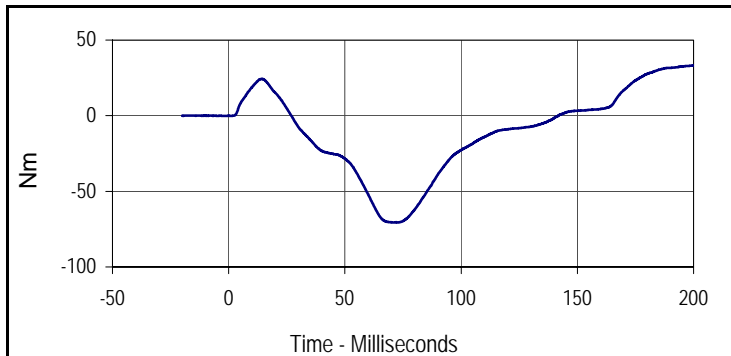
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	285	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.0	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.04	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	18.6	Pass
	20 Msec.	G's	14.0 to 19.0	16.4	Pass
	30 Msec.	G's	11.0 to 16.0	14.0	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	14.0	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	44.0	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	104.5	Pass
	Time	Msec.	72.0 to 82.0	79.1	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	161	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-70.6	Pass
	Time	Msec.	65.0 to 79.0	72.7	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	141.8	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
20.7	2.9	-1.7	56.8



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
104.5	79.1	-38.0	200.0



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
33.0	198.9	-70.6	72.7

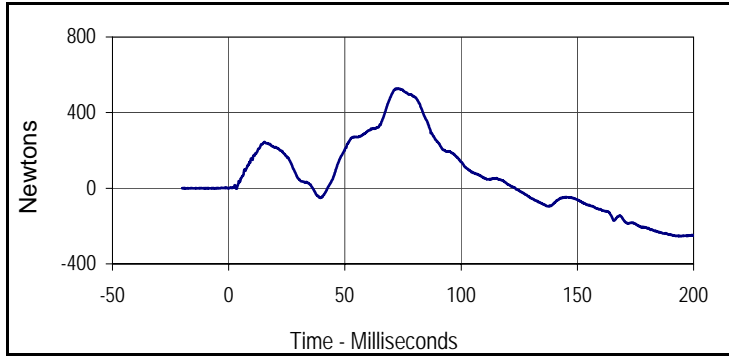
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 6/8/12

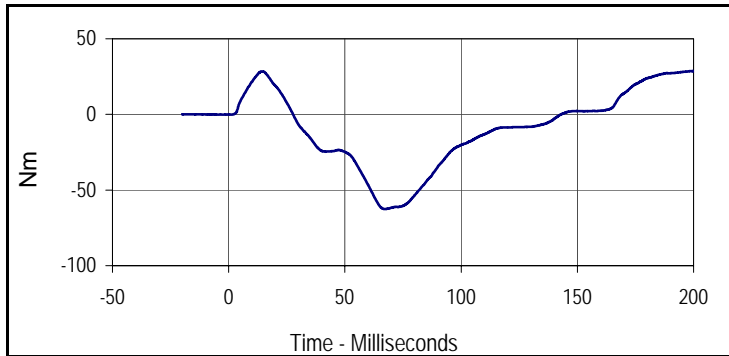


ATD Serial No.: 035

Test I.D.: M035NE040



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
527.4	72.8	-254.5	193.5



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
28.6	199.1	-62.6	67.0

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

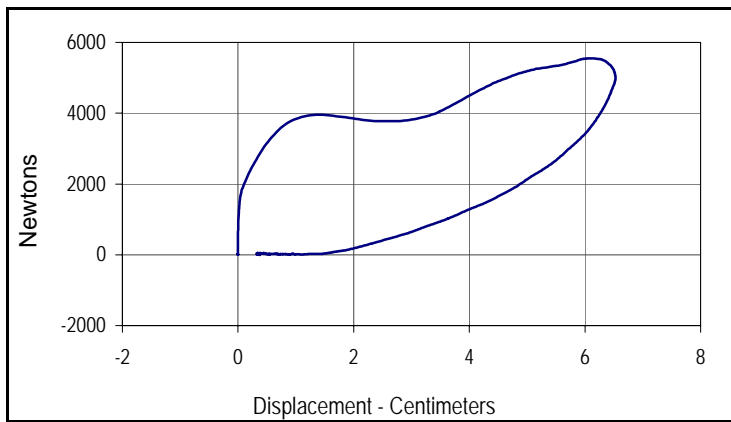
Test Date: 6/8/12

ATD Serial No.: 035

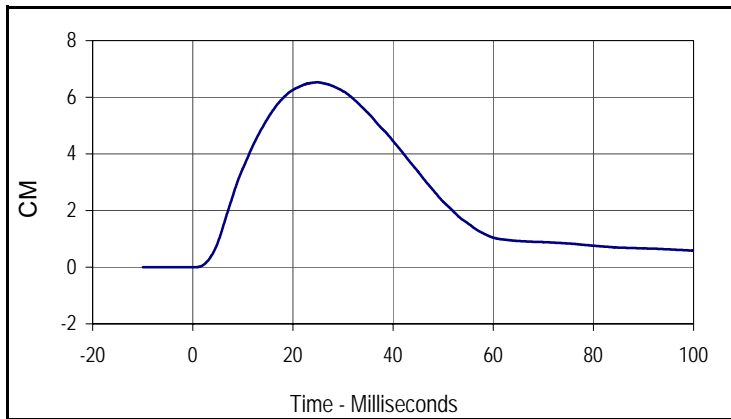
Test I.D.: M035CH040



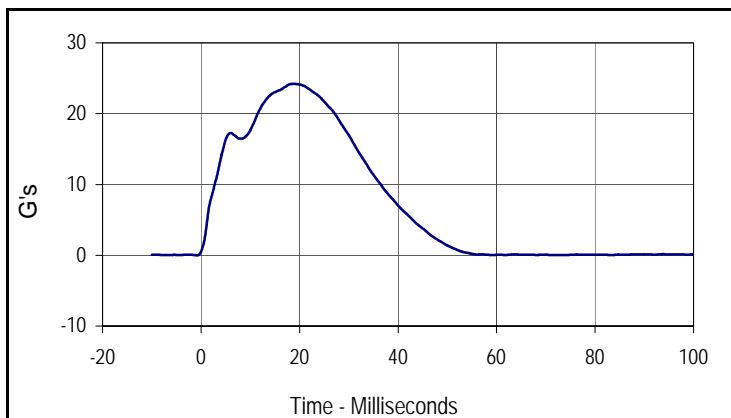
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	310	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.9	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	Newtons	5159 to 5893	5550	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.53	Pass
Internal Hysteresis	%	69 to 85	71.5	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	71.5
Peak Probe Force		Peak Chest Deflection	
5550		6.53	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.5	24.8	0.0	0.4



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
24.2	18.9	0.0	-0.8

Test Program: Hybrid III 50th Percentile Male Knee Impact Test

Test Date: 6/8/12

ATD Serial No.: 035

Test I.D.: M035LK040 , M035RK040

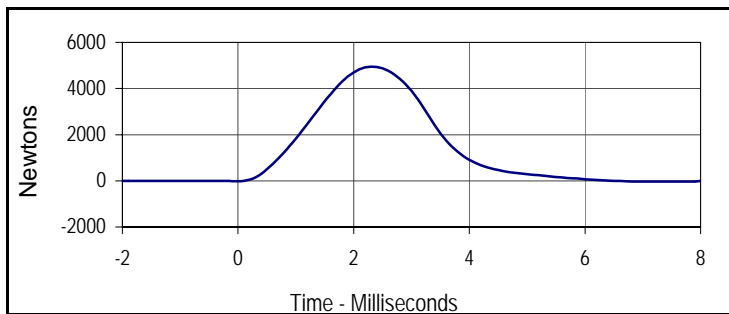


**Left Knee**

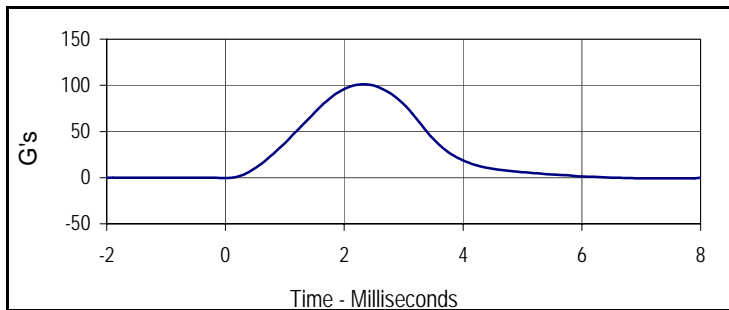
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	330	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.3	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4952	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	5031	Pass
<b>Overall Test Results</b>				<b>Pass</b>



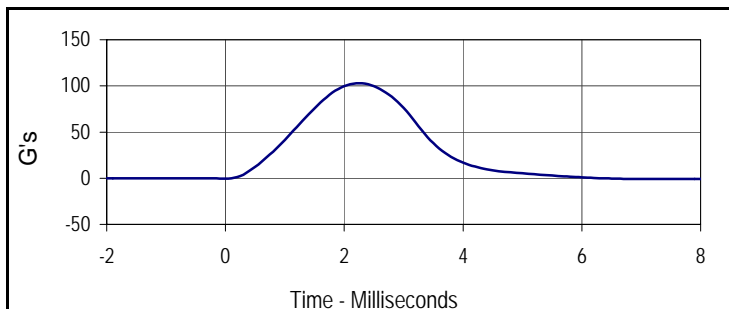
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4951.6	2.3	-37.6	7.9



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
101.2	2.3	-0.8	7.9



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
5030.6	2.2	-46.1	8.0



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
102.8	2.2	-0.9	8.0

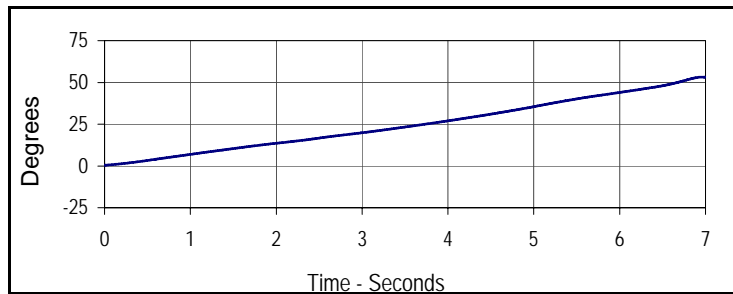


**Left Hip Joint-Femur Results**

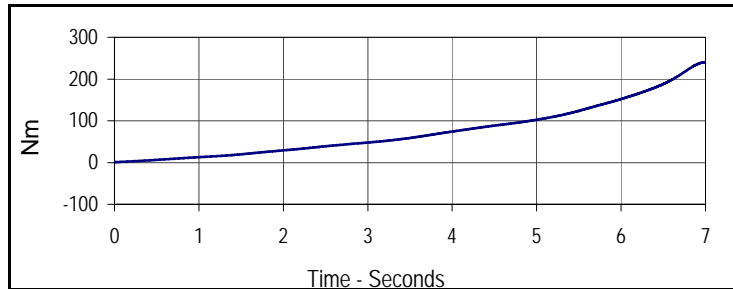
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	355	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.3	Pass
Rotation Rate	deg/sec	5 to 10	7.6	Pass
Femur Torque at 30°	Nm	≤ 95	85.3	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	49.6	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Hip Joint-Femur Results**

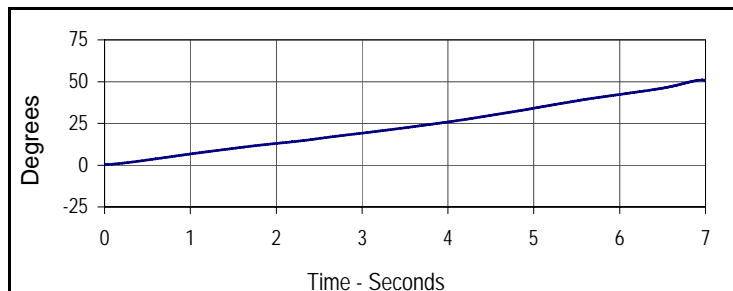
Rotation Rate	deg/sec	5 to 10	7.3	Pass
Femur Torque at 30°	Nm	≤ 95	87.8	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	47.8	Pass
<b>Overall Test Results</b>				<b>Pass</b>



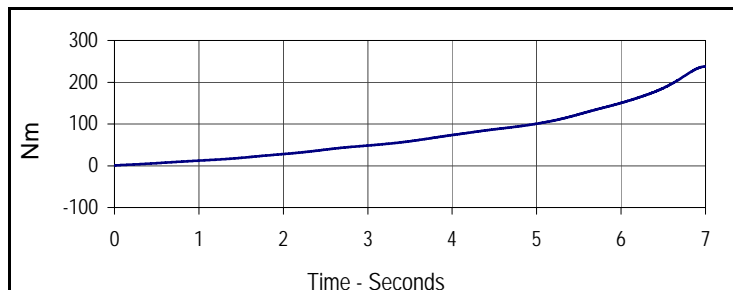
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	Degrees
Max	Time	Min	Time
53.2	7.0	0.4	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
240.0	7.0	1.0	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
51.0	7.0	0.2	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
237.3	7.0	1.0	0.0

Test Program: Hybrid III 5th Percentile Female Dummy Damage Checklist

Test Date: 6/8/12

ATD Serial No.: 141

Test I.D.: N/A



Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

---



---



---

Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 6/8/12

ATD Serial No.: 141

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.50	Pass
Laboratory Relative Humidity	%	10 to 70	29.9	Pass
A - Total sitting height	mm	774.7 to 800.1	784	Pass
B - Shoulder pivot height	mm	431.8 to 457.2	449	Pass
C - H point height	mm	81.3 to 86.3	84	Pass
D - H point location from backline	mm	144.8 to 149.8	147	Pass
E - Shoulder pivot from backline	mm	68.6 to 83.8	78	Pass
F - Thigh clearance	mm	119.4 to 134.6	126	Pass
G - Back of elbow to wrist pivot	mm	243.9 to 259.1	250	Pass
H - Head back to backline	mm	40.7 to 45.7	44	Pass
I - Shoulder to elbow length	mm	276.8 to 297.2	285	Pass
J - Elbow rest height	mm	182.8 to 203.2	200	Pass
K - Buttock to knee length	mm	520.7 to 546.1	530	Pass
L - Popliteal length	mm	355.6 to 376.0	372	Pass
M - Knee pivot height	mm	393.7 to 419.1	402	Pass
N - Buttock popliteal length	mm	414.0 to 439.4	420	Pass
O - Chest depth without jacket	mm	175.3 to 190.5	186	Pass
P - Foot length	mm	218.5 to 233.7	221	Pass
R - Buttock to Knee Pivot Length	mm	457.2 to 482.6	475	Pass
S - Head Breadth	mm	137.1 to 147.3	144	Pass
T - Head Depth	mm	177.8 to 188.0	180	Pass
U - Hip Breadth	mm	299.7 to 314.9	302	Pass
V - Shoulder breadth	mm	350.5 to 365.7	359	Pass
W - Foot breadth	mm	78.8 to 94.0	90	Pass
X - Head circumference	mm	528.3 to 548.7	541	Pass
Y - Chest circumference (with chest jacket)	mm	850.8 to 881.3	861	Pass
Z - Waist circumference	mm	759.5 to 789.9	766	Pass
AA - Location for chest circumference	mm	299.7 to 309.9	300	Pass
BB - Location for waist circumference	mm	160.1 to 170.2	164	Pass
Overall Test Results				Pass

Test Program: Hybrid III 5th Percentile Female Head Drop Test

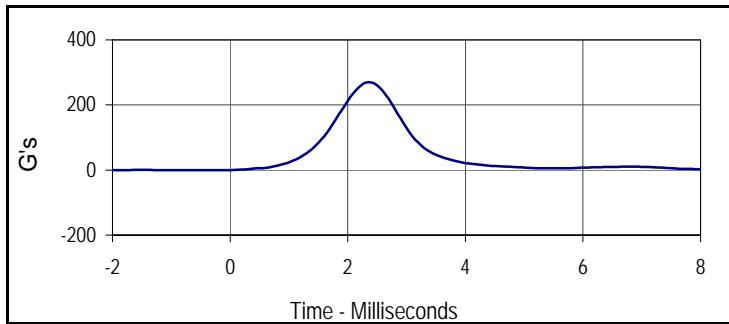
Test Date: 6/8/12

ATD Serial No.: 141

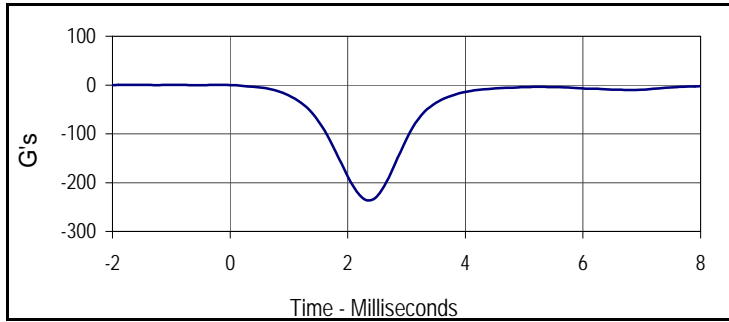
Test I.D.: F141HD042



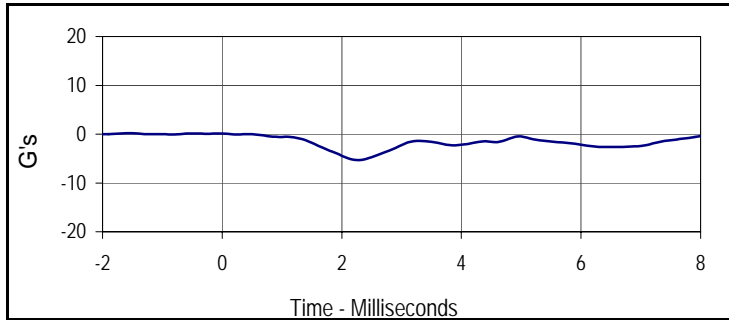
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	245	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.0	Pass
Peak Resultant Acceleration	G's	250.0 to 300.0	269.1	Pass
Peak Lateral Acceleration	G's	≤15.0	5.3	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	3.8	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



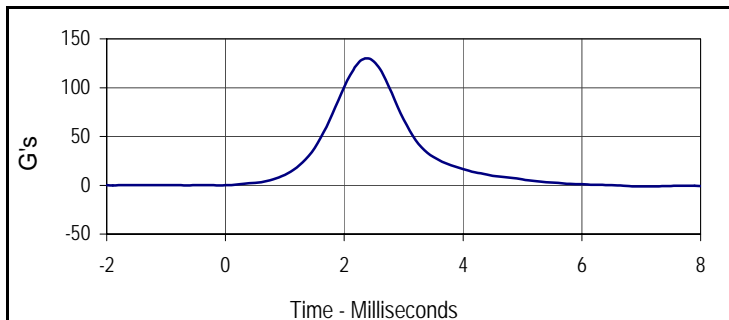
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
269.1	2.4	0.0	-0.7



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
0.2	-1.5	-235.6	2.4



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
0.2	-1.5	-5.3	2.3



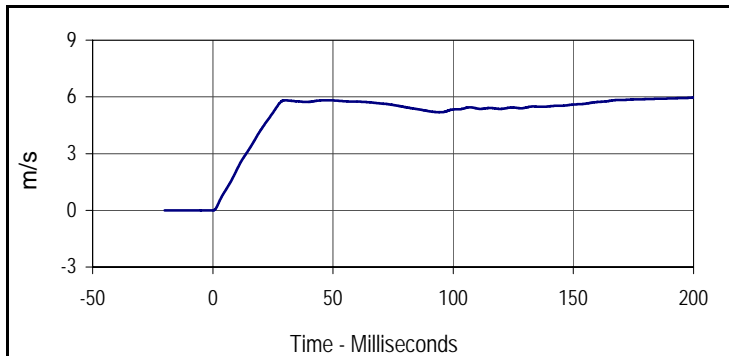
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
129.9	2.4	0.0	-0.6

Test Program: Hybrid III 5th Percentile Female Neck Flexion Test  
 ATD Serial No.: 141

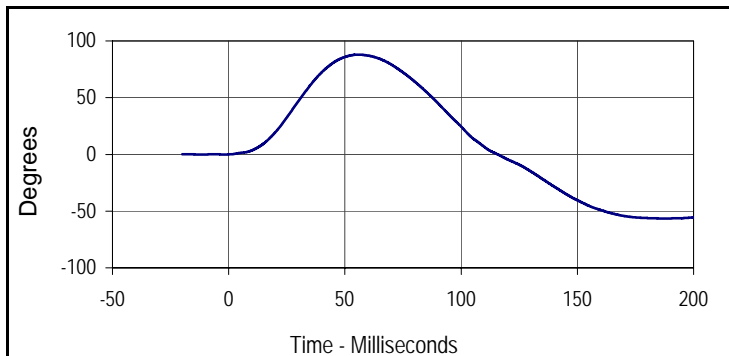
Test Date: 6/8/12  
 Test I.D.: F141NF042



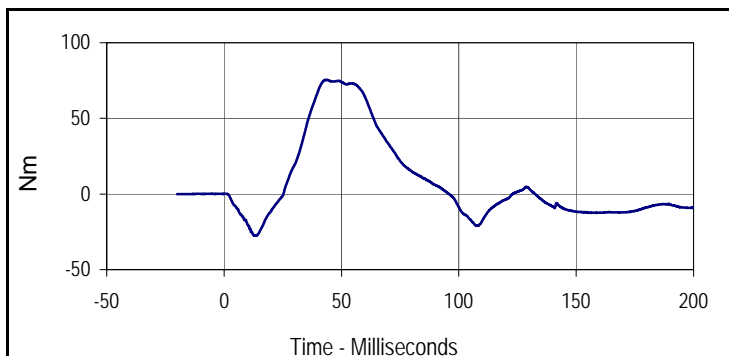
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	270	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	29.3	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.98	Pass	
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.1	Pass
	20 Msec.	m/s	4.0 to 5.0	4.3	Pass
	30 Msec.	m/s	5.8 to 7.0	5.8	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	87.9	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	75.4	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	84.1	Pass	
Overall Test Results				Pass	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.0	200.0	0.0	-0.2



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
87.9	55.7	-56.5	186.7



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
75.4	44.0	-27.6	12.9

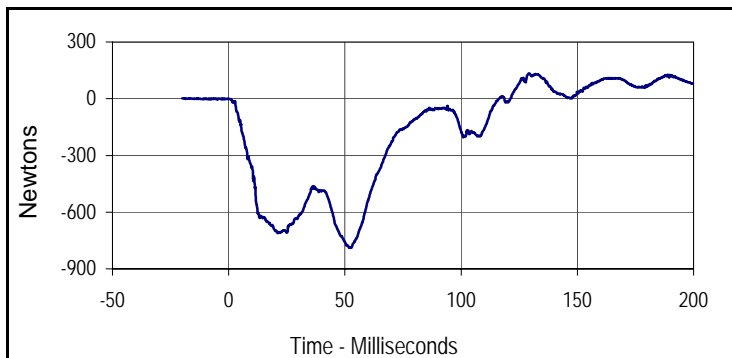
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 6/8/12

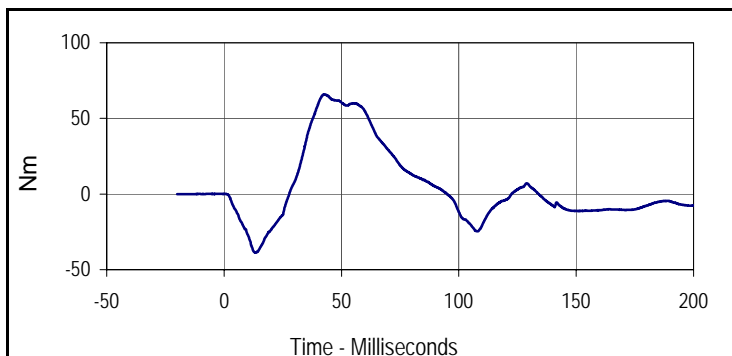


ATD Serial No.: 141

Test I.D.: F141NF042



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
134.4	129.2	-788.8	52.3



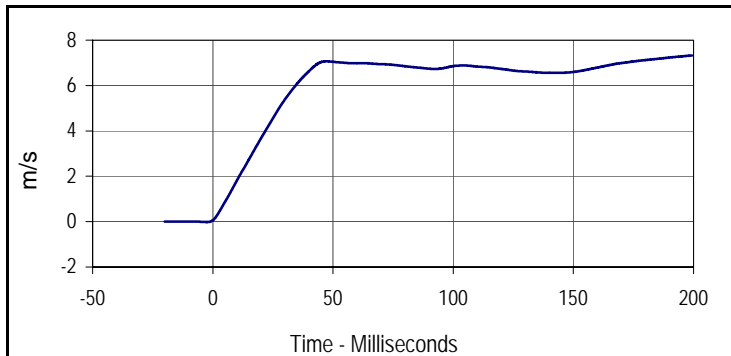
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
65.9	42.9	-38.7	13.4

Test Program: Hybrid III 5th Percentile Female Neck Extension Test  
 ATD Serial No.: 141

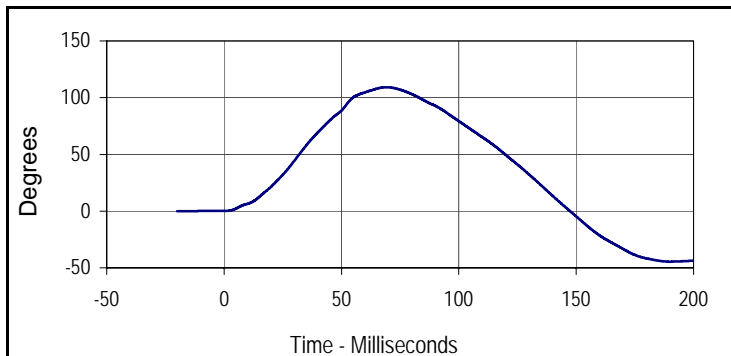
Test Date: 6/8/12  
 Test I.D.: F141NE042



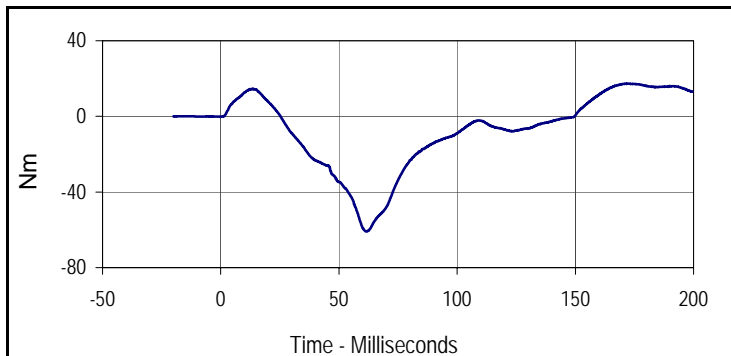
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	310	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.1	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	30.0	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	6.08	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.8	Pass
	20 Msec.	m/s	3.1 to 3.9	3.7	Pass
	30 Msec.	m/s	4.6 to 5.6	5.4	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	109.2	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-60.9	Pass
Positive Moment Decay, Time To -10 Nm	Msec.	94.0 to 114.0	98.7	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.3	199.4	0.0	-2.5



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
109.2	69.3	-44.5	189.8



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
17.3	172.4	-60.9	61.5

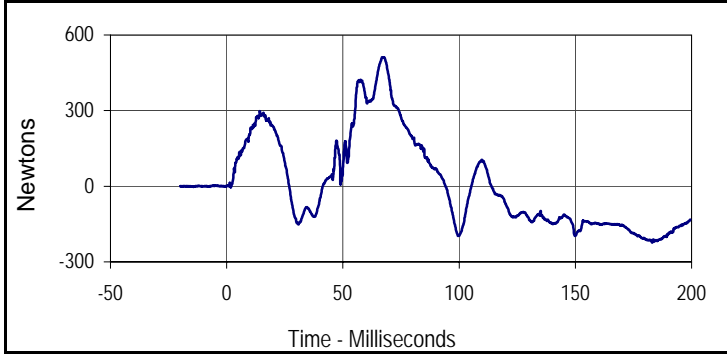
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 6/8/12

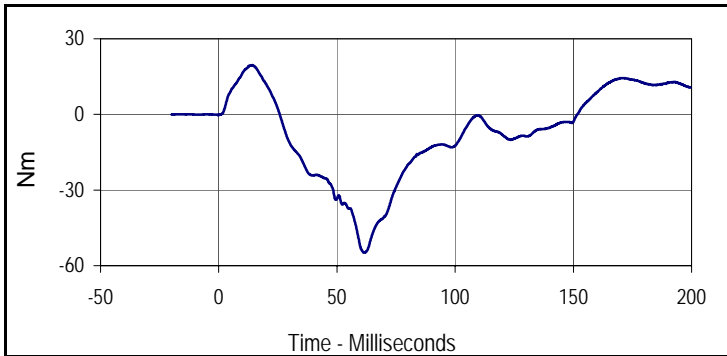


ATD Serial No.: 141

Test I.D.: F141NE042



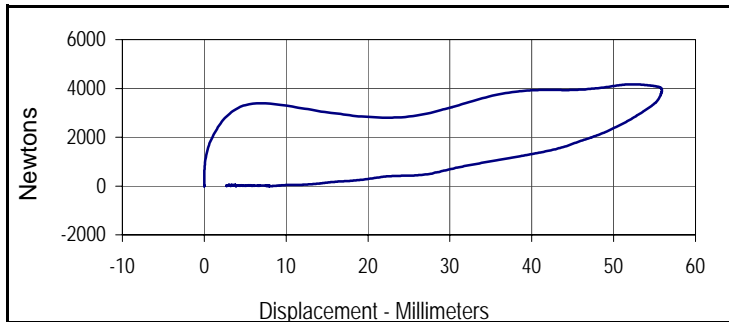
Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
511.6	67.3	-223.9	183.0



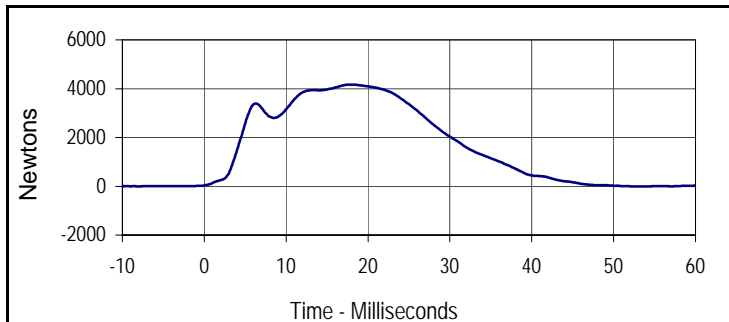
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
19.6	14.3	-54.9	61.6



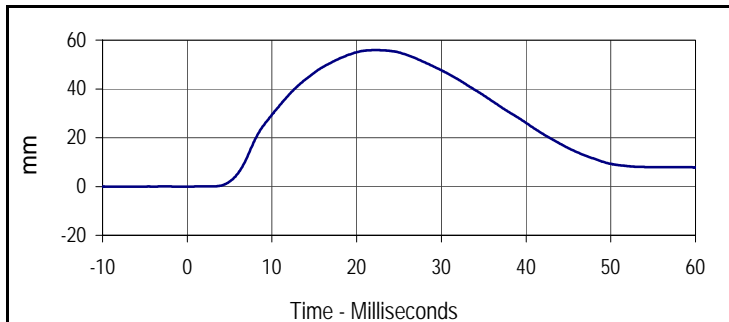
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	350	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.1	Pass
Probe Velocity	m/s	6.59 to 6.83	6.72	Pass
Peak Chest Deflection	mm	50.0 to 58.0	55.9	Pass
Peak Force Between 50 and 58 MM	Newtons	3900 to 4400	4103	Pass
Peak Force Between 18 and 50 MM	Newtons	≤4600	4169	Pass
Internal Hysteresis	%	69 to 85	73.0	Pass
Overall Test Results				Pass



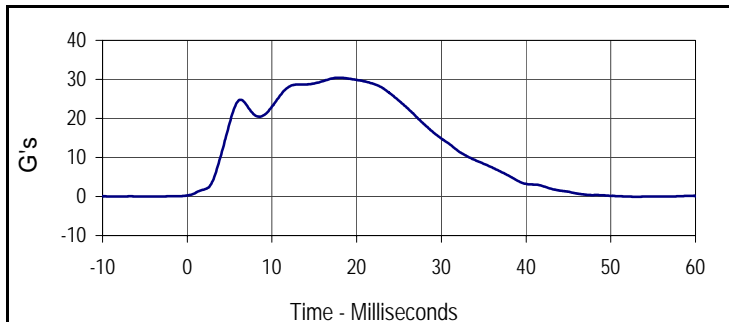
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	73.0
Peak Probe Force		Peak Chest Deflection	
4169.0		55.9	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4169.0	17.8	-7.0	52.8



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
55.9	22.3	0.0	-6.7



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
30.4	17.8	-0.1	52.8

Test Program: Hybrid III 5th Percentile Female Knee Impact Test

Test Date: 6/8/12

ATD Serial No.: 141

Test I.D.: F141LK042, F141RK042

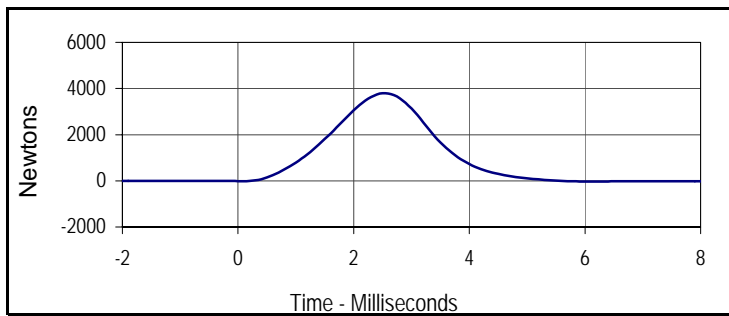


**Left Knee**

Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	370	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	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.2	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	3450 to 4060	3792	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	3450 to 4060	3825	Pass
<b>Overall Test Results</b>				<b>Pass</b>



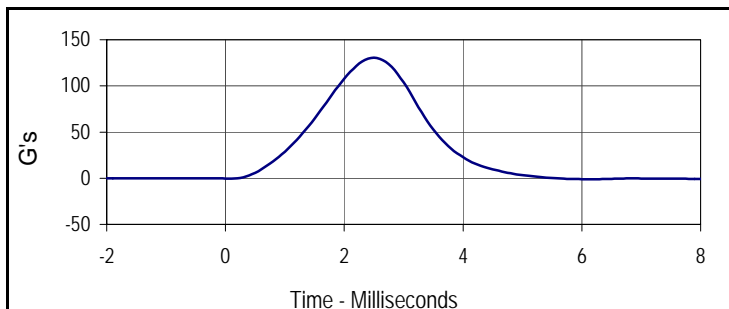
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3791.8	2.5	-35.4	6.1



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
129.4	2.5	-1.2	6.1



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3825.1	2.5	-33.5	6.2



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
130.5	2.5	-1.1	6.2

Test Program: Hybrid III 5th Percentile Female Torso Flexion Test

Test Date: 6/8/12

ATD Serial No.: 141

Test I.D.: F141TF042



**Left Hip Joint-Femur Results**

Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	400	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.1	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	30.1	Pass
Initial Reference Plane Angle		Degrees	≤ 20	2.1	Pass
Peak Force at 45° +/-0.5°		Newtons	320.0 to 390.0	353.9	Pass
Torso Rotation Rate		deg/sec	0.5 to 1.5	1.1	Pass
Final Reference Plane Angle		Degrees	+/-8	-0.7	Pass
Overall Test Results					Pass

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

Test Program: Hybrid III 50th Percentile Male Dummy Damage Checklist

Test Date: 6/14/12

ATD Serial No.: 035

Test I.D.: N/A



Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

---



---



---

Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 6/14/12

ATD Serial No.: 035

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.11	Pass
Laboratory Relative Humidity	%	10 to 70	30.1	Pass
A - Total sitting height	mm	879 to 889	885	Pass
B - Shoulder pivot height	mm	505 to 521	515	Pass
C - H point height	mm	84 to 89	85	Pass
D - H point location from backline	mm	135 to 140	138	Pass
E - Shoulder pivot from backline	mm	84 to 94	89	Pass
F - Thigh clearance	mm	140 to 155	149	Pass
G - Back of elbow to wrist pivot	mm	290 to 305	298	Pass
H - Head back to backline	mm	41 to 46	43	Pass
I - Shoulder to elbow length	mm	330 to 345	335	Pass
J - Elbow rest height	mm	190 to 211	199	Pass
K - Buttock to knee length	mm	579 to 604	586	Pass
L - Popliteal length	mm	429 to 455	438	Pass
M - Knee pivot height	mm	485 to 500	492	Pass
N - Buttock popliteal length	mm	452 to 477	472	Pass
O - Chest depth without jacket	mm	213 to 229	225	Pass
P - Foot length	mm	251 to 267	260	Pass
V - Shoulder breadth	mm	422 to 437	433	Pass
W - Foot breadth	mm	91 to 107	99	Pass
Y - Chest circumference (with chest jacket)	mm	970 to 1001	985	Pass
Z - Waist circumference	mm	836 to 866	865	Pass
AA - Location for chest circumference	mm	429 to 434	431	Pass
BB - Location for waist circumference	mm	226 to 231	230	Pass
Overall Test Results				Pass

Test Program: Hybrid III 50th Percentile Male Head Drop Test

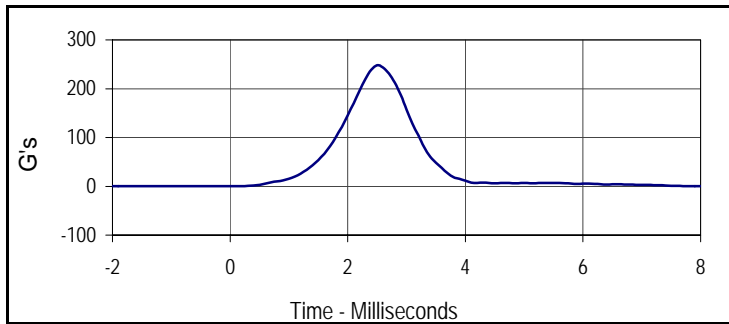
Test Date: 6/14/12

ATD Serial No.: 035

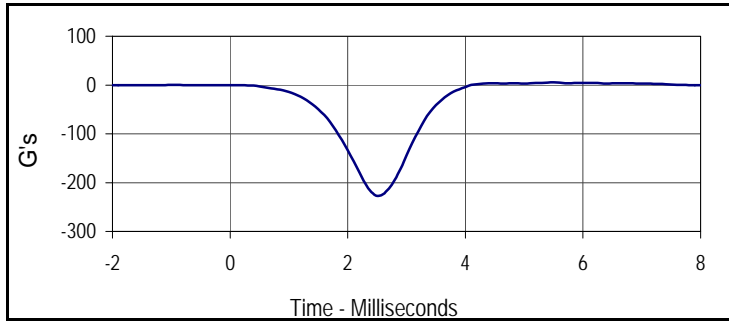
Test I.D.: M035HD041



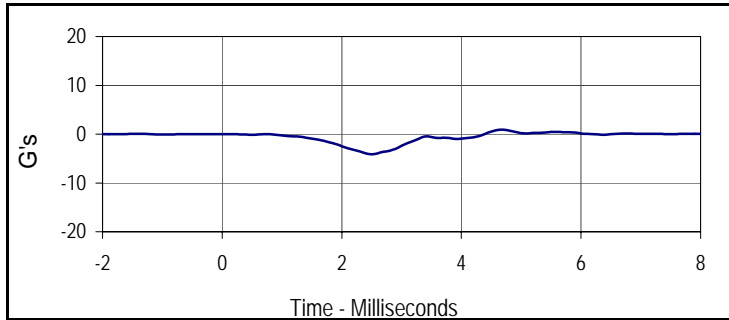
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	245	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.0	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.7	Pass
Peak Resultant Acceleration	G's	225.0 to 275.0	248.0	Pass
Peak Lateral Acceleration	G's	≤15.0	4.1	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	4.6	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



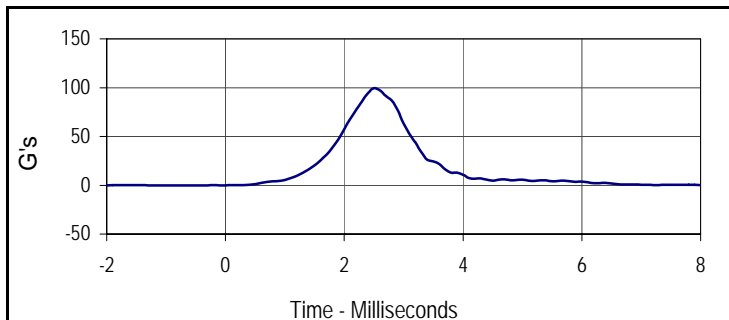
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
248.0	2.5	0.0	-0.1



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
5.6	5.5	-227.1	2.5



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
0.9	4.7	-4.1	2.5



Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
99.4	2.5	-0.2	-0.9

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

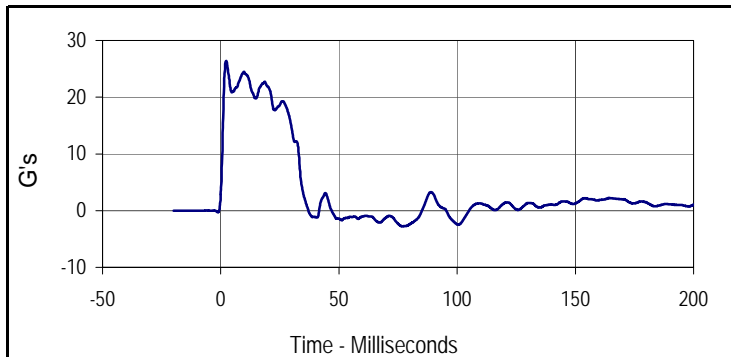
Test Date: 6/14/12

ATD Serial No.: 035

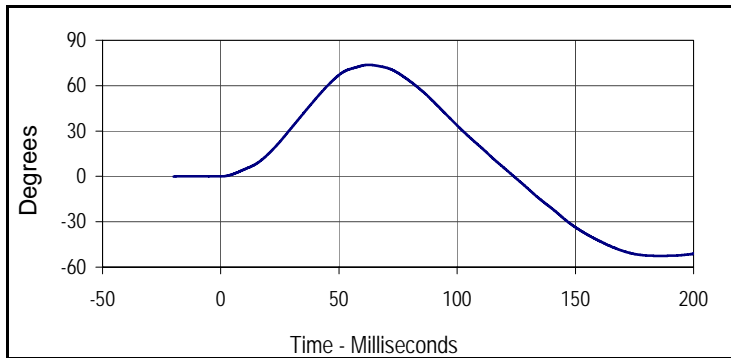
Test I.D.: M035NF041



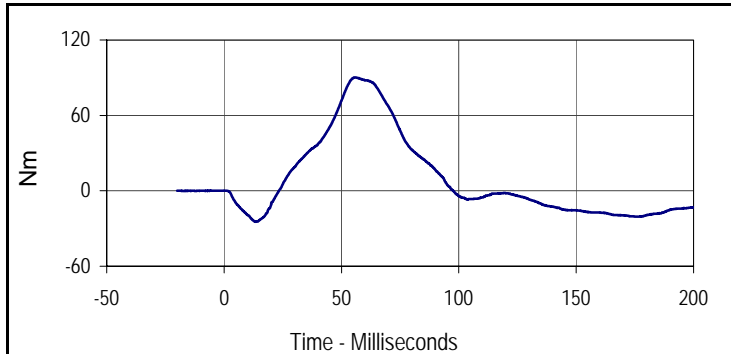
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	265	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	29.7	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	6.95	Pass	
Pendulum Deceleration	10 Msec.	G's	22.5 to 27.5	24.4	Pass
	20 Msec.	G's	17.6 to 22.6	21.8	Pass
	30 Msec.	G's	12.5 to 18.5	14.5	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 29.0	14.5	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	34.0 to 42.0	34.1	Pass	
Maximum "D" Plane Rotation	Max	Degrees	64.0 to 78.0	73.8	Pass
	Time	Msec.	57.0 to 64.0	62.6	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	113.0 to 128.0	124	Pass	
Moment About Occ. Condyle	Max	Nm	84.1 to 108.5	90.3	Pass
	Time	Msec.	47.0 to 58.0	55.9	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	97.0 to 107.0	97.7	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
26.4	2.3	-2.8	76.8



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
73.8	62.6	-52.5	185.7



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
90.3	55.9	-24.6	13.4

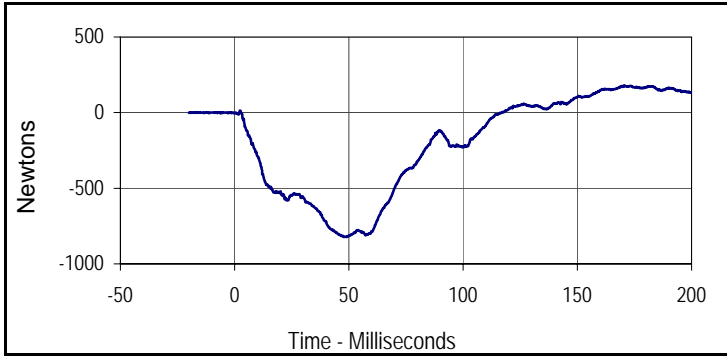
Test Program: Hybrid III 50th Percentile Male Neck Flexion Test

Test Date: 6/14/12

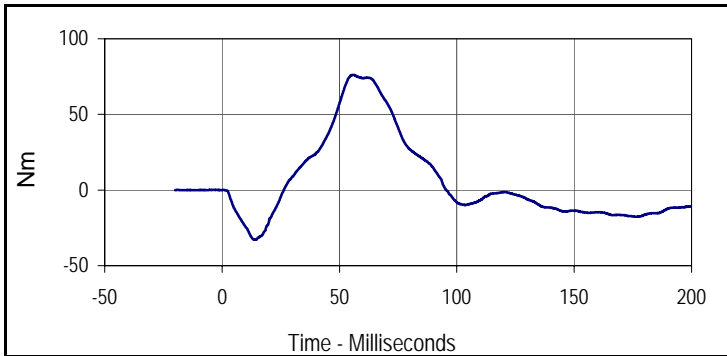


ATD Serial No.: 035

Test I.D.: M035NF041



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
180.6	170.6	-823.0	47.8



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
76.2	55.9	-32.9	13.9

Test Program: Hybrid III 50th Percentile Male Neck Extension Test

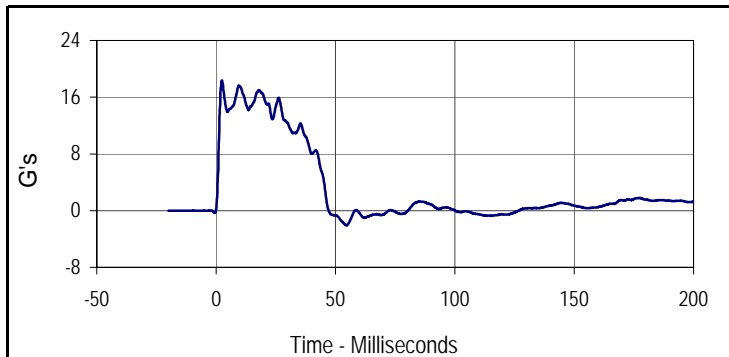
Test Date: 6/14/12

ATD Serial No.: 035

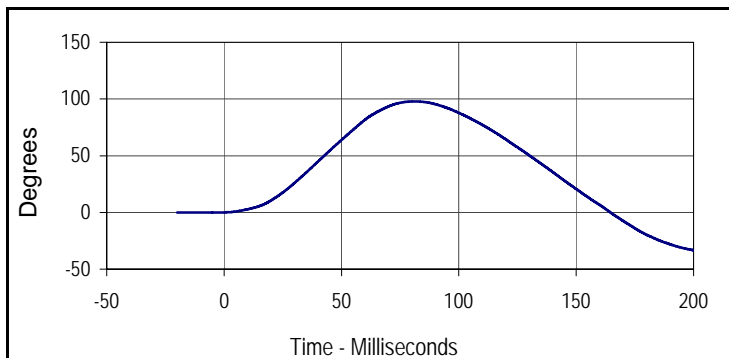
Test I.D.: M035NE041



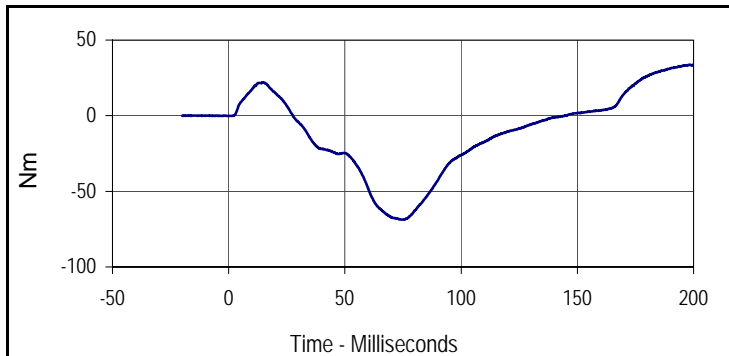
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	290	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	29.7	Pass	
Pendulum Velocity	m/s	5.94 to 6.19	6.10	Pass	
Pendulum Deceleration	10 Msec.	G's	17.2 to 21.2	17.5	Pass
	20 Msec.	G's	14.0 to 19.0	16.0	Pass
	30 Msec.	G's	11.0 to 16.0	12.3	Pass
Peak Pendulum Decel. after 30 Msec.	G's	≤ 22.0	12.3	Pass	
Deceleration Decay, Time to Cross 5 G's	Msec.	38.0 to 46.0	44.7	Pass	
Maximum "D" Plane Rotation	Max	Degrees	81.0 to 106.0	97.8	Pass
	Time	Msec.	72.0 to 82.0	80.8	Pass
"D" Plane Rotation Decay, Time To Zero Crossing	Msec.	147.0 to 174.0	164.6	Pass	
Moment About Occ. Condyle	Max	Nm	-52.9 to -79.9	-68.8	Pass
	Time	Msec.	65.0 to 79.0	74.9	Pass
Positive Moment Decay, Time To Zero Crossing	Msec.	120.0 to 148.0	144.7	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Deceleration			
Plot No.	Type	SAE Class	Units
001	FIL	60	G's
Max	Time	Min	Time
18.4	2.4	-2.1	54.6



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
97.8	80.8	-33.3	200.0



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
33.8	198.4	-68.8	74.9

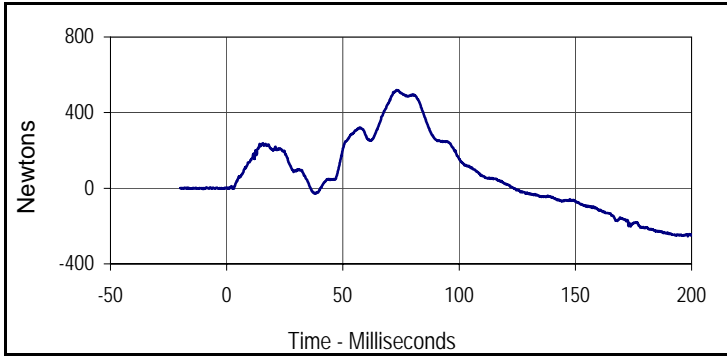
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 6/14/12

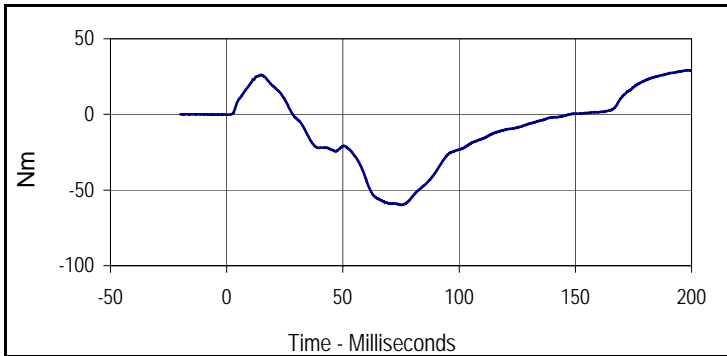


ATD Serial No.: 035

Test I.D.: M035NE041



Curve Description			
Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
518.6	73.2	-253.6	198.4



Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
29.3	198.3	-59.8	74.9

Test Program: Hybrid III 50th Percentile Male Thorax Impact Test

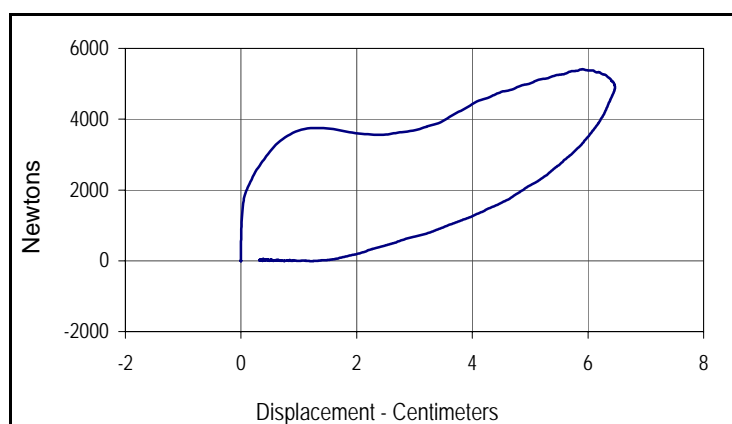
Test Date: 6/14/12

ATD Serial No.: 035

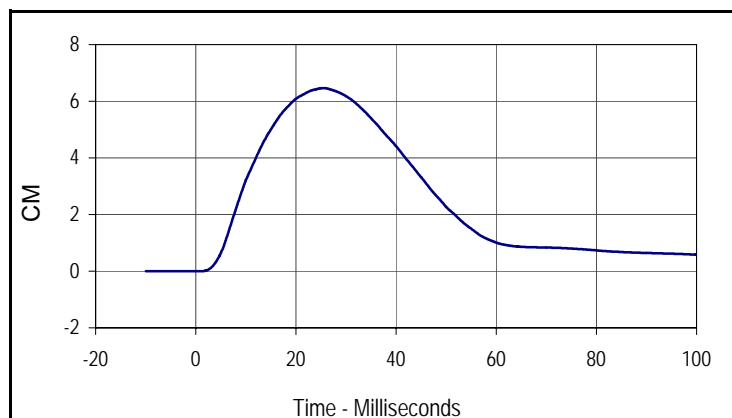
Test I.D.: M035CH041



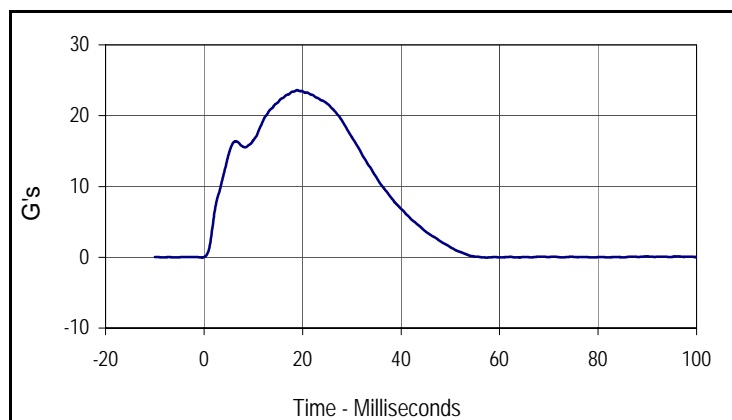
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	315	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	20.9	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.2	Pass
Probe Velocity	m/s	6.58 to 6.82	6.75	Pass
Peak Probe Force	Newtons	5159 to 5893	5408	Pass
Peak Sternum Deflection	CM	6.35 to 7.26	6.47	Pass
Internal Hysteresis	%	69 to 85	70.9	Pass
Overall Test Results				Pass



Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	70.9
Peak Probe Force		Peak Chest Deflection	
5408		6.47	



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
002	FIL	180	CM
Max	Time	Min	Time
6.5	25.5	0.0	1.0



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
003	FIL	180	G's
Max	Time	Min	Time
23.6	18.9	0.0	57.3

Test Program: Hybrid III 50th Percentile Male Knee Impact Test

Test Date: 6/14/12

ATD Serial No.: 035

Test I.D.: M035LK041, M035RK041

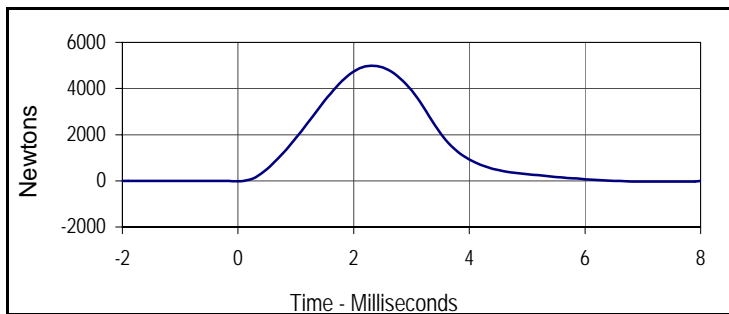


**Left Knee**

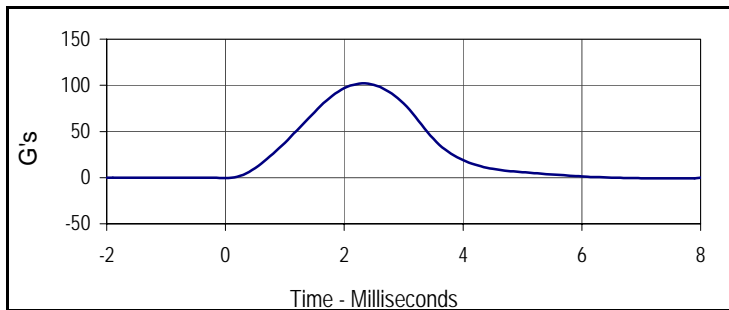
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	350	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.7	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	4715 to 5782	4991	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

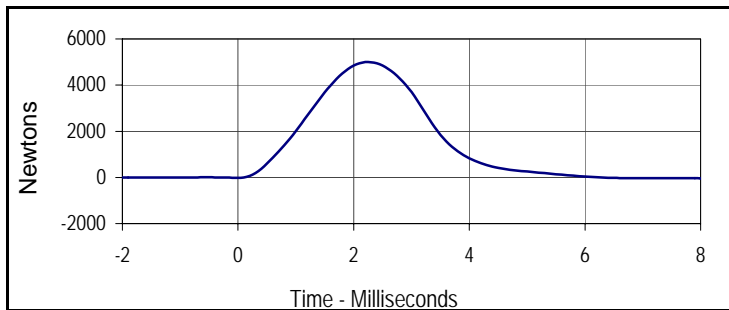
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.10	Pass
Peak Probe Force	Newtons	4715 to 5782	4997	Pass
<b>Overall Test Results</b>				<b>Pass</b>



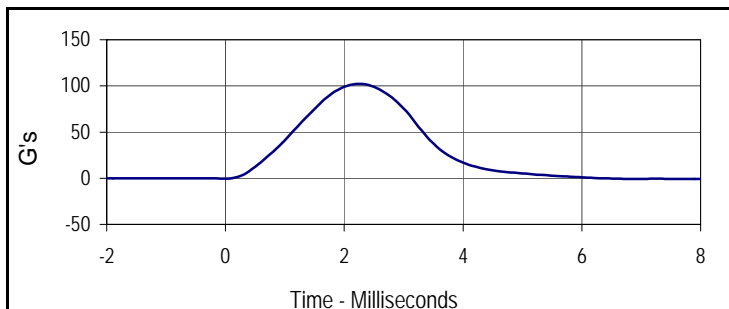
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
4990.6	2.3	-36.6	7.9



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
102.0	2.3	-0.7	7.9



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
4996.6	2.2	-46.1	8.0



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
102.1	2.2	-0.9	8.0

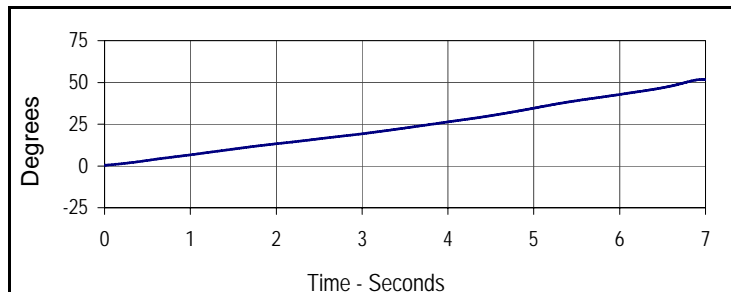


**Left Hip Joint-Femur Results**

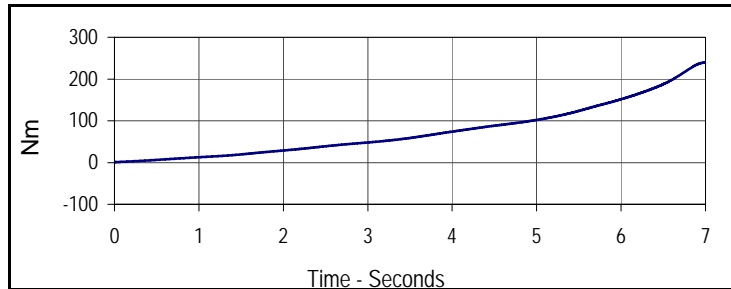
Tested Parameter	Units	Specification	Result	Pass/Fail
Hip Joint-Femur Assembly Soak Time	Minutes	≥240	370	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.6	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.4	Pass
Rotation Rate	deg/sec	5 to 10	7.4	Pass
Femur Torque at 30°	Nm	≤ 95	88.0	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	48.4	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Hip Joint-Femur Results**

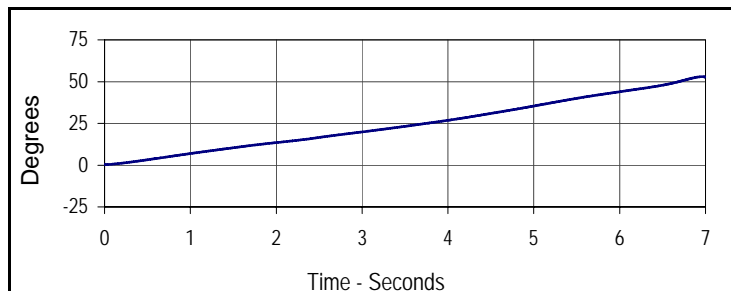
Rotation Rate	deg/sec	5 to 10	7.6	Pass
Femur Torque at 30°	Nm	≤ 95	86.1	Pass
Rotation at 203 Nm	Degrees	40.0 to 50.0	49.3	Pass
<b>Overall Test Results</b>				<b>Pass</b>



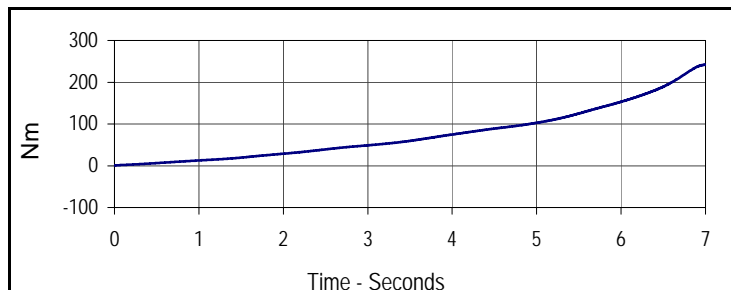
Curve Description			
Left Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
001	FIL	60	Degrees
Max	Time	Min	Time
51.8	7.0	0.4	0.0



Curve Description			
Left Femur Torque			
Plot No.	Type	SAE Class	Units
002	FIL	600	Nm
Max	Time	Min	Time
239.5	7.0	1.0	0.0



Curve Description			
Right Hip-Femur Rotation			
Plot No.	Type	SAE Class	Units
003	FIL	60	Degrees
Max	Time	Min	Time
52.9	7.0	0.3	0.0



Curve Description			
Right Femur Torque			
Plot No.	Type	SAE Class	Units
004	FIL	600	Nm
Max	Time	Min	Time
241.7	7.0	1.0	0.0

Test Program: Hybrid III 5th Percentile Female Dummy Damage Checklist

Test Date: 6/14/12

ATD Serial No.: 141

Test I.D.: N/A



Dummy Item	Inspect for	Comments	Damaged	OK
Entire Dummy	Perform general cleaning			X
Outer Skin	Gashes, rips, cracks			X
Head	Ballast secure			X
	General appearance			X
Neck	Broken or cracked rubber			X
	Upper neck bracket firmly attached to the lower neck bracket			X
	Looseness at the condyle joint			X
	Nodding blocks cracked or out of position			X
Spine	Broken or cracks in rubber			X
Ribs	Broken or bent ribs			X
	Broken or bent rib supports			X
	Damping material separated or cracked			X
	Rubber bumpers in place			X
Chest Displacement Assembly	Bent shaft			X
	Slider arm riding in track			X
Transducer Leads	Torn cables			X
Accelerometer Mountings	Head mounting secure			X
	Chest mounting secure			X
Knees	Skin condition			X
	Insert (do not remove)			X
	Casting			X
Limbs	Normal movement and adjustment			X
Knee Sliders	Wires intact			X
	Rubber returned to "at rest" position			X
Pelvis	Broken			X
Other				X

Describe the repair on repair or replacement of parts:

---



---



---

Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 6/14/12

ATD Serial No.: 141

Test I.D.: N/A



Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	°C	20.6 to 22.2	21.17	Pass
Laboratory Relative Humidity	%	10 to 70	30.5	Pass
A - Total sitting height	mm	774.7 to 800.1	785	Pass
B - Shoulder pivot height	mm	431.8 to 457.2	448	Pass
C - H point height	mm	81.3 to 86.3	84	Pass
D - H point location from backline	mm	144.8 to 149.8	147	Pass
E - Shoulder pivot from backline	mm	68.6 to 83.8	78	Pass
F - Thigh clearance	mm	119.4 to 134.6	127	Pass
G - Back of elbow to wrist pivot	mm	243.9 to 259.1	250	Pass
H - Head back to backline	mm	40.7 to 45.7	44	Pass
I - Shoulder to elbow length	mm	276.8 to 297.2	285	Pass
J - Elbow rest height	mm	182.8 to 203.2	199	Pass
K - Buttock to knee length	mm	520.7 to 546.1	530	Pass
L - Popliteal length	mm	355.6 to 376.0	372	Pass
M - Knee pivot height	mm	393.7 to 419.1	401	Pass
N - Buttock popliteal length	mm	414.0 to 439.4	420	Pass
O - Chest depth without jacket	mm	175.3 to 190.5	186	Pass
P - Foot length	mm	218.5 to 233.7	221	Pass
R - Buttock to Knee Pivot Length	mm	457.2 to 482.6	475	Pass
S - Head Breadth	mm	137.1 to 147.3	144	Pass
T - Head Depth	mm	177.8 to 188.0	180	Pass
U - Hip Breadth	mm	299.7 to 314.9	302	Pass
V - Shoulder breadth	mm	350.5 to 365.7	359	Pass
W - Foot breadth	mm	78.8 to 94.0	90	Pass
X - Head circumference	mm	528.3 to 548.7	541	Pass
Y - Chest circumference (with chest jacket)	mm	850.8 to 881.3	861	Pass
Z - Waist circumference	mm	759.5 to 789.9	766	Pass
AA - Location for chest circumference	mm	299.7 to 309.9	300	Pass
BB - Location for waist circumference	mm	160.1 to 170.2	164	Pass
Overall Test Results				Pass

Test Program: Hybrid III 5th Percentile Female Head Drop Test

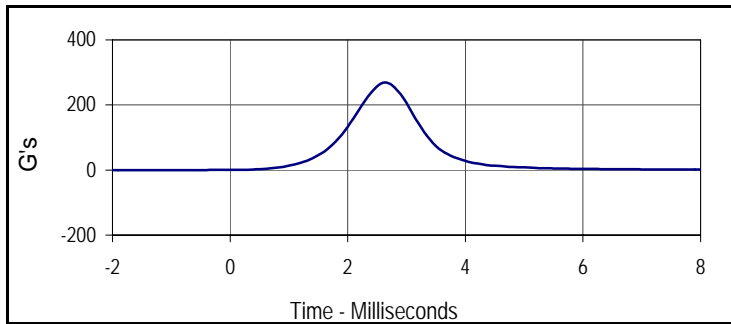
Test Date: 6/14/12

ATD Serial No.: 141

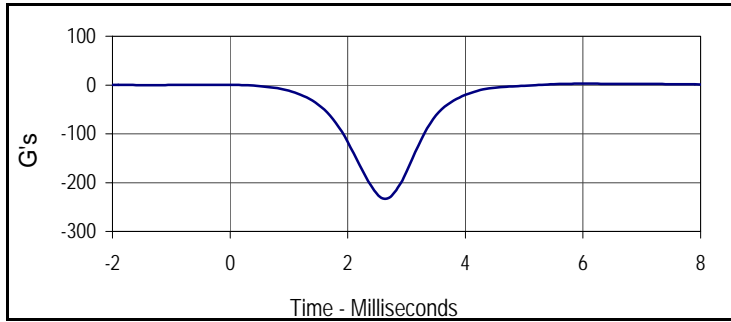
Test I.D.: F141HD043



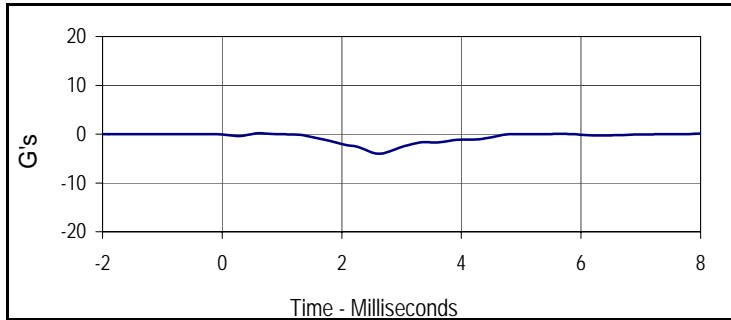
Tested Parameter	Units	Specification	Result	Pass/Fail
Head Assembly Soak Time	Minutes	≥240	250	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.8	Pass
Peak Resultant Acceleration	G's	250.0 to 300.0	267.7	Pass
Peak Lateral Acceleration	G's	≤15.0	4.0	Pass
Oscillations After Main Pulse	%	<10% of peak Res. Acceleration	1.4	Pass
Is Acceleration Unimodal?	Yes/No	Yes	Yes	Pass
<b>Overall Test Results</b>				<b>Pass</b>



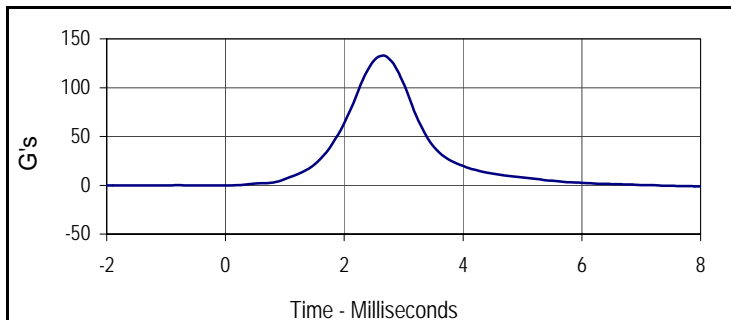
Curve Description			
Head Resultant			
Plot No.	Type	SAE Class	Units
001	RES	1000	G's
Max	Time	Min	Time
267.7	2.6	0.0	-2.0



Curve Description			
Head X			
Plot No.	Type	SAE Class	Units
002	FIL	1000	G's
Max	Time	Min	Time
2.8	6.0	-232.7	2.6



Curve Description			
Head Y			
Plot No.	Type	SAE Class	Units
003	FIL	1000	G's
Max	Time	Min	Time
0.2	0.6	-4.0	2.6



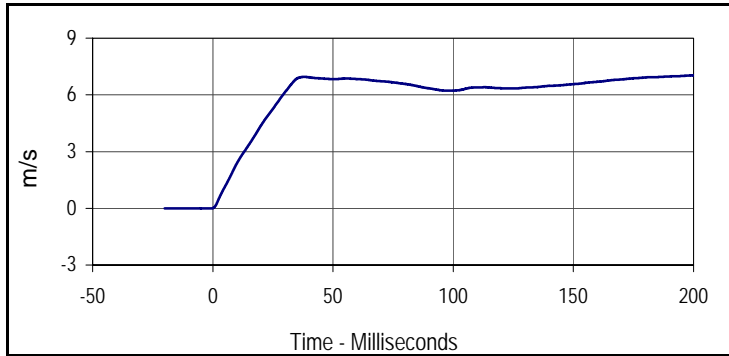
Curve Description			
Head Z			
Plot No.	Type	SAE Class	Units
004	FIL	1000	G's
Max	Time	Min	Time
132.4	2.6	-0.1	-0.1

Test Program: Hybrid III 5th Percentile Female Neck Flexion Test  
 ATD Serial No.: 141

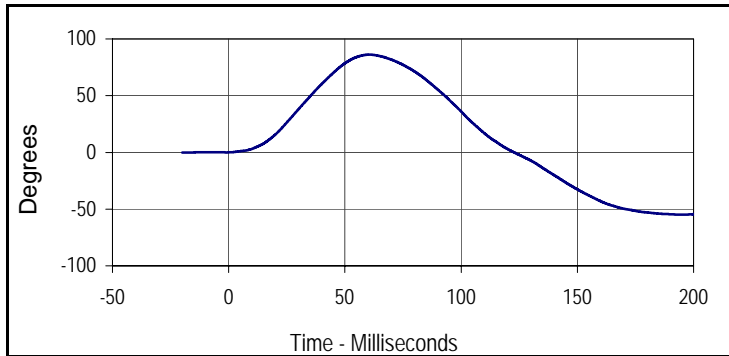
Test Date: 6/14/12  
 Test I.D.: F141NF043



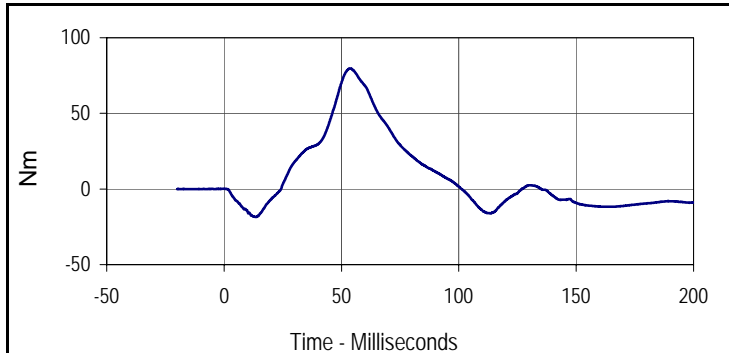
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	275	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	20.8	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	30.7	Pass	
Pendulum Velocity	m/s	6.89 to 7.13	7.00	Pass	
Pendulum Deceleration	10 Msec.	m/s	2.1 to 2.5	2.4	Pass
	20 Msec.	m/s	4.0 to 5.0	4.4	Pass
	30 Msec.	m/s	5.8 to 7.0	6.1	Pass
"D" Plane Rotation	Max	Degrees	77.0 to 91.0	86.2	Pass
Peak Moment in Rotation	Max	Nm	69.0 to 83.0	79.6	Pass
Positive Moment Decay, Time To 10 Nm	Msec.	80.0 to 100.0	90.6	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
7.0	200.0	0.0	-0.8



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
86.2	60.5	-54.9	194.7



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
79.6	53.7	-18.5	13.3

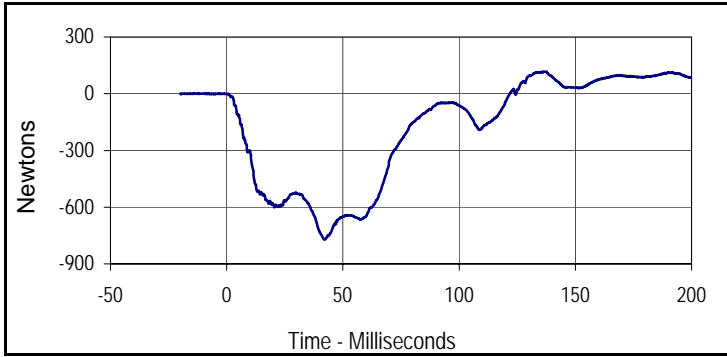
Test Program: Hybrid III 5th Percentile Female Neck Flexion Test

Test Date: 6/14/12

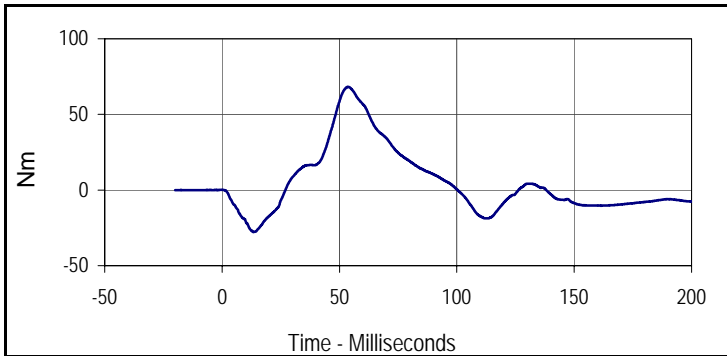


ATD Serial No.: 141

Test I.D.: F141NF043



Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
117.5	136.5	-771.6	41.9



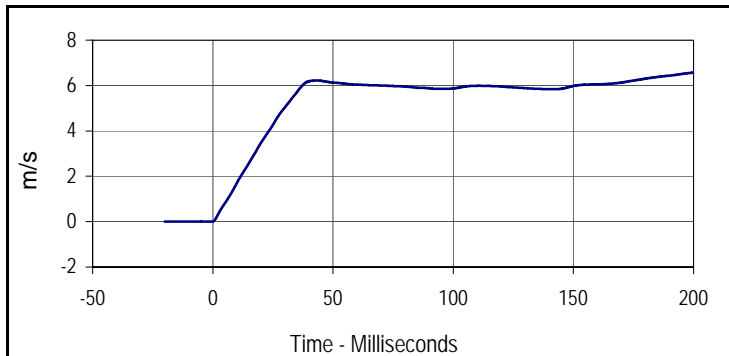
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
68.2	53.7	-27.7	13.4

Test Program: Hybrid III 5th Percentile Female Neck Extension Test  
 ATD Serial No.: 141

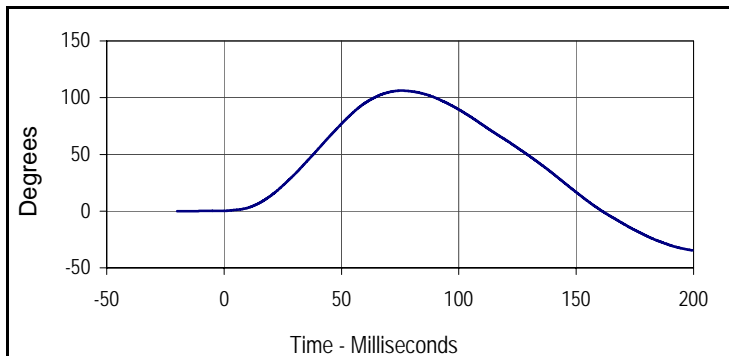
Test Date: 6/14/12  
 Test I.D.: F141NE043



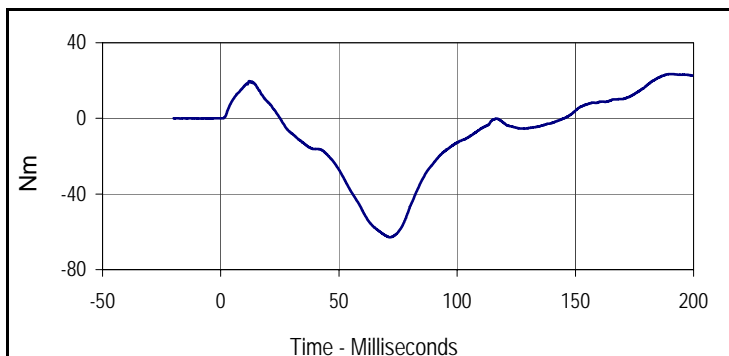
Tested Parameter	Units	Specification	Result	Pass/Fail	
Neck Assembly Soak Time	Minutes	≥240	300	Pass	
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass	
	Min		20.7	Pass	
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass	
	Min		29.0	Pass	
Laboratory Temperature During Test	°C	20.6 to 22.2	21.2	Pass	
Laboratory Humidity During Test	%	10.0 to 70.0	30.2	Pass	
Pendulum Velocity	m/s	5.95 to 6.19	6.11	Pass	
Pendulum Deceleration	10 Msec.	m/s	1.5 to 1.9	1.7	Pass
	20 Msec.	m/s	3.1 to 3.9	3.5	Pass
	30 Msec.	m/s	4.6 to 5.6	5.0	Pass
"D" Plane Rotation	Max	Degrees	99.0 to 114.0	106.2	Pass
Peak Moment in Rotation	Max	Nm	-53.0 to -65.0	-62.9	Pass
Positive Moment Decay, Time To -10 Nm	Msec.	94.0 to 114.0	104.8	Pass	
<b>Overall Test Results</b>				<b>Pass</b>	



Curve Description			
Pendulum Velocity			
Plot No.	Type	SAE Class	Units
001	FIL	180	m/s
Max	Time	Min	Time
6.6	200.0	0.0	-0.7



Curve Description			
"D" Plane Rotation			
Plot No.	Type	SAE Class	Units
002	FIL	60	Degrees
Max	Time	Min	Time
106.2	75.6	-34.6	199.4



Curve Description			
Moment About Occipital Condyle			
Plot No.	Type	SAE Class	Units
003	FIL	600	Nm
Max	Time	Min	Time
23.5	190.4	-62.9	71.6

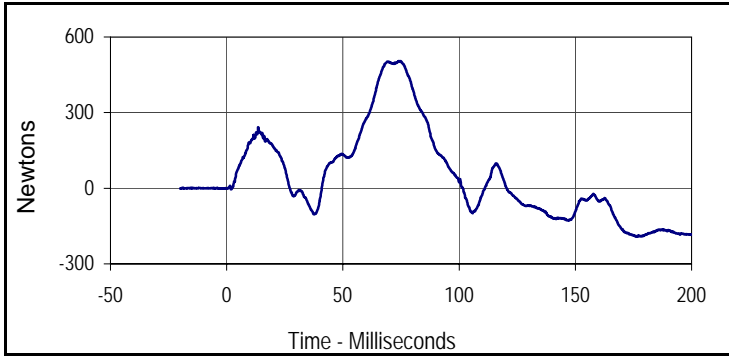
Test Program: Hybrid III 5th Percentile Female Neck Extension Test

Test Date: 6/14/12

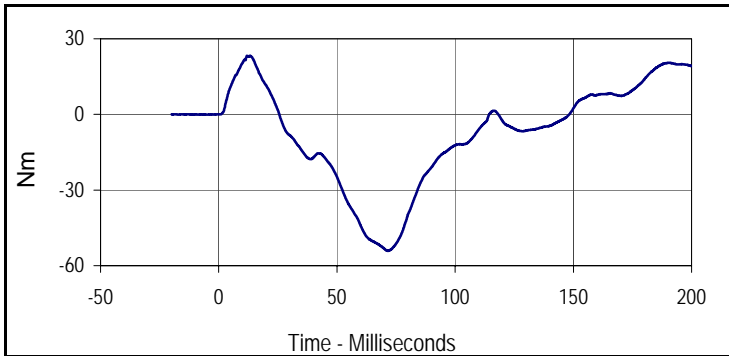


ATD Serial No.: 141

Test I.D.: F141NE043



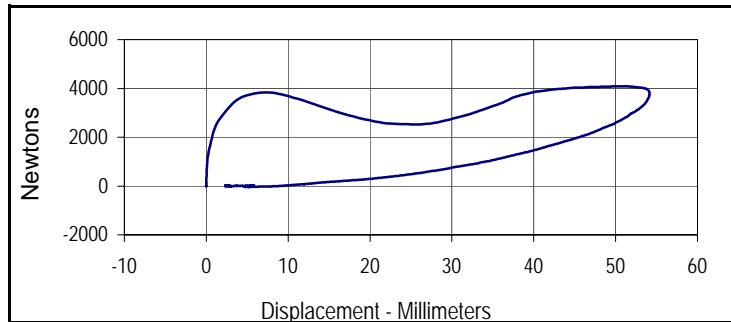
Curve Description			
Upper Neck Force X			
Plot No.	Type	SAE Class	Units
004	FIL	1000	Newtons
Max	Time	Min	Time
505.0	74.1	-192.1	176.0



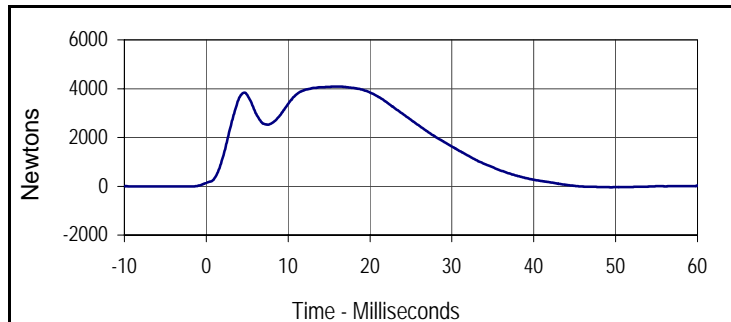
Curve Description			
Neck Moment Y			
Plot No.	Type	SAE Class	Units
005	FIL	600	Nm
Max	Time	Min	Time
23.3	13.2	-54.1	71.6



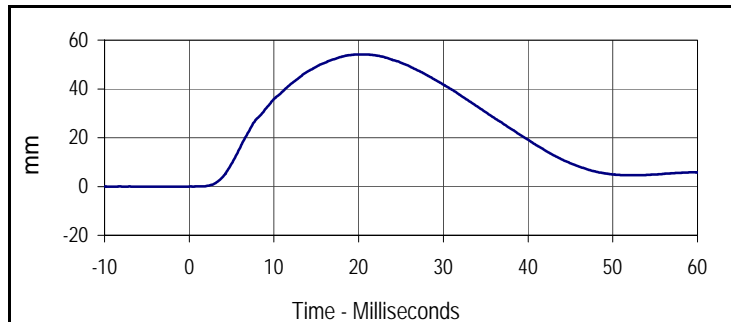
Tested Parameter	Units	Specification	Result	Pass/Fail
Dummy Soak Time	Minutes	≥240	330	Pass
Temperature During Soak	Max	20.6 to 22.2	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	20.6 to 22.2	21.5	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	29.9	Pass
Probe Velocity	m/s	6.59 to 6.83	6.75	Pass
Peak Chest Deflection	mm	50.0 to 58.0	54.1	Pass
Peak Force Between 50 and 58 MM	Newtons	3900 to 4400	4089	Pass
Peak Force Between 18 and 50 MM	Newtons	≤4600	4091	Pass
Internal Hysteresis	%	69 to 85	72.5	Pass
Overall Test Results				Pass



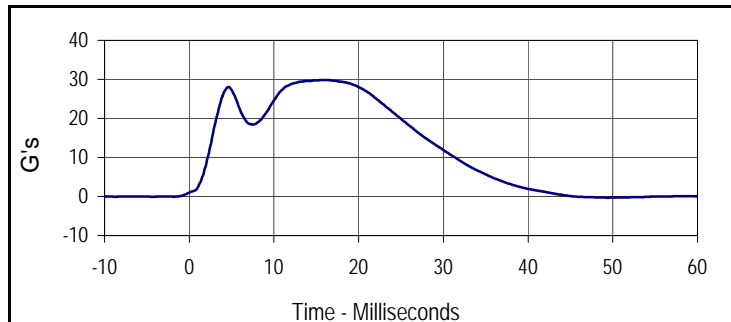
Curve Description			
Probe Force vs. Chest Deflection			
Plot No.	Type	SAE Class	Hysteresis
001	FIL	180	72.5
Peak Probe Force		Peak Chest Deflection	
4091.3		54.1	



Curve Description			
Probe Force			
Plot No.	Type	SAE Class	Units
002	FIL	180	Newtons
Max	Time	Min	Time
4091.3	15.7	-39.7	49.4



Curve Description			
Chest Deflection			
Plot No.	Type	SAE Class	Units
003	FIL	600	mm
Max	Time	Min	Time
54.1	20.4	0.0	-3.1



Curve Description			
Impactor Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	180	G's
Max	Time	Min	Time
29.9	15.7	-0.3	49.4

Test Program: Hybrid III 5th Percentile Female Knee Impact Test

Test Date: 6/14/12

ATD Serial No.: 141

Test I.D.: F141LK043, F141RK043

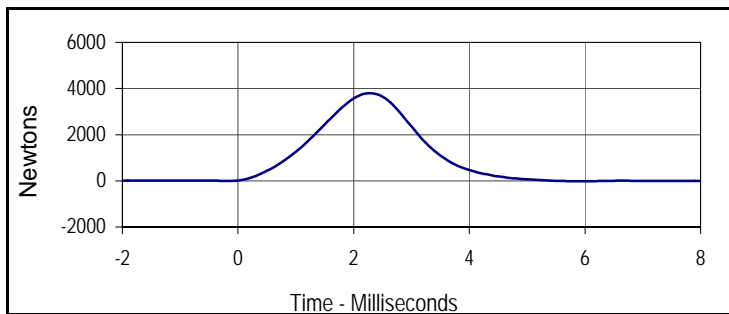


**Left Knee**

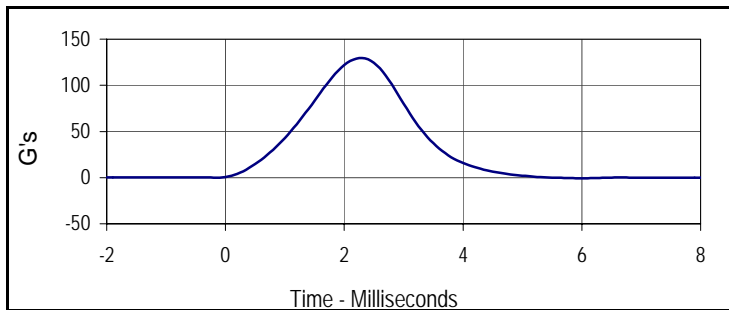
Tested Parameter	Units	Specification	Result	Pass/Fail
Knee Assembly Soak Time	Minutes	≥240	360	Pass
Temperature During Soak	Max	18.9 to 25.6	21.7	Pass
	Min		20.7	Pass
Humidity During Soak	Max	10.0 to 70.0	31.0	Pass
	Min		29.0	Pass
Laboratory Temperature During Test	°C	18.9 to 25.6	21.4	Pass
Laboratory Humidity During Test	%	10.0 to 70.0	30.3	Pass
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.09	Pass
Peak Probe Force	Newtons	3450 to 4060	3799	Pass
<b>Overall Test Results</b>				<b>Pass</b>

**Right Knee**

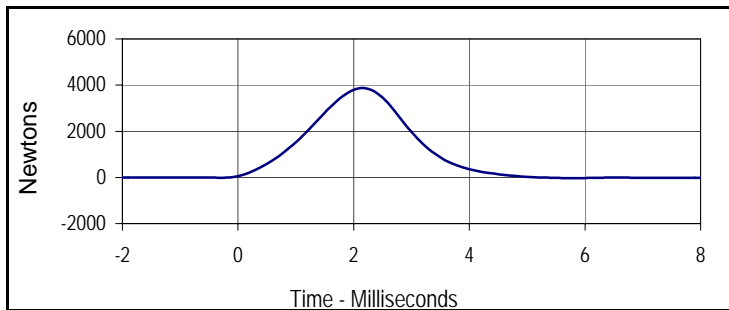
Pendulum Velocity at T=0	m/sec	2.07 to 2.13	2.11	Pass
Peak Probe Force	Newtons	3450 to 4060	3860	Pass
<b>Overall Test Results</b>				<b>Pass</b>



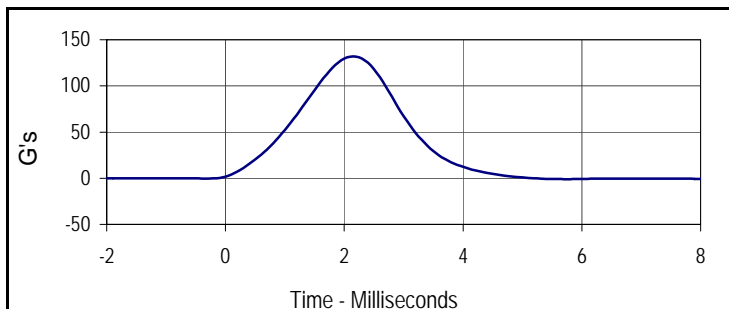
Curve Description			
Left Knee Probe Force			
Plot No.	Type	SAE Class	Units
001	FIL	600	Newtons
Max	Time	Min	Time
3799.4	2.3	-22.5	6.0



Curve Description			
Left Knee Acceleration			
Plot No.	Type	SAE Class	Units
002	FIL	600	G's
Max	Time	Min	Time
129.6	2.3	-0.8	6.0



Curve Description			
Right Knee Probe Force			
Plot No.	Type	SAE Class	Units
003	FIL	600	Newtons
Max	Time	Min	Time
3860.3	2.2	-29.3	5.7



Curve Description			
Right Knee Acceleration			
Plot No.	Type	SAE Class	Units
004	FIL	600	G's
Max	Time	Min	Time
131.7	2.2	-1.0	5.7

Test Program: Hybrid III 5th Percentile Female Torso Flexion Test

Test Date: 6/14/12

ATD Serial No.: 141

Test I.D.: F141TF043



**Left Hip Joint-Femur Results**

Tested Parameter		Units	Specification	Result	Pass/Fail
Dummy Soak Time		Minutes	≥240	390	Pass
Temperature During Soak	Max	°C	18.9 to 25.6	21.7	Pass
	Min	°C		20.7	Pass
Humidity During Soak	Max	%	10.0 to 70.0	31.0	Pass
	Min	%		29.0	Pass
Laboratory Temperature During Test		°C	18.9 to 25.6	21.2	Pass
Laboratory Humidity During Test		%	10.0 to 70.0	29.7	Pass
Initial Reference Plane Angle		Degrees	≤ 20	1.7	Pass
Peak Force at 45° +/-0.5°		Newtons	320.0 to 390.0	347.8	Pass
Torso Rotation Rate		deg/sec	0.5 to 1.5	1.1	Pass
Final Reference Plane Angle		Degrees	+/-8	-0.2	Pass
<b>Overall Test Results</b>					<b>Pass</b>