

**REPORT NUMBER: SNCAP-KAR-11-061**

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

**NISSAN MOTOR CO., LTD.  
2011 NISSAN LEAF SL 5-DOOR HATCHBACK**

**NHTSA No: MB5219**

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




**JUNE 17, 2011**


**FINAL REPORT**

**PREPARED FOR:  
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**

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Approval Date: June 22, 2011

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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><br>SNCAP-KAR-11-061   | <b>2. Government Accession No.</b> | <b>3. Recipient's Catalog No.</b>                                       |
| <b>4. Title and Subtitle</b><br>Final Report of New Car Assessment Program<br>Side Impact Testing of a 2011 Nissan Leaf SL 5-Door Hatchback<br>NHTSA No. MB5219  |                                    | <b>5. Report Date</b><br>June 22, 2011                                  |
|  |                                    | <b>6. Performing Organization Code</b><br>KAR                           |
| <b>7. Authors</b><br>Mr. Kelsey A. Chiu, Engineering Department Supervisor, KARCO<br>Mr. Frank Richardson, Program Manager, KARCO  |                                    | <b>8. Performing Organization Report No.</b><br>TR-P30003-26-NC         |
|  |                                    | <b>10. Work Unit No.</b>  |
| <b>9. Performing Organization Name and Address</b><br>KARCO Engineering, LLC.<br>9270 Holly Rd.<br>Adelanto, CA, 92301   |                                    | <b>11. Contract or Grant No.</b><br>DTNH22-09-D-00122                   |
|  |                                    | <b>13. Type of Report and Period Covered</b><br>Final Report, June 2011 |
| <b>12. Sponsoring Agency Name and Address</b><br>U. S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Crashworthiness Standards<br>1200 New Jersey Ave., SE, Room W43-410<br>Washington, D.C. 20590 |                                    | <b>14. Sponsoring Agency Code</b><br>NVS-111                            |
|  |                                    | <b>15. Supplementary Notes</b>  |

### 16. Abstract

A 55/28 km/h 90 deg. Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2011 Nissan Leaf SL 5-door hatchback in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at KARCO Engineering, LLC in Adelanto, CA, on June 17, 2011.

The impact velocity of the Moving Deformable Barrier was 61.87 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 31.7 deg. C. The target vehicle's maximum post-test static crush was 228 mm located at level 3. The test vehicle's occupant performance data is as follows:

| Measurement Description                   | Driver ATD (ES-2re) |           |        |
|---|---------------------|-----------|--------|
|   | Units               | Threshold | Result |
| Head Injury Criteria (HIC <sub>36</sub> ) |                     | 1000      | 37.5   |
| Maximum Thorax Rib Deflection             | mm                  | 44        | 27.7   |
| Total Abdominal Force                     | N                   | 2500      | 654    |
| Pubic Symphysis Force                     | N                   | 6000      | 1570   |

| Measurement Description                                 | Passenger ATD (SID-IIs) |           |        |
|---|-------------------------|-----------|--------|
|   | Units                   | Threshold | Result |
| Head Injury Criteria (HIC <sub>36</sub> )               |                         | 1000      | 275.4  |
| Lower Spine Resultant Acceleration                      | g                       | 82        | 57     |
| Total Pelvic Force (Sum of Acetubular and Iliac Forces) | N                       | 5525      | 3083   |

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

|  |   |  |                  |
|--|---|--|------------------|
| <b>17. Key Words</b><br>New Car Assessment Program (NCAP)<br>Side Impact<br>Moving Deformable Barrier (MDB)<br>ES-2re<br>SID-IIs |   | <b>18. Distribution Statement</b><br>Copies of this report are available from:<br>National Highway Traffic Safety Admin.<br>Technical Reference Division<br>1200 New Jersey Ave., SE<br>Room W43-410<br>Washington, DC 20590 |                  |
| <b>19. Security Classification of this report</b><br>UNCLASSIFIED  | <b>20. Security Classification of this page</b><br>UNCLASSIFIED | <b>21. No. of Pages</b><br>156   | <b>22. Price</b> |

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**SECTION 1**  
**PURPOSE AND SUMMARY OF TEST**

**PURPOSE**

This moving deformable barrier side impact test is part of the MY 2011 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-09-D-00122. The purpose of this test is to generate comparative side impact performance in a 2011 Nissan Leaf SL 5-door hatchback. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated January 2010.

**SUMMARY**

A 2011 Nissan Leaf SL 5-door hatchback was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.87 km/h (38.44 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by KARCO Engineering, LLC. in Adelanto, California, on June 17, 2011. Pre- and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in Appendix A of this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated January 2010. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)

Head Accelerometers

Thorax Rib 1 to Rib 3 Potentiometers

Abdomen Forward, Middle, and Rear Load Cells

Lower Spine Accelerometers

Pubic Load Cell

PASSENGER ATD (SID-IIs)

Head Accelerometers

Thorax Upper, Middle and Lower Rib Potentiometers

Abdomen Upper and Lower Rib Potentiometers  
 Lower Spine Accelerometers  
 Iliac Load Cell  
 Acetabulum Load Cell

Dummy injury values were recorded as follows:

| Measurement Description                   | Units | Driver ATD (ES-2re) |        |
|---|-------|---------------------|--------|
|   |       | Threshold           | Result |
| Head Injury Criteria (HIC <sub>36</sub> ) |       | 1000                | 37.5   |
| Maximum Thorax Rib Deflection             | mm    | 44                  | 27.7   |
| Combined Abdominal Force                  | N     | 2500                | 654    |
| Pubic Symphysis Force                     | N     | 6000                | 1570   |

| Measurement Description                                 | Units | Passenger ATD (SID-IIs) |        |
|---|-------|-------------------------|--------|
|   |       | Threshold               | Result |
| Head Injury Criteria (HIC <sub>36</sub> )               |       | 1000                    | 275.4  |
| Lower Spine (T12) Resultant Acceleration                | g     | 82                      | 57     |
| Total Pelvic Force (sum of acetabular and iliac forces) | N     | 5525                    | 3083   |

Supplemental restraint information is given below:

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

### GENERAL COMMENTS

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

Photographs taken with 'Pre-Test' labels include the date 6/16/11, which was the date the photos were taken.

## SECTION 2

### OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11

### 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          | 29.573           |
| Pressure           | Tire Pressures      | lbf/in <sup>2</sup> | kPa         | 7.0              |
| Volume             | Liquid              | gal                 | liter       | 3.785            |
| Temperature        | General Use         | °F                  | °C          | $=(tf - 32)/1.8$ |
| Force              | Dynamic Forces      | lbf                 | N           | 4.448            |
| Moment             | Torque              | lbf/ft              | Nm          | 1.355            |

**DATA SHEET NO. 1**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback      NHTSA No. MB5219  
 Test Program: MDB Side Impact Test      Test Date: 06/17/11

**TEST VEHICLE INFORMATION AND OPTIONS**

|                            |                     |
|----------------------------|---------------------|
| NHTSA Number               | MB5219              |
| Model Year                 | 2011                |
| Make                       | Nissan              |
| Model                      | Leaf SL             |
| Body Style                 | 5-Door Hatchback    |
| VIN                        | JN1AZ0CP9BT002501   |
| Body Color                 | Super Black         |
| Delivery Date              | 6/3/2011            |
| Odometer Reading (km / mi) | 13 / 8              |
| Dealer                     | Puente Hills Nissan |
| Transmission               | n/a                 |
| Final Drive                | Front               |
| Type / No. of Cylinders    | Electric            |
| Engine Displacement (L)    | n/a                 |
| Engine Placement           | Transverse          |
| Roof Rack                  | No                  |
| Sunroof / T-Top            | No                  |
| Tinted Glass               | No                  |
| Traction Control           | Yes                 |
| Power Brakes               | Yes                 |
| Front Disc                 | Yes                 |
| Rear Disc                  | Yes                 |

|                                |     |
|--------------------------------|-----|
| Anti-Lock Brakes               | Yes |
| All Wheel Drive                | No  |
| Power Steering                 | Yes |
| Driver Front Airbag            | Yes |
| Driver Curtain Airbag          | Yes |
| Driver Head/Torso Airbag       | No  |
| Driver Torso Airbag            | No  |
| Driver Torso/Pelvis Airbag     | Yes |
| Driver Pelvis Airbag           | No  |
| Driver Knee Airbag             | No  |
| Rear Pass. Curtain Airbag      | Yes |
| Rear Pass. Head/Torso Airbag   | No  |
| Rear Pass. Torso Airbag        | No  |
| Rear Pass. Torso/Pelvis Airbag | No  |
| Rear Pass. Pelvis Airbag       | No  |
| Pretensioners                  | Yes |
| Load Limiters                  | Yes |
| Automatic Door Locks           | Yes |
| Bucket Seats                   | Yes |
| Tilt Steering                  | Yes |
| Other                          |     |
| Other                          |     |

Does Owner's Manual provide instructions to turn off automatic door locks? No

**DATA FROM CERTIFICATION LABEL**

|                     |                        |
|---------------------|------------------------|
| Manufactured By     | Nissan Motor Co., LTD. |
| Date of Manufacture | Apr-11                 |

|                 |      |
|-----------------|------|
| GVWR (kg)       | 1960 |
| GAWR Front (kg) | 999  |
| GAWR Rear (kg)  | 966  |

**VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION**

| Measured Parameter          | Front | Rear | Third | Total |     |
|-----------------------------|-------|------|-------|-------|-----|
| Designated Seating Capacity | 2     | 3    |       | 5     |     |
| Capacity Weight (VCW) (kg)  |       |      |       | 390.0 | A   |
| DSC x 68.04 (kg)            |       |      |       | 340.2 | B   |
| Cargo Weight (RCLW) (kg)    |       |      |       | 49.8  | A-B |

**VEHICLE SEAT TYPE**

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

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

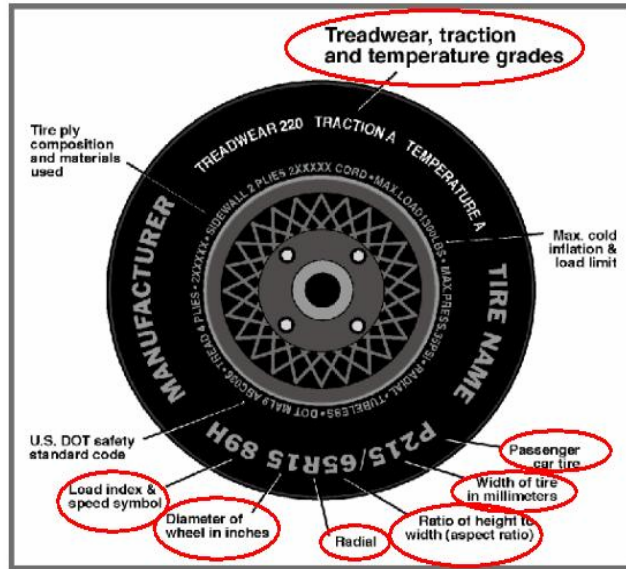
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**VEHICLE TIRE INFORMATION**

| Measured Parameter       | Front                         | Rear                          |
|--------------------------|-------------------------------|-------------------------------|
| Max. Tire Pressure (kpa) | 300                           | 300                           |
| Cold Pressure (kpa)      | 250                           | 250                           |
| Recommended Tire Size    | P205/55R16 89H                | P205/55R16 89H                |
| Tire Size on Vehicle     | P205/55R16 89H                | P205/55R16 89H                |
| Tire Model               | Ecopia                        | Ecopia                        |
| Tire Manufacturer        | Bridgestone                   | Bridgestone                   |
| Treadwear                | 400                           | 400                           |
| Traction                 | A                             | A                             |
| Temperature Grades       | A                             | A                             |
| Tire Plies Sidewall      | 1 Polyester                   | 1 Polyester                   |
| Tire Plies Body          | 1 Polyester, 2 Steel, 1 Nylon | 1 Polyester, 2 Steel, 1 Nylon |
| Load Index/Speed Symbol  | 89H                           | 89H                           |
| Tire Material            | Polyester, Steel, Nylon       | Polyester, Steel, Nylon       |
| DOT Safety Code Right    | EL 8K JBC 1011                | EL 8K JBC 0811                |
| DOT Safety Code Left     | EL 8K JBC 1011                | EL 8K JBC 0811                |

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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback NHTSA No. MB5219  
 Test Program: MDB Side Impact Test Test Date: 06/17/11

**TEST VEHICLE WEIGHTS**

|       | Units | As Delivered (UVW) |       |        | As Tested (ATW) |       |        | Fully Loaded |       |        |
|-------|-------|--------------------|-------|--------|-----------------|-------|--------|--------------|-------|--------|
|       |       | Front              | Rear  | Total  | Front           | Rear  | Total  | Front        | Rear  | Total  |
| Left  | kg    | 435.5              | 339.0 |        | 482.5           | 401.0 |        | 472.5        | 412.5 |        |
| Right | kg    | 422.0              | 325.5 |        | 438.5           | 366.5 |        | 429.5        | 380.5 |        |
| Ratio | %     | 56.3%              | 43.7% | 100.0% | 54.5%           | 45.5% | 100.0% | 53.2%        | 46.8% | 100.0% |
| Total | kg    | 857.5              | 664.5 | 1522.0 | 921.0           | 767.5 | 1688.5 | 902.0        | 793.0 | 1695.0 |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                   | Units | Value  |       |
|--------------------------------------|-------|--------|-------|
| Total Delivered Weight (UVW)         | kg    | 1522.0 | A     |
| Actual Weight of 2 P572 ATDs Used    | kg    | 125.0  | B     |
| Rated Cargo/Luggage Wt (RCLW)        | kg    | 49.8   | C     |
| Calculated Vehicle Target Wt (TVTWT) | kg    | 1696.8 | A+B+C |

**TEST VEHICLE ATTITUDES**

| Condition    | Units | LF  | RF  | LR  | RR  | CG (Aft of Front Axle) |
|--------------|-------|-----|-----|-----|-----|------------------------|
| Fully Loaded | mm    | 703 | 712 | 693 | 697 | 1263                   |
| As Tested    | mm    | 700 | 700 | 685 | 697 | 1227                   |

**GENERAL TEST VEHICLE DATA**

| Measurement Description                 | Units | Value |
|---|-------|-------|
| Total Vehicle Wheelbase                 | mm    | 2699  |
| Total Vehicle Length at Left Side       | mm    | 3195  |
| Total Vehicle Length at Centerline      | mm    | 4333  |
| Total Vehicle Length at Right Side      | mm    | 3192  |
| Weight of Ballast in Cargo Area         | kg    | 53.1  |
| Weight of Vehicle Components Removed    | kg    | 37.0  |
| Amount of Stoddard Solvent in Fuel Tank | L     |       |

**Vehicle components removed to make Target Vehicle Test Weight:**

Non-struck side door panels (5.5 kg), right front passenger window (3.5), right rear passenger window (3.5 kg), passenger side door mirror (1.0 kg), cargo area trim panels (7.5 kg), tail lights (3.5 kg), rear bumper beam (11.5 kg), non-struck side door speakers (1.0 kg)

**TEST VEHICLE VERTICAL IMPACT LINE DATA**

| Measurement Description               | Units | Value |
|---------------------------------------|-------|-------|
| Target Impact Point Aft of Front Axle | mm    | 411   |
| Actual Impact Point Aft of Front Axle | mm    | 421   |

## DATA SHEET NO. 2

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

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

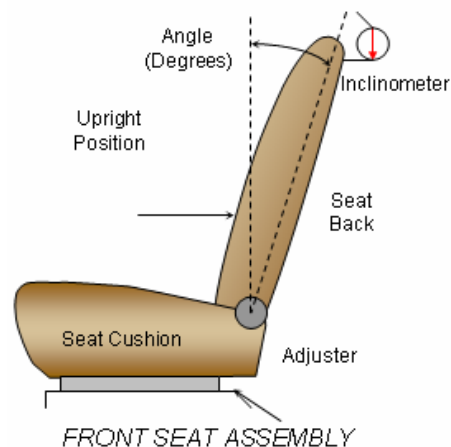
NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11

#### NOMINAL DESIGN RIDING POSITION

The driver's seat back is set to the manufacturer's designated seat back angle. The passenger's seat back is fixed. A digital inclinometer is used to measure the driver's seat back angle at the seat back and the passenger's seat back angle at the headrest post.



#### SEAT BACK ANGLES

|                          | Degrees (°) |
|--------------------------|-------------|
| Driver w/Seated Dummy    | 10.4        |
| Passenger w/Seated Dummy | 11.6        |

#### SEAT FORE/AFT POSITION

Seat travel is measured from the forward most possible position to the rear most possible position with the seat set at mid angle and lowest height. The driver's seat is set to the middle of the fore-aft travel. The passenger's seat is fixed.

#### SEAT FORE/AFT POSITIONS

| Seating Position | Total Fore/Aft Travel | Placed in Position |
|------------------|-----------------------|--------------------|
| Driver Seat      | 240 mm                | 120 mm             |
| Rear Seat        | Fixed                 | Fixed              |

#### SEAT BELT UPPER ANCHORAGE

The driver's seat belt upper anchorage is positioned to the manufacturer's design position for a 50<sup>th</sup> percentile adult male ATD. The passenger's seat belt upper anchorage is fixed. Position zero (0) is the uppermost position.

#### SEAT BELT UPPER ANCHORAGES

| Seating Position | Total No. of Positions | Placed in Position |
|------------------|------------------------|--------------------|
| Driver Seat      | 4                      | 0                  |
| Rear Seat        | Fixed                  | Fixed              |

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

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

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

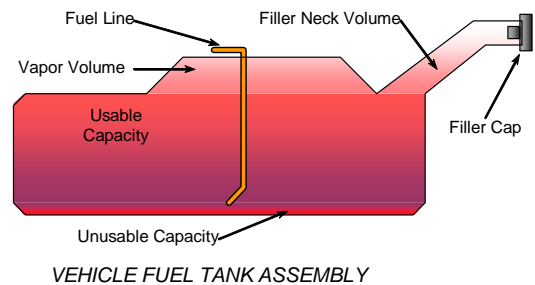
Test Date: 06/17/11

**FUEL TANK CAPACITY**

| Description                            | Liters |
|--|--------|
| Usable Capacity of "Standard Tank"     |        |
| Usable Capacity of "Optional Tank"     |        |
| Usable Capacity Used for FMVSS 301     |        |
| Actual Amount of Stoddard Solvent Used |        |

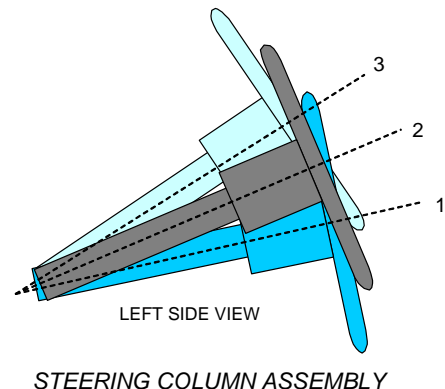
**FUEL PUMP**

The test vehicle is electric and is not equipped with any liquid fuel system, including a fuel pump or tank. There is no fuel filler door.



**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. The telescoping steering wheel travel is fixed.



**STEERING COLUMN POSITIONING**

|                                   | Degrees | Fore-Aft Position (mm) |
|-----------------------------------|---------|------------------------|
| Lowermost Position, No. 1         | 23.5    |                        |
| Geometric Center Position, No. 2  | 26.0    |                        |
| Uppermost Position, No. 3         | 28.5    |                        |
| Telescoping Steering Wheel Travel |         |                        |
| Test Position                     | 26.0    |                        |

**DATA SHEET NO. 3**

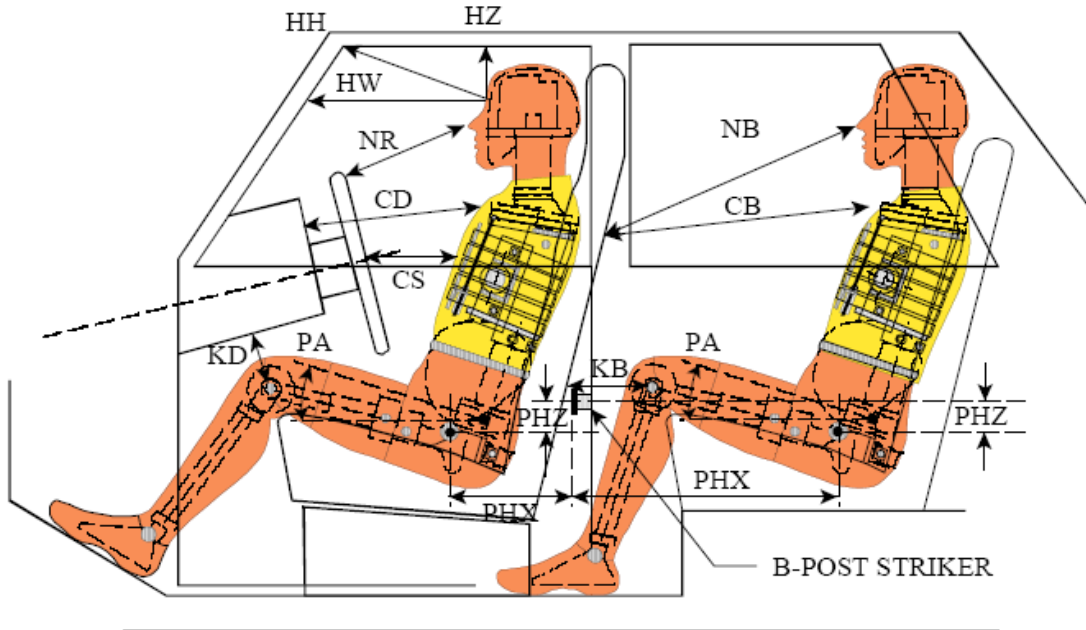
**DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**LEFT SIDE VIEW**

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

**DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION**

| Driver Code | Pass. Code | Description                  | Driver      |           | Passenger   |           |
|-------------|------------|------------------------------|-------------|-----------|-------------|-----------|
|             |            |                              | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| HH          |            | Head to Header               | 404         | 14.0      |             |           |
| HW          |            | Head to Windshield           | 730         | 0.0       |             |           |
| HZ          | HZ         | Head to Roof                 | 199         | 90.0      | 247         | 90.0      |
| NR          | NB         | Nose to Rim/Seat Back        | 446         | 21.1      | 608         | 15.3      |
| CD          | CB         | Chest to Dash/Seat Back      | 567         | 0.7       | 604         | 3.4       |
| CS          |            | Chest to Steering Wheel      | 354         | 19.0      |             |           |
| KDL         | KBL        | Left Knee to Dash/Seat Back  | 113         | 28.0      | 309         | 28.7      |
| KDR         | KBR        | Right Knee to Dash/Seat Back | 114         | 24.6      | 319         | 29.4      |
| PA          | PA         | Pelvic Angle                 |             | 16.4      |             | 20.0      |
| PHX         | PHX        | H-Point to Striker (x-axis)  | 280         |           | 310         |           |
| PHZ         | PHZ        | H-Point to Striker (z-axis)  | 155         |           | 284         |           |
| SA          | SA         | Seat Back Angle              |             | 10.4      |             | 12.3      |

## DATA SHEET NO. 4

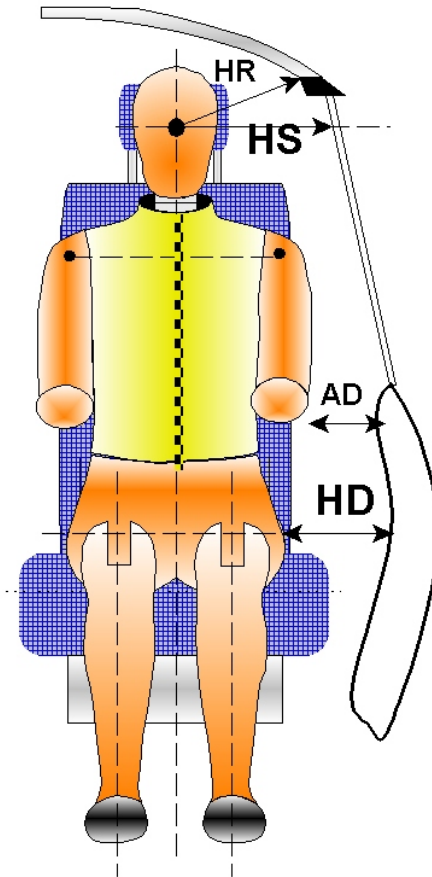
### DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



### DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

| Code | Measurement Description | Units | Driver | Passenger |
|------|-------------------------|-------|--------|-----------|
| HR   | Head to Side Header     | mm    | 219    | 267       |
| HS   | Head to Side Window     | mm    | 322    | 354       |
| AD   | Arm to Door             | mm    | 74     | 144       |
| HD   | H-Point to Door         | mm    | 156    | 184       |

**DATA SHEET NO. 5**

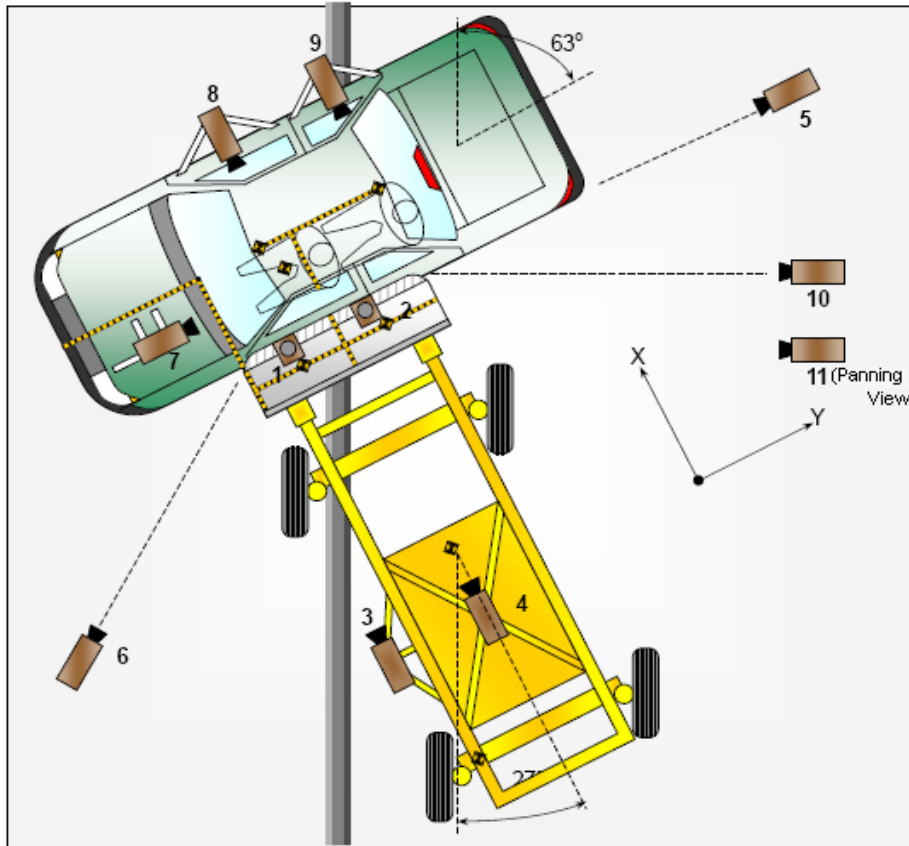
**CAMERA LOCATIONS AND DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**CAMERA LOCATIONS AND DATA**

| Camera No. | View                      | Coordinates (mm) |       |       | Angle (°) | Lens (mm) | Film Speed (fps) |
|------------|---------------------------|------------------|-------|-------|-----------|-----------|------------------|
|            |                           | X*               | Y*    | Z*    |           |           |                  |
| 1          | Overhead Overall          | 1220             | 2287  | -5486 | 90        | 14        | 1000             |
| 2          | Overhead Close-Up         | 609              | 2287  | -5102 | 90        | 35        | 1000             |
| 3          | Left Impact Point (MDB)   | -2134            | 0     | -1143 | 7.5       | 25        | 1000             |
| 4          | Side Overall (MDB)        | -3912            | 838   | -1829 | 11.9      | 12.5      | 1000             |
| 5          | Rear                      | -64              | 2485  | -1348 | 0         | 85        | 1000             |
| 6          | Left Front                | -2266            | -3564 | -1475 | 0         | 24        | 1000             |
| 7          | Driver Front (On-Board)   | 429              | -812  | 1225  | 6.2       | 35        | 1000             |
| 8          | Driver Side (On-Board)    | 1486             | 666   | 1114  | 10.5      | 14        | 1000             |
| 9          | Passenger Side (On-Board) | 1466             | 1549  | 1211  | 12.4      | 14        | 1000             |
| 10         | Real Time Overall         |                  |       |       |           | Zoom      | 30               |
| 11         | Real Time Inrun           |                  |       |       |           | Zoom      | 30               |

Reference: Impact Point Projected to Ground  
 +X = To Front of MDB, +Y = To Right of MDB, +Z = Down  
 \*All measurements accurate to ±6 mm

**DATA SHEET NO. 6**

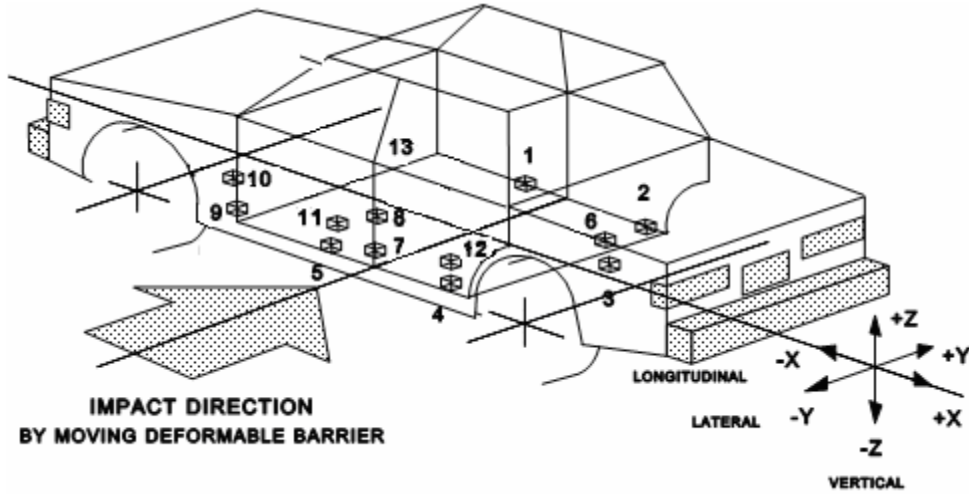
**VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

| Loc. No. | Sensor Description              | Coordinates (mm) |      |      |
|----------|---------------------------------|------------------|------|------|
|          |                                 | X                | Y    | Z    |
| 1        | Right Sill at Front Seat        | 2498             | 667  | -349 |
| 2        | Right Sill at Rear Seat         | 1604             | 685  | -351 |
| 3        | Rear Floorpan Above Axle        | 673              | 95   | -418 |
| 4        | Left Sill at Rear Door          | 1448             | -680 | -185 |
| 5        | Left Sill at Front Door         | 2253             | -655 | -180 |
| 6        | Right Rear Occupant Compartment | 1451             | 321  | -435 |
| 7        | B-Pillar Lower                  | 1785             | -709 | -547 |
| 8        | B-Pillar Mid                    | 1779             | -709 | -865 |
| 9        | A-Pillar Lower                  | 2871             | 787  | -432 |
| 10       | A-Pillar Mid                    | 2880             | -760 | -880 |
| 11       | Front Seat Track                | 2109             | -546 | -384 |
| 12       | Rear Seat Structure             |                  |      |      |
| 13       | Vehicle CG                      | 1579             | 0    | -427 |

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

**DATA SHEET NO. 7**

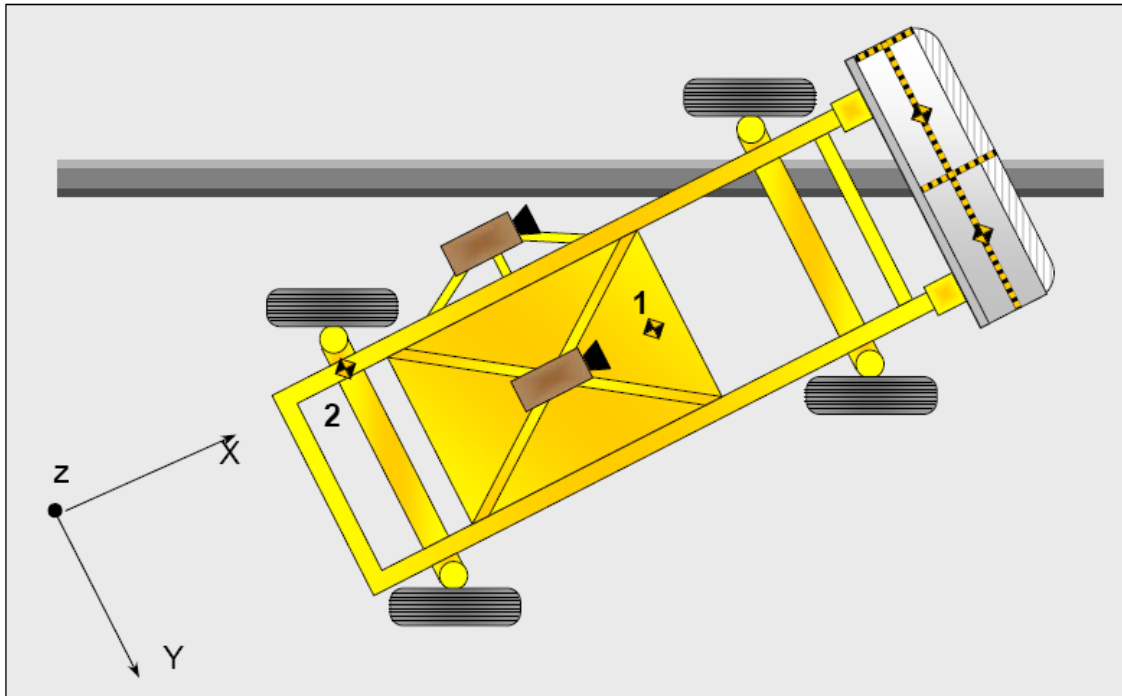
**MDB ACCELEROMETER LOCATIONS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**MDB ACCELEROMETER LOCATIONS**

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

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

**DATA SHEET NO. 8**

**TEST VEHICLE SUMMARY OF RESULTS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11

**MAXIMUM EXTERIOR CRUSH**

| Level | Description             | Units | Maximum Crush | Above Ground |
|-------|-------------------------|-------|---------------|--------------|
| 1     | Sill Top Height         | mm    | 61            | 268          |
| 2     | Occupant H-Point Height | mm    | 219           | 596          |
| 3     | Mid-Door Height         | mm    | 228           | 659          |
| 4     | Window Sill Height      | mm    | 166           | 956          |
| 5     | Window Top Height       | mm    | 15            | 1480         |
|       | Maximum Penetration     | mm    | 228           |              |

**INSTRUMENTATION**

|                                  |    |
|----------------------------------|----|
| Driver Dummy Channels            | 16 |
| Passenger Dummy Channels         | 16 |
| Airbag Timing Sensors            | 4  |
| Vehicle Structure Accelerometers | 21 |
| MDB Accelerometers               | 5  |
| Total No. of Contact Switches    | 8  |
| Total                            | 70 |

**CAMERA COVERAGE**

|                              |    |
|------------------------------|----|
| High-Speed Vehicle On-Board  | 3  |
| High-Speed Vehicle Off-Board | 4  |
| High-Speed MDB On-Board      | 2  |
| Real Time                    | 2  |
| Total                        | 11 |

**DATA SHEET NO. 9**

**MOVING DEFORMABLE BARRIER (MDB) SUMMARY OF RESULTS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback      NHTSA No. MB5219  
 Test Program: MDB Side Impact Test      Test Date: 06/17/11

**MDB SPECIFICATIONS**

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

**MDB WEIGHTS**

|        | Units | Front Axle | Rear Axle | Total |
|--------|-------|------------|-----------|-------|
| Left   | kg    | 402        | 298       |       |
| Right  | kg    | 377        | 292       |       |
| Ratio  | %     | 56.9%      | 43.1%     |       |
| Totals | kg    | 779        | 590       | 1368  |

**SPEED AND IMPACT DATA**

| Measured Parameter              | Units   | Requirement  | Value |
|---------------------------------|---------|--------------|-------|
| Trap No. 1 Velocity (Primary)   | km/h    | 61.1 to 62.7 | 61.87 |
| Trap No. 2 Velocity (Redundant) | km/h    | 61.1 to 62.7 | 61.81 |
| MDB CL to Target Vehicle CL     | degrees | 88.5-91.5    | 89.1  |

**MAXIMUM STATIC CRUSH OF HONEYCOMB FACE**

| Vertical Location |                  |             | From Centerline |           | Max. Crush (mm) |
|-------------------|------------------|-------------|-----------------|-----------|-----------------|
| Row               | Description      | Height (mm) | Distance (mm)   | Direction |                 |
| 1                 | Center of Bumper | 432         | 800             | Right     | 239             |
| 2                 | Top of Bumper    | 533         | 800             | Right     | 138             |
| 3                 | Mid Level        | 686         | 800             | Left      | 114             |
| 4                 | Top of Stack     | 813         | 800             | Left      | 148             |

**MDB INSTRUMENTATION AND CAMERAS**

|                  |   |
|------------------|---|
| Accelerometers   | 5 |
| Contact Switches | 2 |

**DATA SHEET NO. 10**  
**POST-TEST OBSERVATIONS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11

**TEST DUMMY INFORMATION AND CONTACT POINTS**

| Description           | Front Seat Dummy (ES-2re)                | Rear Seat Dummy (SID-IIs)                         |
|-----------------------|--|---|
| Dummy Type/Serial No. | ES-2re, S/N: F035                        | SID-IIs, S/N: 299                                 |
| Head Contact          | Curtain Airbag, Side Header, Headrest    | Curtain Airbag, Side Header, Center Seat Seatback |
| Upper Torso Contact   | Curtain Airbag, Side Torso/Pelvis Airbag | Door Panel  |
| Lower Torso Contact   | Torso/Pelvis Airbag, Door Panel          | Door Panel  |
| Left Knee Contact     | Knee Bolster, Right Knee                 | Door Panel, Right Knee                            |
| Right Knee Contact    | Left Knee                                | Left Knee   |

**POST-TEST DOOR OPENING AND SEAT TRACK INFORMATION**

| Description             | Front                           | Rear                            |
|-------------------------|---------------------------------|---------------------------------|
| Left Side Door Opening  | Jammed shut                     | Jammed shut                     |
| Right Side Door Opening | Remained closed and operational | Remained closed and operational |
| Hatch and Other Doors   | Remained closed and operational | Remained closed and operational |
| Seat Movement           | None                            | None                            |
| Seatback Failure        | No                              | No                              |

**POST-TEST STRUCTURAL OBSERVATIONS**

| Critical Areas of Performance | Observations and Conclusions |      |
|-------------------------------|------------------------------|------|
| Pillar Performance            | No separation occurred       |      |
| Sill Separation               | No separation occurred       |      |
| Windshield Damage             | None                         |      |
| Window Damage                 | None                         | None |
| Other Notable Effects         | None                         |      |

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

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

**MDB LEFT EDGE IMPACT POINT DATA**

| Measured Parameter | Units | Requirement | Value       |
|--------------------|-------|-------------|-------------|
| Horizontal Offset  | mm    | +/- 50      | +10 (Right) |
| Vertical Offset    | mm    | +/- 20      | +7 (Up)     |

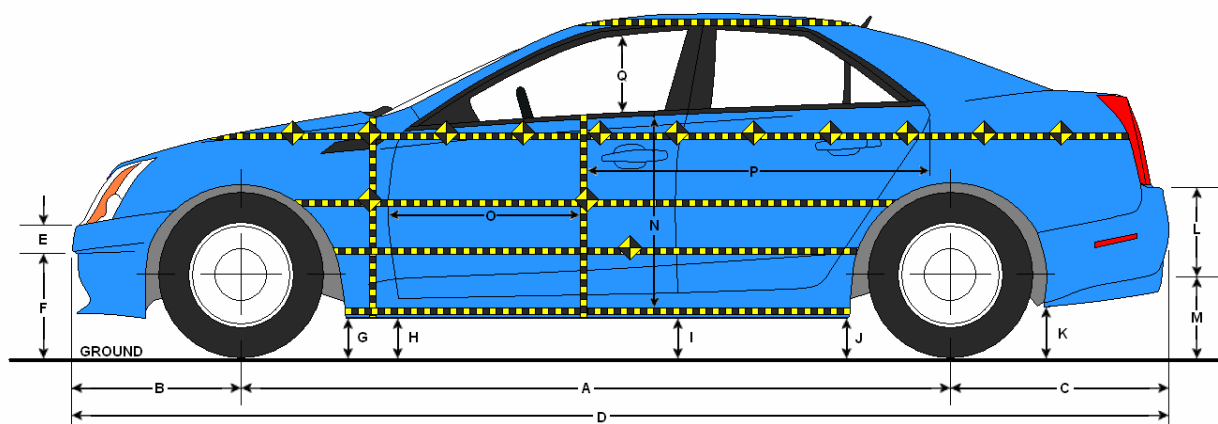
**DATA SHEET NO. 11**  
**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**LEFT SIDE VIEW**

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

| Code | Dimension                              | Measurement (mm) |      |            |
|------|--|------------------|------|------------|
|      |  | Pre              | Post | Difference |
| A    | Wheelbase                              | 2699             | 2708 | 9          |
| B    | Front Axle to FSOV                     | 953              | 950  | -3         |
| C    | Rear Axle to RSOV                      | 680              | 674  | -6         |
| D    | Total Length at Centerline             | 4333             | 4331 | -2         |
| E    | Front Bumper Thickness                 | 147              | 148  | 1          |
| F    | Front Bumper Bottom to Ground          | 402              | 413  | 11         |
| G    | Sill Height at Front Wheel Well        | 191              | 221  | 30         |
| H    | Sill Height at Front Door Leading Edge | 195              | 221  | 26         |
| I    | Sill Height at B-Pillar                | 219              | 294  | 75         |
| J1   | Sill Height at Rear Wheel Well         | 213              | 295  | 82         |
| J2   | Pinch Weld Height at Rear Wheel Well   | 188              | 252  | 64         |
| K    | Sill Height Aft of Rear Wheel Well     | 429              | 492  | 63         |
| L    | Rear Bumper Thickness                  | 119              | 118  | -1         |
| M    | Bottom of Rear Bumper to Ground        | 545              | 610  | 65         |
| N    | Sill Height to Window Bottom Sill      | 642              | 653  | 11         |
| O    | Front Door Leading Edge to Impact CL   | 805              | 735  | -70        |
| P    | Rear Door Trailing Edge to Impact CL   | 1341             | 1325 | -16        |
| Q    | Front Window Opening                   | 449              | 465  | 16         |
| R    | Right Side Length                      | 3192             | 3194 | 2          |
| S    | Left Side Length                       | 3195             | 3175 | -20        |
| T    | Vehicle Width at B-Pillar              | 1772             | 1617 | -155       |

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

**DATA SHEET NO. 12**

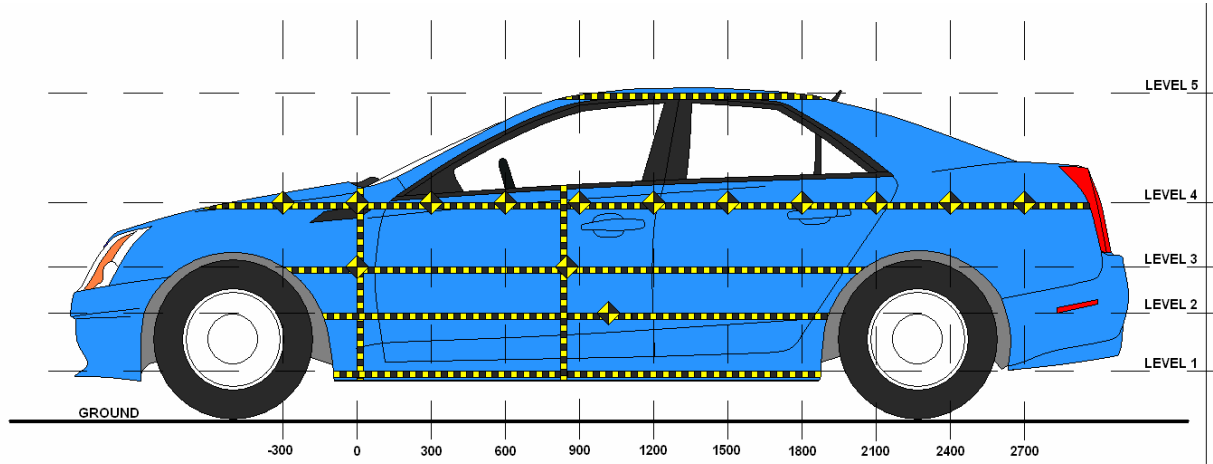
**VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**LEFT SIDE VIEW**

| Level | Description             | Height Above Ground (mm) |
|-------|-------------------------|--------------------------|
| 1     | Sill Top Height         | 268                      |
| 2     | Occupant H-Point Height | 596                      |
| 3     | Mid-Door Height         | 659                      |
| 4     | Window Sill Height      | 956                      |
| 5     | Window Top Height       | 1480                     |

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

**VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11

|      | Pre-Test (mm) |     |     |     |     | Post-Test (mm) |     |     |     |     | Difference (mm) |     |     |     |    |
|------|---------------|-----|-----|-----|-----|----------------|-----|-----|-----|-----|-----------------|-----|-----|-----|----|
|      | 1             | 2   | 3   | 4   | 5   | 1              | 2   | 3   | 4   | 5   | 1               | 2   | 3   | 4   | 5  |
| -900 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| -750 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| -600 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| -450 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| -300 |               |     |     | 752 |     |                |     |     | 772 |     |                 |     |     | 20  |    |
| -150 |               |     | 618 | 730 |     |                |     | 630 | 743 |     |                 |     | 12  | 13  |    |
| 0    | 664           | 622 | 624 | 722 |     | 662            | 633 | 638 | 737 |     | -2              | 11  | 14  | 15  |    |
| 150  | 680           | 628 | 627 | 712 |     | 716            | 786 | 778 | 745 |     | 36              | 158 | 151 | 33  |    |
| 300  | 685           | 626 | 624 | 703 |     | 708            | 843 | 834 | 739 |     | 23              | 217 | 210 | 36  |    |
| 450  | 683           | 624 | 622 | 695 |     | 711            | 842 | 836 | 746 |     | 28              | 218 | 214 | 51  |    |
| 600  | 682           | 622 | 620 | 688 |     | 711            | 827 | 832 | 755 |     | 29              | 205 | 212 | 67  |    |
| 750  | 680           | 622 | 619 | 681 | 913 | 712            | 813 | 823 | 769 | 927 | 32              | 191 | 204 | 88  | 14 |
| 900  | 680           | 621 | 619 | 674 | 905 | 714            | 798 | 820 | 769 | 916 | 34              | 177 | 201 | 95  | 11 |
| 1050 | 681           | 621 | 619 | 668 | 902 | 716            | 798 | 807 | 749 | 915 | 35              | 177 | 188 | 81  | 13 |
| 1200 | 684           | 623 | 620 | 661 | 903 | 720            | 798 | 803 | 775 | 917 | 36              | 175 | 183 | 114 | 14 |
| 1350 | 687           | 625 | 622 | 658 | 903 | 723            | 819 | 820 | 824 | 917 | 36              | 194 | 198 | 166 | 14 |
| 1500 | 688           | 629 | 626 | 657 | 904 | 727            | 846 | 839 | 806 | 919 | 39              | 217 | 213 | 149 | 15 |
| 1650 | 688           | 632 | 629 | 658 | 909 | 749            | 851 | 857 | 784 | 921 | 61              | 219 | 228 | 126 | 12 |
| 1800 | 678           | 628 | 628 | 657 | 914 | 699            | 834 | 835 | 762 | 923 | 21              | 206 | 207 | 105 | 9  |
| 1950 |               | 621 | 620 | 639 | 918 |                | 705 | 718 | 708 | 927 |                 | 84  | 98  | 69  | 9  |
| 2100 |               |     | 618 | 662 | 925 |                |     | 654 | 686 | 932 |                 |     | 36  | 24  | 7  |
| 2250 |               |     |     | 669 | 936 |                |     |     | 700 | 943 |                 |     |     | 31  | 7  |
| 2400 |               |     |     | 684 |     |                |     |     | 697 |     |                 |     |     | 13  |    |
| 2550 |               |     |     | 708 |     |                |     |     | 712 |     |                 |     |     | 4   |    |
| 2700 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| 2850 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |

**MAXIMUM CRUSH DATA**

|                           | Level 1 | Level 2 | Level 3 | Level 4 | Level 5 |
|---------------------------|---------|---------|---------|---------|---------|
| Maximum Crush (mm)        | 61      | 219     | 228     | 166     | 15      |
| Distance from Impact (mm) | 1650    | 1650    | 1650    | 1350    | 1500    |

DATA SHEET NO. 12 ... (CONTINUED)

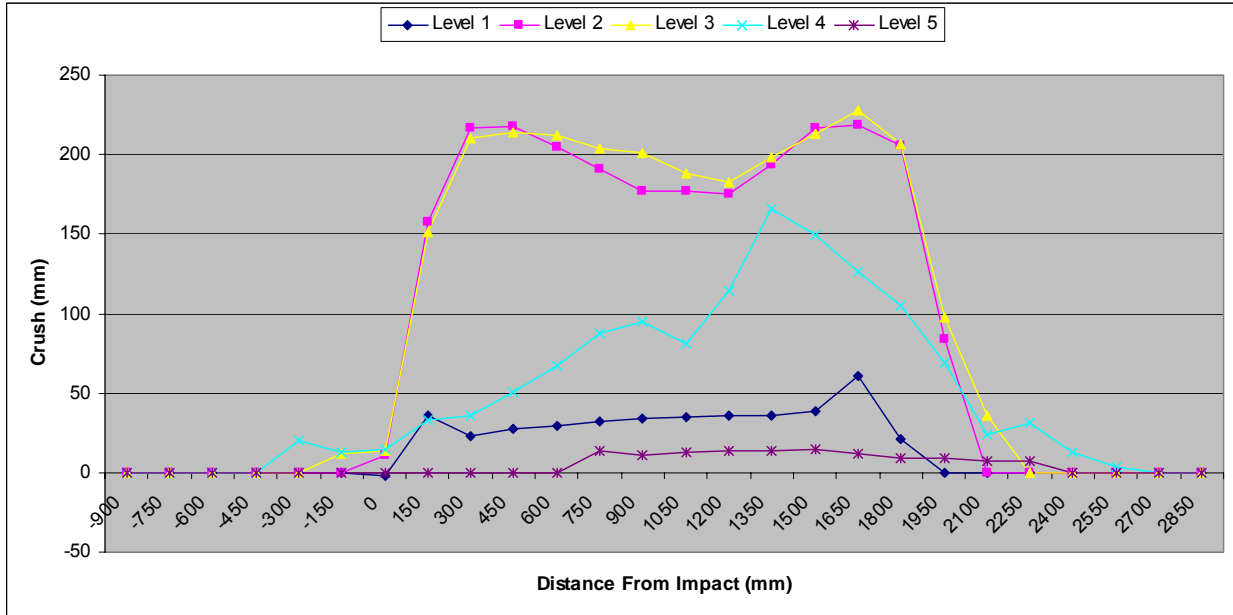
VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**DATA SHEET NO. 13**

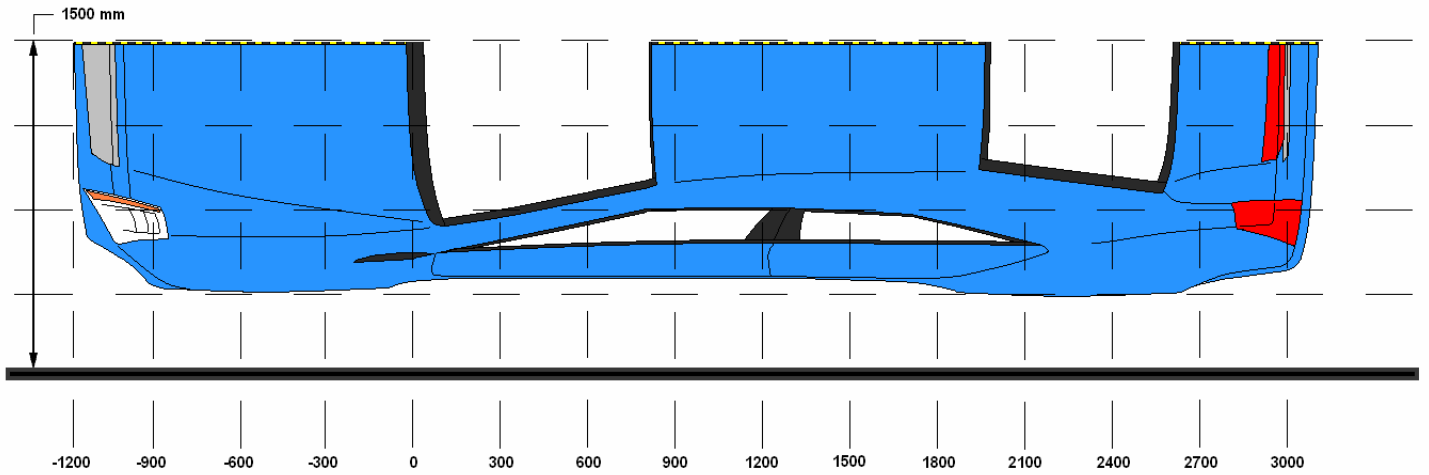
**VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**TOP VIEW**

**DAMAGE PROFILE DISTANCES**

| DPD | Distance From Impact Point in mm | Level | Pre-Test (mm) | Post-Test (mm) | Max. Static Crush (mm) |
|-----|----------------------------------|-------|---------------|----------------|------------------------|
| 1   | 2550                             | 4     | 708           | 712            | 4                      |
| 2   | 2100                             | 3     | 618           | 654            | 36                     |
| 3   | 1500                             | 2     | 629           | 846            | 217                    |
| 4   | 900                              | 3     | 619           | 820            | 201                    |
| 5   | 300                              | 2     | 626           | 843            | 217                    |
| 6   | -300                             | 4     | 752           | 772            | 20                     |

**DATA SHEET NO. 14**

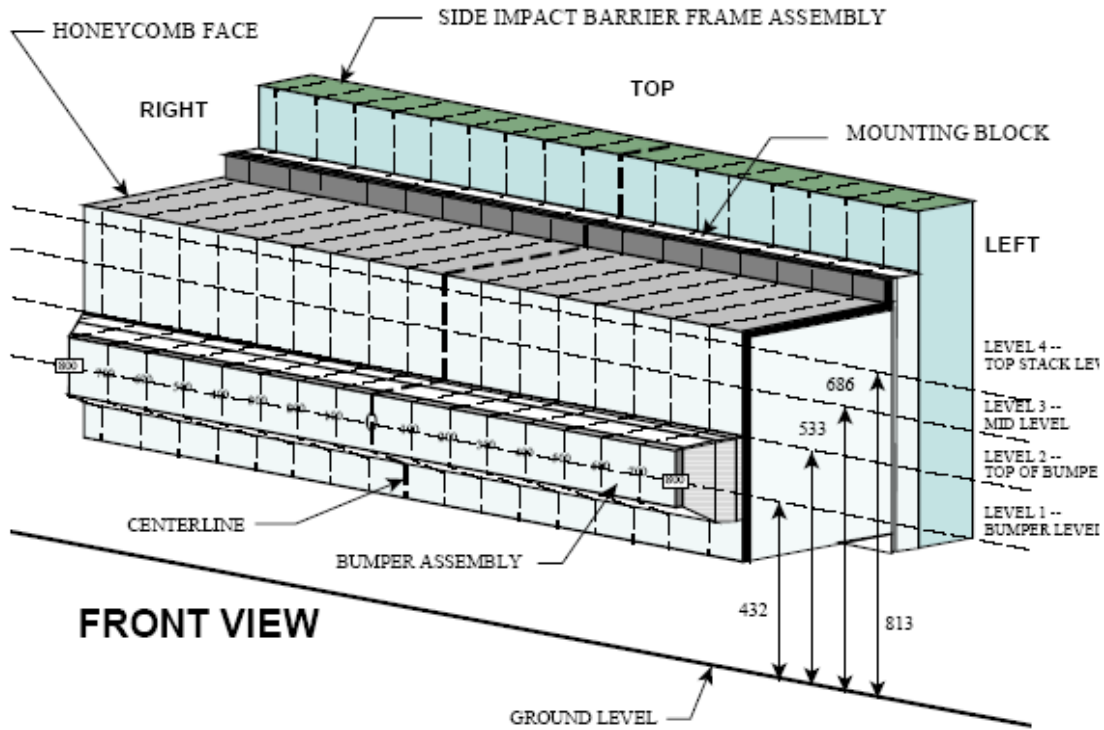
**EXTERIOR STATIC CRUSH FOR IMPACTOR FACE**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



NOTE: Dimensions are shown in millimeters, mm

**DEFORMABLE BARRIER STATIC CRUSH**

| Stack Level | Distance Right of Center |     |     |     |     |     |     |     | C/L | Distance Left of Center |     |     |     |     |     |     |     |
|-------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-------------------------|-----|-----|-----|-----|-----|-----|-----|
|             | 800                      | 700 | 600 | 500 | 400 | 300 | 200 | 100 |     | 100                     | 200 | 300 | 400 | 500 | 600 | 700 | 800 |
| 1           | 239                      | 217 | 215 | 217 | 209 | 209 | 204 | 201 | 218 | 191                     | 185 | 182 | 175 | 174 | 173 | 174 | 205 |
| 2           | 138                      | 116 | 102 | 102 | 93  | 96  | 107 | 108 | 100 | 96                      | 93  | 96  | 100 | 107 | 109 | 112 | 118 |
| 3           | 65                       | 46  | 55  | 59  | 67  | 97  | 114 | 100 | 74  | 56                      | 44  | 43  | 39  | 48  | 55  | 75  | 114 |
| 4           | 88                       | 64  | 43  | 47  | 63  | 105 | 137 | 93  | 79  | 62                      | 54  | 57  | 76  | 88  | 109 | 126 | 148 |

All dimensions in millimeters.

**DATA SHEET NO. 15**

**FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

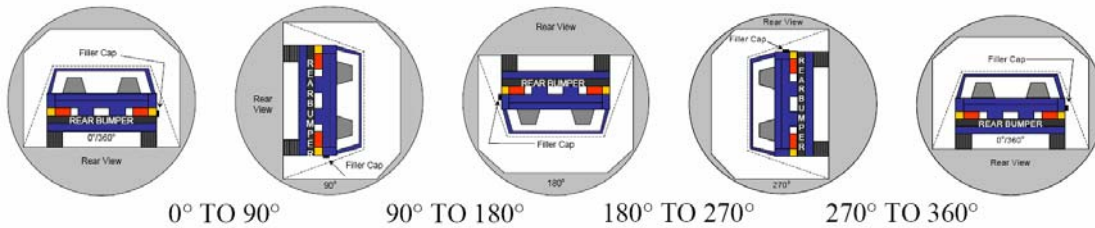
Test Date: 06/17/11

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

Temperature at Time of Impact: 31.7° C

Test Time: 12:11 PM

- A. From impact until vehicle motion ceases: n/a oz.  
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: n/a oz.  
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: n/a oz.  
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: There is no liquid fuel system on this vehicle.



**SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase   | Rotation Time | Hold Time | Total Time |
|--------------|---------------|-----------|------------|
| 0° To 90°    | 80            | 300       | 380        |
| 90° To 180°  | 84            | 300       | 384        |
| 180° To 270° | 73            | 334       | 407        |
| 270° To 360° | 75            | 300       | 375        |

**FMVSS 301 SPILLAGE TABLE**

| Test Phase   | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|--------------|-----------------|--------------|----------------|---------------|
| 0° To 90°    | n/a             |              |                |               |
| 90° To 180°  | n/a             |              |                |               |
| 180° To 270° | n/a             |              |                |               |
| 270° To 360° | n/a             |              |                |               |

**SOLVENT SPILLAGE LOCATION TABLE**

| Test Phase   | Spillage Location |
|--------------|-------------------|
| 0° To 90°    | n/a               |
| 90° To 180°  | n/a               |
| 180° To 270° | n/a               |
| 270° To 360° | n/a               |

**DATA SHEET NO. 16**

**FMVSS NO. 305 ELECTRIC VEHICLE PROPULSION SYSTEM DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback NHTSA No. MB5219  
Test Program: MDB Side Impact Test Test Date: 06/17/11

**ELECTRIC VEHICLE PROPULSION SYSTEM DATA**

|  |                                |
|--|--------------------------------|
| Type of Electric Vehicle                                     | Electric                       |
| Propulsion Battery Type                                      | Lithium-Ion                    |
| Nominal Voltage  | 360 V                          |
| Physical Location of Automatic Propulsion Battery Disconnect | Inside the Battery Pack System |
| Auxilliary Battery Type                                      | Lead-Acid Battery              |

**PROPULSION BATTERY SYSTEM DATA**

|  |                      |
|--|----------------------|
| Electrolyte Fluid Type                                   | Organic Electrolyte  |
| Electrolyte Fluid Specific Gravity                       | 1.192                |
| Electrolyte Fluid Kinematic Viscosity                    | 4.8                  |
| Electrolyte Fluid Color                                  | Clear                |
| Propulsion Battery Coolant Type, Color, Specific Gravity | Air Cooled           |
| Location of Battery Modules                              | Underside of Vehicle |

**DATA SHEET NO. 17**

**FMVSS NO. 305 POST-IMPACT DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback NHTSA No. MB5219  
 Test Program: MDB Side Impact Test Test Date: 06/17/11

**ELECTROLYTE SPILLAGE MEASUREMENTS**

- A. From impact until 30 minutes later: 0.0 L  
 (Maximum Allowable = 5.0 L total)
- B. Spillage Details: No leakage occurred

**MEASUREMENT DESCRIPTIONS**

| Code      | Units      | Description   |
|-----------|------------|---|
| $V_b$     | V          | Propulsion Battery Voltage  |
| $V_1$     | V          | Propulsion Battery Negative to Chassis  |
| $V_2$     | V          | Propulsion Battery Positive to Chassis  |
| $R_o$     | $\Omega$   | Resistance of Grounding Circuit   |
| $V_1'$    | V          | Propulsion Battery Negative to Chassis with $R_o$ installed                             |
| $V_2'$    | V          | Propulsion Battery Positive to Chassis with $R_o$ installed                             |
| $R_{i1}$  | $\Omega$   | Electrical Isolation Value of Propulsion Battery Negative to Chassis Ground             |
| $R_{i2}$  | $\Omega$   | Electrical Isolation Value of Propulsion Battery Positive to Chassis Ground             |
| $R_i$     | $\Omega$   | Electrical Isolation Value of Propulsion Battery - The Minimum of $R_{i1}$ and $R_{i2}$ |
| $R_i/V_b$ | $\Omega/v$ | Electrical Isolation per Volt of Propulsion Battery                                     |

**ELECTRICAL ISOLATION DATA**

| Code      | Units      | Threshold | Pre-Test  | Post-Test   |
|-----------|------------|-----------|-----------|-------------|
| $V_b$     | V          |           | 392.7     | 2.9         |
| $V_1$     | V          |           | 350.0     | 0.5         |
| $V_2$     | V          |           | 50.0      | 0.1         |
| $R_o$     | $\Omega$   |           | 219,500   | 219,500     |
| $V_1'$    | V          |           | 0.0       | 0.0         |
| $V_2'$    | V          |           | 0.0       | 0.0         |
| $R_{i1}$  | $\Omega$   |           | 8,529,143 | Zero Volts  |
| $R_{i2}$  | $\Omega$   |           | 7,024,000 | Zero Volts  |
| $R_i$     | $\Omega$   |           | 7,024,000 | Zero Volts  |
| $R_i/V_b$ | $\Omega/V$ | 500       | 19,511    | Zero Volts* |

\* "Zero Volts" is considered as being compliant.

**DATA SHEET NO. 18**

**FMVSS NO. 305 STATIC ROLLOVER DATA**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11

**STATIC ROLLOVER ELECTRICAL ISOLATION DATA**

| Code                           | Units | Threshold | Rollover Position |             |             |             |
|--------------------------------|-------|-----------|-------------------|-------------|-------------|-------------|
|                                |       |           | 90°               | 180°        | 270°        | 360°        |
| V <sub>b</sub>                 | V     |           | 0.0               | 0.0         | 0.0         | 0.0         |
| V <sub>1</sub>                 | V     |           | 0.1               | 0.2         | 0.0         | 0.2         |
| V <sub>2</sub>                 | V     |           | 0.0               | 0.0         | 0.0         | 0.0         |
| R <sub>o</sub>                 | Ω     |           | 219,500           | 219,500     | 219,500     | 219,500     |
| V <sub>1</sub> '               | V     |           | 0.0               | 0.0         | 0.0         | 0.0         |
| V <sub>2</sub> '               | V     |           | 0.0               | 0.0         | 0.0         | 0.0         |
| R <sub>i1</sub>                | Ω     |           | Zero Volts        | Zero Volts  | Zero Volts  | Zero Volts  |
| R <sub>i2</sub>                | Ω     |           | Zero Volts        | Zero Volts  | Zero Volts  | Zero Volts  |
| R <sub>i</sub>                 | Ω     |           | Zero Volts        | Zero Volts  | Zero Volts  | Zero Volts  |
| R <sub>i</sub> /V <sub>b</sub> | Ω/V   | 500       | Zero Volts*       | Zero Volts* | Zero Volts* | Zero Volts* |

FMVSS 305 Requirements: Maximum allowable propulsion battery electrolyte spillage is 5.0 L.

**FMVSS 305 ELECTROLYTE SPILLAGE REQUIREMENT**

|                            |   |
|----------------------------|---|
| Maximum Allowable Spillage | 5.0L throughout impact test and static rollover |
|----------------------------|---|

**FMVSS 305 ELECTROLYTE COLLECTED**

| Test Phase   | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|--------------|-----------------|--------------|----------------|---------------|
| 0° to 90°    | 0               |              |                |               |
| 90° to 180°  | 0               |              |                |               |
| 180° to 270° | 0               | 0            |                |               |
| 270° to 360° | 0               |              |                |               |

**ELECTROLYTE SPILLAGE LOCATION TABLE**

| Test Phase   | Spillage Location |
|--------------|-------------------|
| 0° to 90°    | None              |
| 90° to 180°  | None              |
| 180° to 270° | None              |
| 270° to 360° | None              |

\* "Zero Volts" is considered as being compliant.

**DATA SHEET NO. 19**

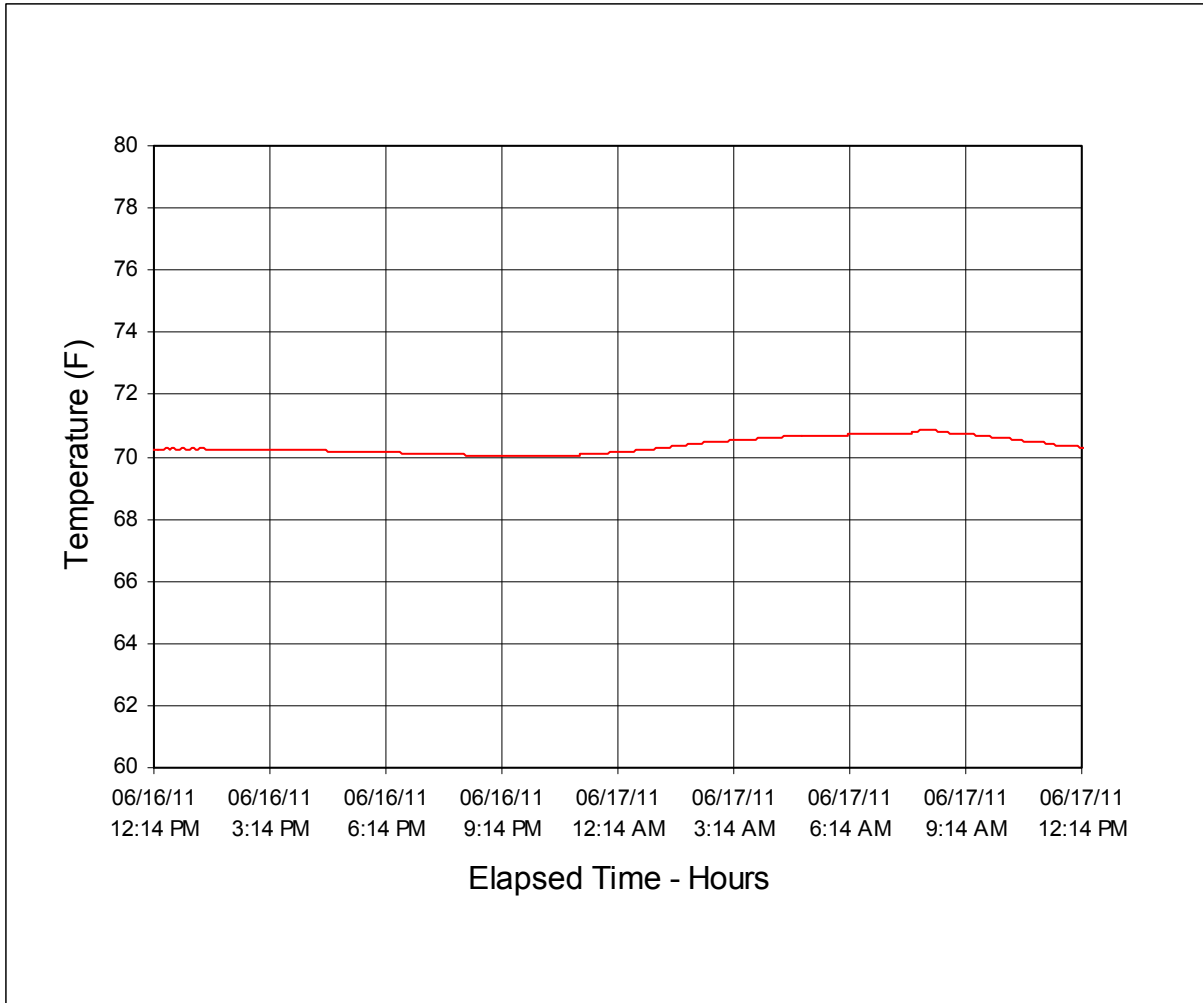
**DUMMY / VEHICLE TEMPERATURE STABILIZATION**

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback

NHTSA No. MB5219

Test Program: MDB Side Impact Test

Test Date: 06/17/11



**APPENDIX A  
PHOTOGRAPHS**

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FIGURE 1. As-Delivered Right Front Three-Quarter View of Test Vehicle



FIGURE 2. As-Delivered Left Rear Three-Quarter View of Test Vehicle



FIGURE 3. Pre-Test Frontal View of Test Vehicle



FIGURE 4. Post-Test Frontal View of Test Vehicle



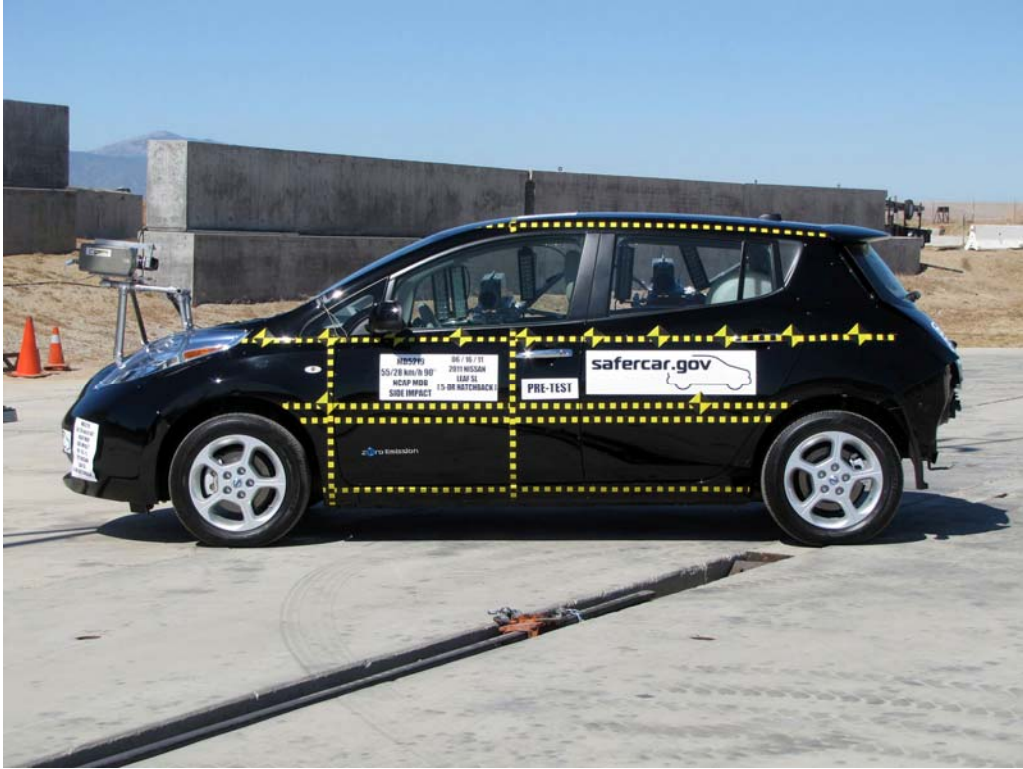


FIGURE 7. Pre-Test Left Side View of Test Vehicle



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



FIGURE 9. Pre-Test Left Rear Three-Quarter View of Test Vehicle



FIGURE 10. Post-Test Left Rear Three-Quarter View of Impact Zone



FIGURE 11. Pre-Test Rear View of Test Vehicle

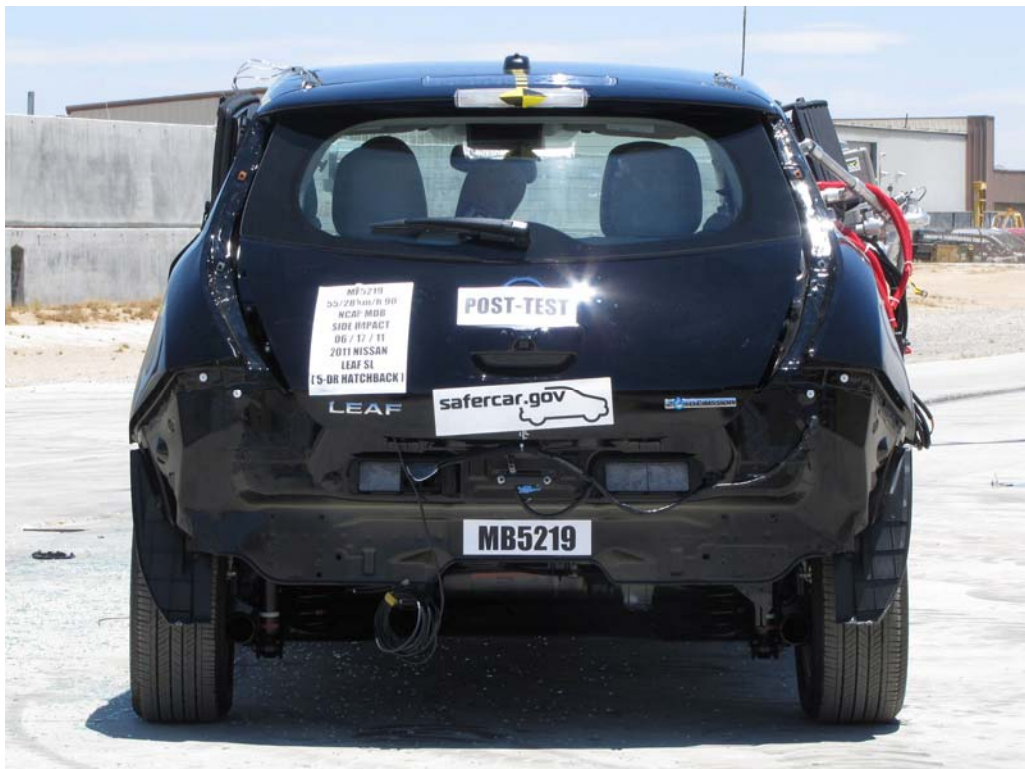


FIGURE 12. Post-Test Rear View of Test Vehicle



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



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



FIGURE 15. Pre-Test Overhead View of Test Vehicle with MDB Positioned Against Side of Test Vehicle



FIGURE 16. Post-Test Overhead View of Test Vehicle and MDB



FIGURE 17. Pre-Test Left Side View of MDB Positioned Against Side of Test Vehicle at Ideal Impact Point



FIGURE 18. Pre-Test Right Side View of MDB Positioned Against Side of Test Vehicle at Ideal Impact Point



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



FIGURE 37. Pre-Test View of Parking Brake



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



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



FIGURE 40. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



FIGURE 41. Pre-Test Driver Dummy and Door Clearance View



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



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



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



FIGURE 45. Pre-Test Driver Inner Door Panel View



FIGURE 46. Post-Test Driver Dummy Inner Door Panel View  
Showing Driver Dummy Contact Locations



FIGURE 47. Post-Test Driver Dummy Close-Up Head Contact with Vehicle Interior View



FIGURE 48. Post-Test Driver Dummy Close-Up Head Contact with Side Airbag View



FIGURE 49. Post-Test Driver Dummy Close-Up Torso Contact with Vehicle Interior View



FIGURE 50. Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View



FIGURE 51. Post-Test Driver Dummy Close-Up Pelvis Contact with Vehicle Interior View



FIGURE 52. Post-Test Driver Dummy Close-Up Pelvis Contact with Side Airbag View



FIGURE 53. Pre-Test Left Side View of Rear Passenger Dummy Showing Belt, Chalking, and Contact Switches



FIGURE 54. Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



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



FIGURE 56. Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



FIGURE 57. Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint



FIGURE 58. Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning



FIGURE 59. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



FIGURE 60. Pre-Test View of Rear Passenger Dummy's Neck  
Showing Position of Adjustable Neck Bracket



FIGURE 61. Pre-Test View of Rear Passenger Dummy's Head  
Showing Dummy's Head is Level



FIGURE 62. Pre-Test Placement of Rear Passenger Dummy's Feet



FIGURE 63. Pre-Test View of Belt Anchorage for Rear Passenger Dummy



FIGURE 64. Pre-Test Close-Up Left Side View of Rear Passenger Seat Track



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



FIGURE 66. Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint

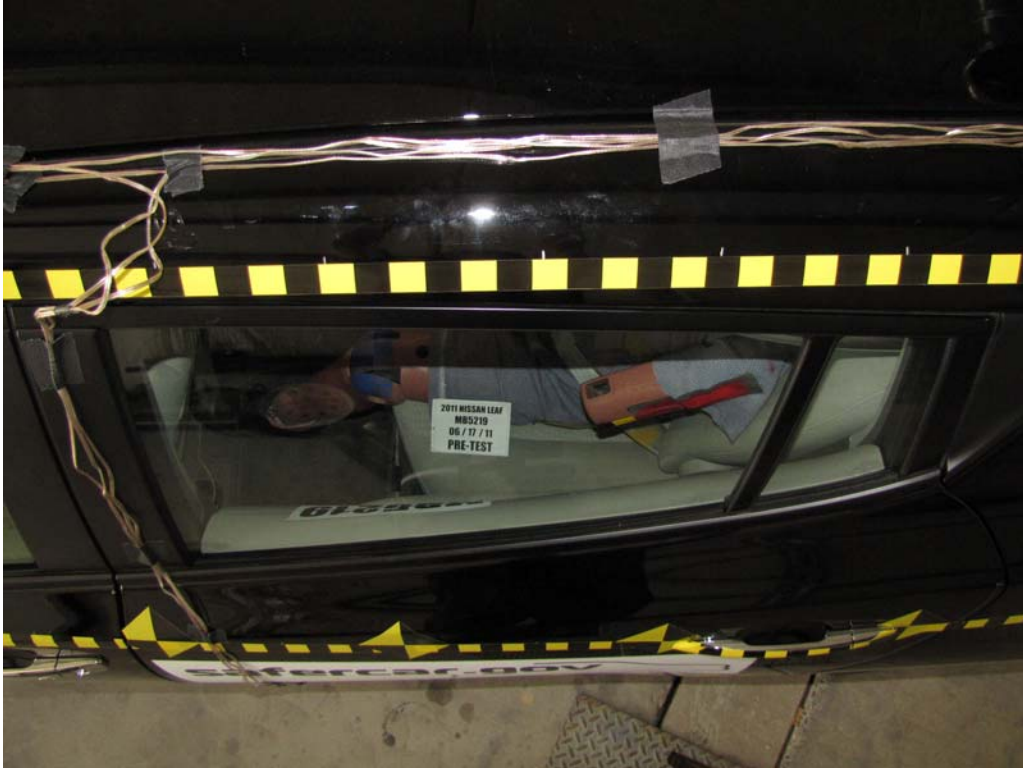


FIGURE 67. Pre-Test Rear Passenger Dummy and Door Clearance View

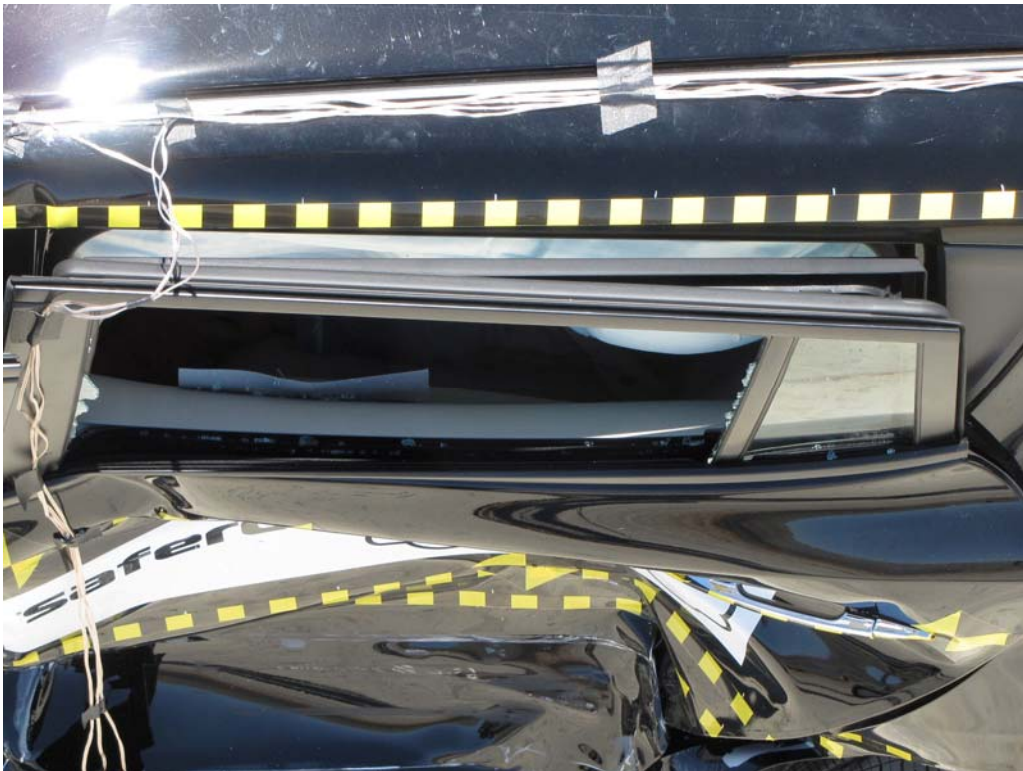


FIGURE 68. Post-Test Rear Passenger Dummy and Door Clearance View



FIGURE 69. Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



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



FIGURE 71. Pre-Test Rear Passenger Inner Door Panel View



FIGURE 72. Post-Test Rear Passenger Inner Door Panel View  
Showing Rear Passenger Dummy Contact Locations

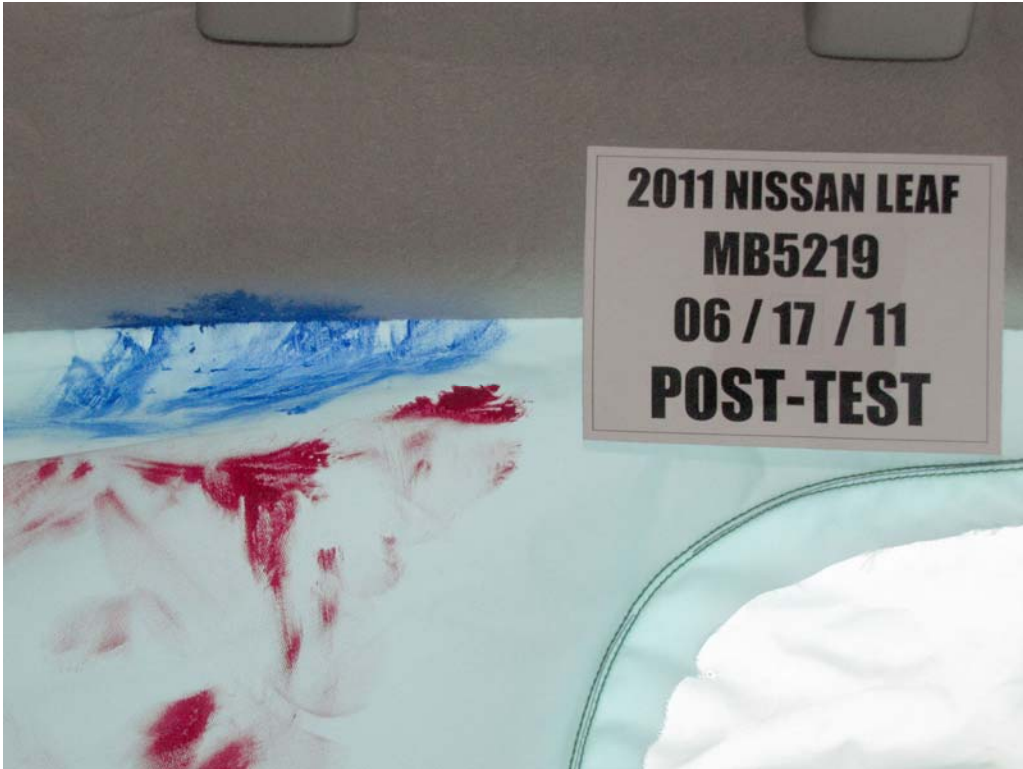


FIGURE 73. Post-Test Rear Passenger Dummy Close-Up  
Head Contact with Vehicle Interior View



FIGURE 74. Post-Test Rear Passenger Dummy Close-Up  
Head Contact with Side Airbag View



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

Photograph Not Applicable  
Vehicle Not Equipped with  
Rear Side Airbag

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



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

Photograph Not Applicable  
Vehicle Not Equipped with  
Rear Side Airbag

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

**Photograph Not Applicable  
Vehicle Not Equipped with  
Fuel Filler Cap**

FIGURE 79. Pre-Test View of Fuel Filler Cap

**Photograph Not Applicable  
Vehicle Not Equipped with  
Fuel Filler Cap**

FIGURE 80. Post-Test View of Fuel Filler Cap



FIGURE 81. Pre-Test Front View of MDB Impactor Face



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



FIGURE 83. Pre-Test Top View of MDB Impactor Face



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



FIGURE 85. Pre-Test Left Side View of MDB Impactor Face



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



FIGURE 87. Pre-Test Right Side View of MDB Impactor Face



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



FIGURE 89. Close-Up View of Vehicle's Certification Label



FIGURE 90. Close-Up View of Vehicle's Tire Information Placard



FIGURE 91. Pre-Test Ballast View



FIGURE 92. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 93. FMVSS No. 301/305 Rollover 0 Degrees



FIGURE 94. FMVSS No. 301/305 Rollover 90 Degrees



FIGURE 95. FMVSS No. 301/305 Rollover 180 Degrees




FIGURE 96. FMVSS No. 301/305 Rollover 270 Degrees



FIGURE 97. FMVSS No. 301/305 Rollover 360 Degrees



FIGURE 98. Impact Event



## 2011 NISSAN LEAF SL

**100% Electric,  
No Gas, Zero Emissions Vehicle**

**Standard Equipment Included at No Extra Charge**

**MECHANICAL & PERFORMANCE**  
 24 kWh Lithium-Ion Battery  
 80 kW AC Synchronous Motor  
 3.3 kW Onboard Charger  
 Regenerative Braking System  
 Vehicle Speed-Sensitive Power-Assisted Steering  
 Front and Rear Stabilizer Bars  
 4-Wheel Power-Assisted Ventilated Disc Brakes  
 Electronic Parking Brake  
 18" Alloy Wheels  
 P205/55R18 Tires  
 The Nissan KE  
 Portable Trickle Charge Cable (120V EVSE)

**SAFETY & SECURITY**  
 Nissan Advanced Air Bag System (AABS)  
 Front Seat-Mounted Side Impact Supplemental Air Bags  
 Rear-Mounted Curtain Side Impact Supplemental Air Bags for Front and Rear-Seat Outboard Occupant Head Protection  
 Front Seat Belts with Pretensioners, Load Limiters and Adjustable Upper Anchors  
 3-Point Seat Belts with AIRLUR (Driver ELR Only)  
 Lower Anchors and Tethers for Children (LATCH)  
 Child Safety Rear Door Locks  
 Rear Child Seats  
 Pipe-Style Steel Side-Door Guard Beams  
 4-Wheel Anti-Lock Braking System (ABS)  
 Energy-Absorbing Steering Column  
 Vehicle Dynamic Control (VDC) with Traction Control System (TCS)  
 Tire Pressure Monitoring System (TPMS)  
 Electronic Brake Force Distribution (EBD) and Brake Assist (BA)  
 Vehicle Security System (VSS)  
 Nissan Vehicle Immobilizer System

**COMFORT & CONVENIENCE**  
 6-Way Manual Driver Seat  
 4-Way Manual Front Passenger Seat  
 Padded Recycled Cloth Seat Fabric  
 60/40 Split Fold-Down Rear Seat  
 Power 2ND Drive Selects  
 Cruise Control with Steering Wheel-Mounted Controls

**EXTERIOR FEATURES**  
 Aerodynamic LED Headlights and Taillights  
 Automatic On/Off Headlights  
 Fog Lights  
 Dual Power Remote-Controlled Outside Mirrors  
 Body-Colored Front and Rear Bumpers  
 Photocatalytic Solar Panel Spoiler  
 Aerodynamic Underbody Cover and Rear Diffuser  
 Chrome Outside Door Handles  
 Variable Intermittent Front Wiper/Washers  
 Intermittent Rear Window Wiper  
 Power Rear Windows

**EXTERIOR FEATURES**  
 6-Speaker AM/FM/CD Audio System with MP3/WMA/CO-RDM Playback Capability  
 Auxiliary Audio Input, AUX  
 USB Connection Port for iPod® Interface and other Compatible Devices  
 XM® Satellite Radio\*\*\*  
 Nissan Navigation System  
 CA/MA/MD\*\*\*  
 Bluetooth® Hands-Free Phone System  
 Rear-View Mirror  
 Digital Meter Cluster  
 MultiFunction Trip Computer  
 Automatic Temperature Control (ATC)  
 Nissan Intelligent Key™ with Push Button Start  
 Power Windows with Driver's Window One-Touch Auto-Up/Down  
 Power Door Locks with Auto-Locking Feature  
 Sun Visors  
 Auto-Dimming Inside Mirror  
 Honda's® Universal Transceiver  
 Front Center Console with Cup Holders and Storage  
 Rear Cargo Area Cover  
 12 Volt DC Power Outlet

**Destination Charges: \$50.00**

**Total\* \$35,448.00**

\*\*\*XM® includes activation & 3 months of service only. XM® coverage not available in HI or AK and some markets.  
 \*\*\*\*Includes activation and 36 months of service. Requires cellular network. Signal strength may vary or not exist. Standard text limits may apply. After 36 months, subscription service required.

Manufacturer's Suggested Retail Base Price: \$33,720.00  
 Options Included by Manufacturer: \$1,728.00  
 QUICK CHARGE POST FLOOR MATS & CARGO AREA MAT: \$170.00

### EPA Fuel Economy and Environmental Comparisons

Electric Vehicle

**99** MPG equivalent  
combined city/hwy

**106** city

**92** highway

**34** kW-hrs per 100 miles

**Charge & Range**

Full Battery Charge Time  
 7 hours  
 at 240V

with a fully charged battery, vehicle can travel about

**73** miles

**Annual Electric Cost**

**\$561**

How This Vehicle Compares

Among all vehicles and within midsize car

Environment

Greenhouse Gas Emissions (CO<sub>2</sub> equivalent)

Other Air Pollutants

See the FREE Fuel Economy Guide at dealers or [www.fueleconomy.gov](http://www.fueleconomy.gov)

### GOVERNMENT SAFETY RATINGS

| Frontal Crash   | Driver Passenger   | Not Rated   |
|---|--|---|
| Star ratings based on the risk of injury in a frontal impact. | Star ratings based on the risk of injury in a side impact. | Star ratings based on the risk of rollover in a single vehicle crash. |

Star ratings range from 1 to 5 stars (★ ★ ★ ★ ★), with 5 being the highest.  
 Source: National Highway Traffic Safety Administration (NHTSA).  
[www.safercar.gov](http://www.safercar.gov) or 1-888-327-4266

This vehicle qualifies for Nissan's **Security+Plus Vehicle Protection Plan**  
 The only service agreement backed by Nissan  
 Ask your dealer for details, or call 1-800-NISSAN-1 for more information

### DELIVERY

VEHICLE COLORS:  
 EXT: SUPER BLACK  
 INT: LIGHT GREY

FINAL ASSEMBLY POINT:  
 LOS ANGELES

TRANSPORT METHOD:  
 TRUCK

DEALER:  
 PRINTE HILLS NISSAN  
 1730 E GALE AVENUE  
 CITY OF INDUSTRY CA 91748

VIN: JN1AZ0CP9RT02051  
 EMISSIONS: 50 STATE EMISSIONS  
 MDL: 17211-02051 R1H-K  
 OPT: G-CD30FL02266

2011052102131RF5258

FIGURE 99. Monroney Label

### REAR SEATS

#### Folding

Before folding the rear seats:

- Secure the seat belts on the seat belt hooks located on the side wall. See "Seat belt hooks" later in this section.
- To fold down the seatback, pull the release knob.
- To return the seatback to the seating position, lift up each seatback and push it to the upright position until it is latched.

**WARNING**

- Do not fold down the rear seat area or any objects are on the rear seats.
- Never allow anyone to ride in the cargo area or on the rear seats when they are in the folded-down position. Use of these areas by passengers without proper restraints could result in serious injury in an accident or sudden stop.

#### HEAD RESTRAINTS

Head restraints supplement the other vehicle safety systems. They may provide additional protection against injury in certain rear end collisions. Adjust the head restraints properly, as specified in this section. Check the adjustment after someone else uses the seat. Do not attach anything to the head restraint stalks or remove the head restraints. Do not use the seat if the head restraints are removed.

**WARNING**

Head restraints supplement the other vehicle safety systems. They may provide additional protection against injury in certain rear end collisions. Adjust the head restraints properly, as specified in this section. Check the adjustment after someone else uses the seat. Do not attach anything to the head restraint stalks or remove the head restraints. Do not use the seat if the head restraints are removed.

Properly secure all cargo with ropes or straps to help prevent it from sliding or shifting. Do not place cargo higher than the seatbacks, unless cargo could cause personal injury.

When returning the seatbacks to the upright position, be certain they are completely secured in the latched position. If they are not completely secured, passengers may be injured in an accident or sudden stop.

Properly secure all cargo with ropes or straps to help prevent it from sliding or shifting. Do not place cargo higher than the seatbacks, unless cargo could cause personal injury.

When returning the seatbacks to the upright position, be certain they are completely secured in the latched position. If they are not completely secured, passengers may be injured in an accident or sudden stop.

When removed, if the head restraint removed, reinstall and properly adjust the head restraint before an occupant uses the seating position. Refer to these instructions to ensure the effectiveness of the restraints. This may increase the risk of serious injury or death in a collision.

The illustration shows the seating position equipped with head restraints. The head restraints are adjustable.

▲ Indicates the seating position is equipped with a head restraint.

#### Components

- Head restraint
- Adjustment notches
- Lock knob
- Stalks

#### ADJUSTABLE HEADRESTS

**WARNING**

The adjustable headrests supplement the other vehicle safety systems. They may provide additional protection against injury in certain rear end collisions. Adjust the headrest properly, as specified in this section. Check the adjustment after someone else uses the seat. Do not attach anything to the adjustable headrest stalks or remove the adjustable headrest. Do not use the seat if the adjustable headrest has been removed. If the adjustable headrest was removed, reinstall and properly adjust the headrest before an occupant uses the seating position. Failure to follow these instructions can reduce the effectiveness of the adjustable headrests. This may increase the risk of serious injury or death in a collision.

#### Adjustment

Adjust the head restraint so the center is level with the center of your ears.

To raise the head restraint, pull it up.

To lower, push and hold the lock knob and push the head restraint down.

#### Removal

Use the following procedure to remove the adjustable head restraints.

- Pull the head restraint up to the highest position.
- Push and hold the lock knob.
- Remove the head restraint from the seat.
- Place the head restraint properly in a secure place so it is not loose in the vehicle.
- Reinstall and properly adjust the head restraint before an occupant uses the seating position.

#### Install

Align the head restraint stalks with the holes in the seat. Make sure that the head restraint is facing the correct direction. The stalk with the adjustment notches (▲) must be installed in the hole with the lock knob (Ⓛ).

- Push and hold the lock knob and push the head restraint down.
- Properly adjust the head restraint before an occupant uses the seating position.

FIGURE 100. Driver Head Restraint Use and Adjustment Information from Vehicle Manual



FIGURE 101. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Manual



FIGURE 102. Electric System Label



FIGURE 103. Electric System Label

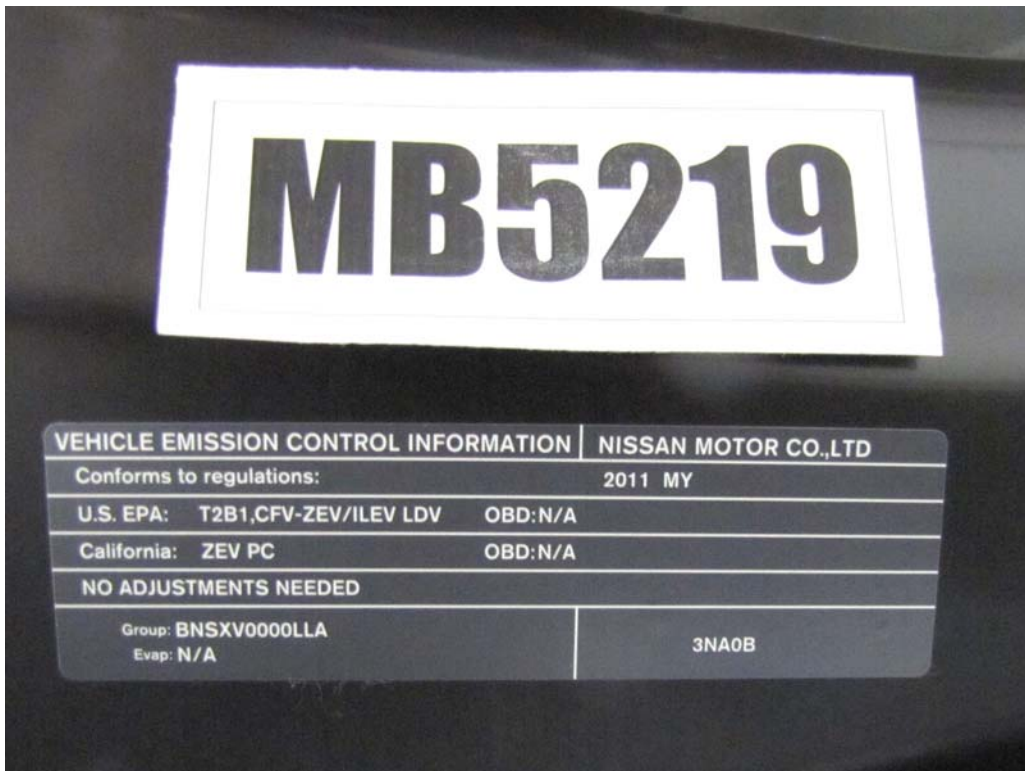


FIGURE 104. Electric System Label



FIGURE 105. Electric System Label



FIGURE 106. Electric System Label



FIGURE 107. Pre-Test Electric Drive Motor



FIGURE 108. Post-Test Electric Drive Motor



FIGURE 109. Pre-Test Propulsion Battery Disconnect



FIGURE 110. Post-Test Propulsion Battery Disconnect



FIGURE 111. Pre-Test Battery Charging Port



FIGURE 112. Post-Test Battery Charging Port



FIGURE 113. Pre-Test Battery Pack Assembly



FIGURE 114. Post-Test Battery Pack Assembly



FIGURE 115. Pre-Test Battery Mounting Hardware



FIGURE 116. Post-Test Battery Mounting Hardware



FIGURE 117. Pre-Test Battery Mounting Hardware



FIGURE 118. Post-Test Battery Mounting Hardware



FIGURE 119. Pre-Test Battery Mounting Hardware

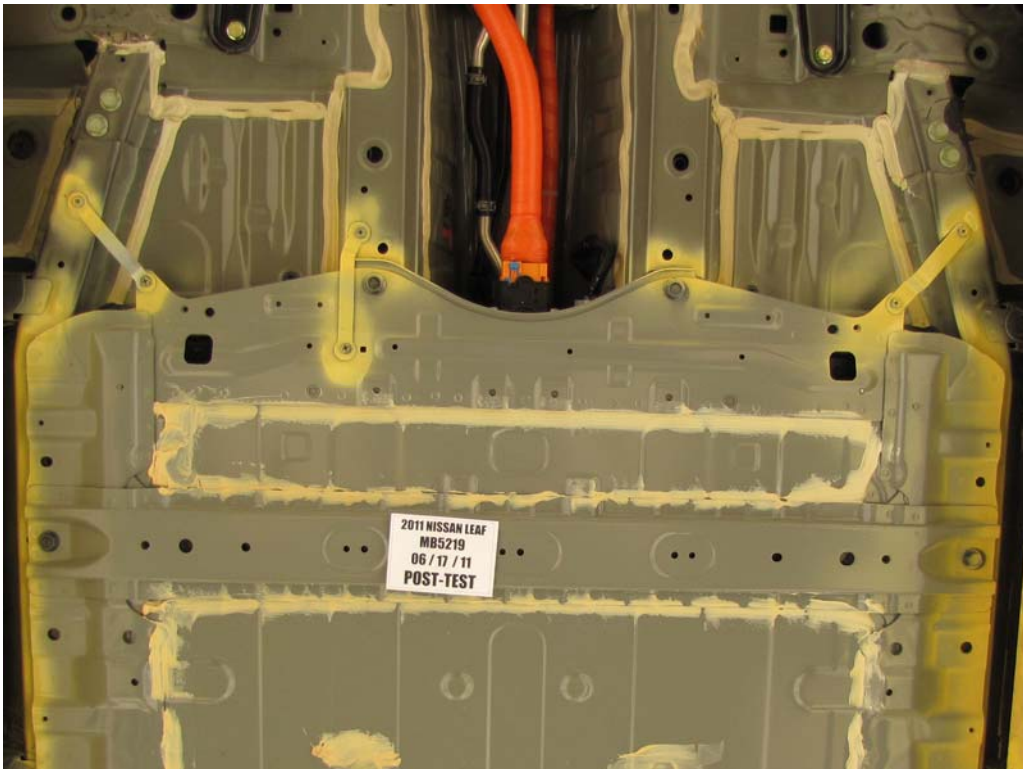


FIGURE 120. Post-Test Battery Mounting Hardware



FIGURE 121. Pre-Test Battery Mounting Hardware



FIGURE 122. Post-Test Battery Mounting Hardware

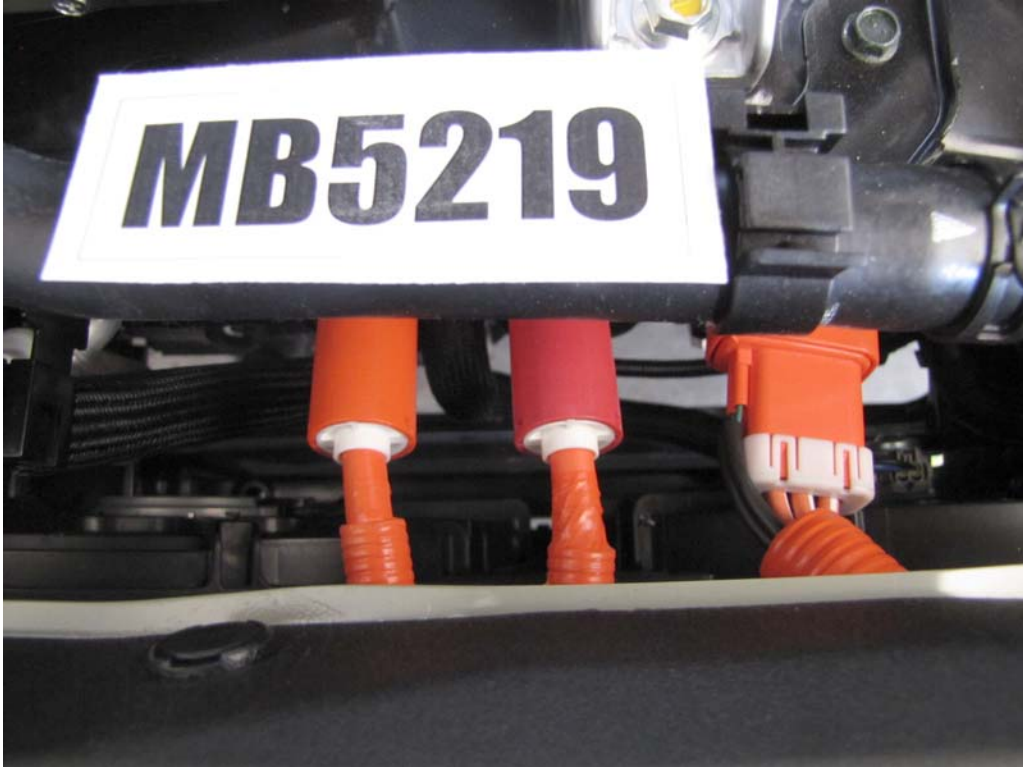


FIGURE 123. Pre-Test High Voltage Connections



FIGURE 124. Post-Test High Voltage Connections

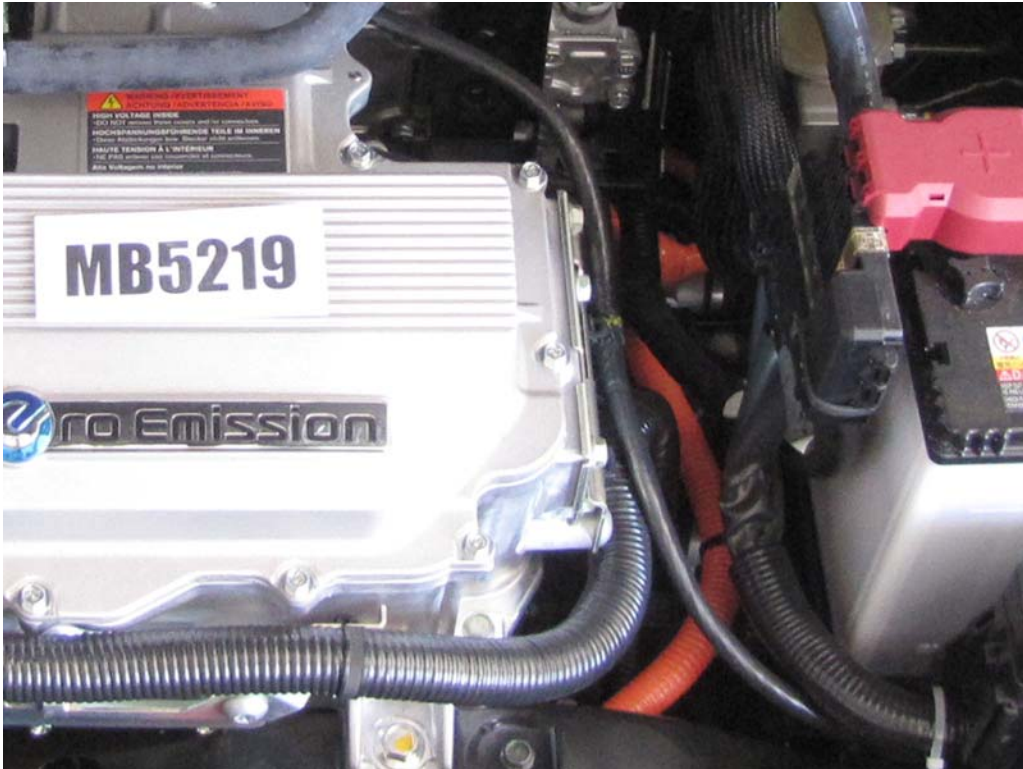


FIGURE 125. Pre-Test High Voltage Connections



FIGURE 126. Post-Test High Voltage Connections



FIGURE 127. Pre-Test High Voltage Connections



FIGURE 128. Post-Test High Voltage Connections



FIGURE 129. Pre-Test High Voltage Connections



FIGURE 130. Post-Test High Voltage Connections



FIGURE 131. Pre-Test High Voltage Connections



FIGURE 132. Post-Test High Voltage Connections



FIGURE 133. Pre-Test High Voltage Connections



FIGURE 134. Post-Test High Voltage Connections

# Photograph Not Applicable No Electrolyte Leakage

FIGURE 135. Post-Test Electrolyte Leakage

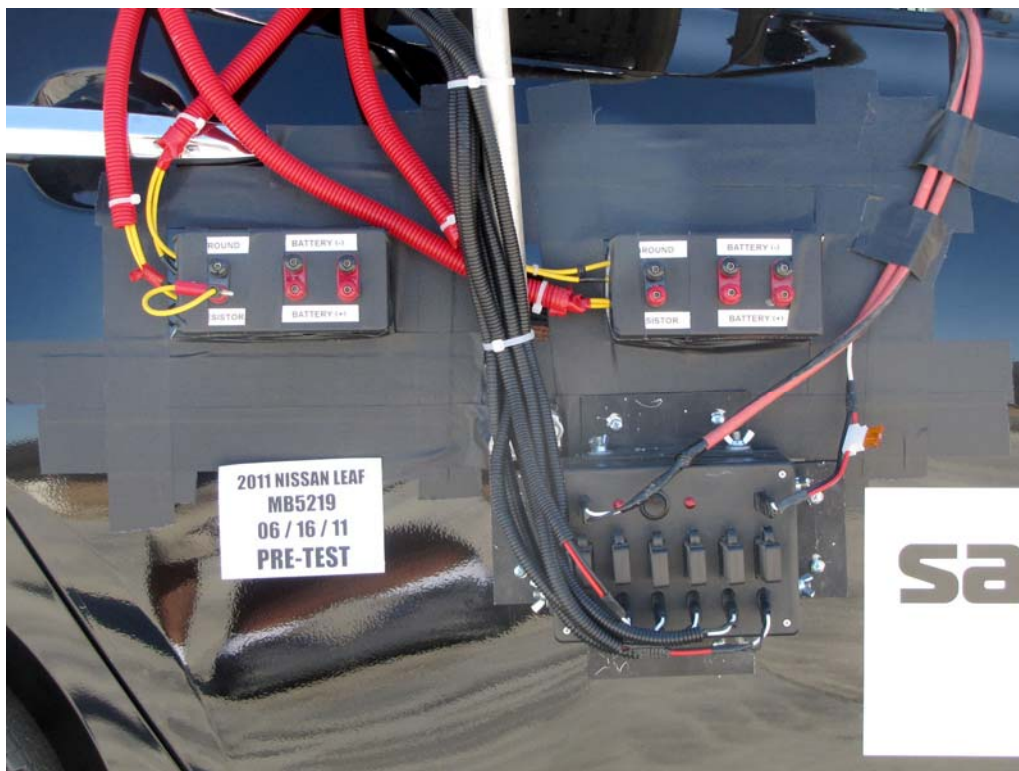


FIGURE 136. Pre-Test FMVSS 305 Measuring Equipment



FIGURE 137. Post-Test FMVSS 305 Measuring Equipment

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

## TABLE OF DATA PLOTS

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

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

**[www.NHTSA.dot.gov](http://www.NHTSA.dot.gov).**

### Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)  
Passenger Upper Abdomen Rib Deflection (Y)  
Passenger Lower Abdomen Rib Deflection (Y)  
Driver Head Acceleration Redundant (X)  
Driver Head Acceleration Redundant (Y)  
Driver Head Acceleration Redundant (Z)  
Driver Shoulder Contact Switch  
Driver Torso Contact Switch  
Driver Pelvis Contact Switch  
Passenger Head Acceleration Redundant (X)  
Passenger Head Acceleration Redundant (Y)  
Passenger Head Acceleration Redundant (Z)  
Passenger Shoulder Contact Switch  
Passenger Torso Contact Switch  
Passenger Pelvis Contact Switch

#### **Vehicle Instrumentation Data**

Driver Side Airbag Timing  
Driver Side Curtain Airbag Timing  
Passenger Side Airbag Timing (if applicable)  
Passenger Side Curtain Airbag Timing (if different from Driver)  
Right Side Sill at Front Seat Acceleration (X)  
Right Side Sill at Front Seat Acceleration (Y)  
Right Side Sill at Front Seat Acceleration (Z)  
Right Side Sill at Rear Seat Acceleration (X)  
Right Side Sill at Rear Seat Acceleration (Y)  
Right Side Sill at Rear Seat Acceleration (Z)  
Rear Floorpan Above Axle Acceleration (X)  
Rear Floorpan Above Axle Acceleration (Y)  
Rear Floorpan Above Axle Acceleration (Z)  
Left Side Sill at Front Seat Acceleration (Y)  
Left Side Sill at Rear Seat Acceleration (Y)  
Right Rear Occupant Compartment Acceleration (Y)  
Lower A-Post Acceleration (Y)  
Upper A-Post Acceleration (Y)  
Lower B-Post Acceleration (Y)  
Upper B-Post Acceleration (Y)

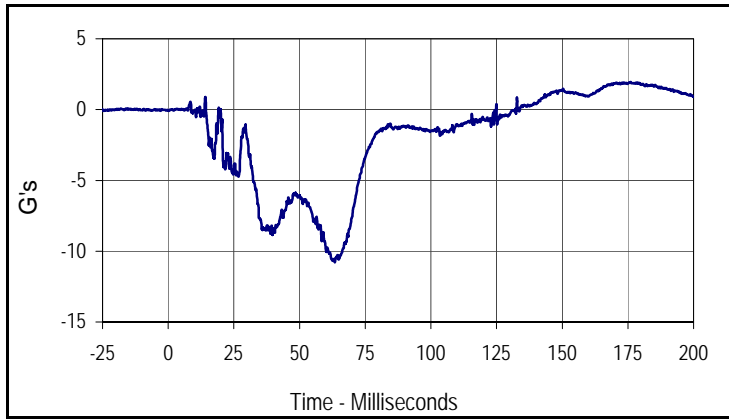
Front Seat Track Acceleration (Y)  
Rear Seat Track Acceleration (Y)  
Vehicle Center of Gravity Acceleration (X)  
Vehicle Center of Gravity Acceleration (Y)  
Vehicle Center of Gravity Acceleration (Z)

**MDB Instrumentation Data**

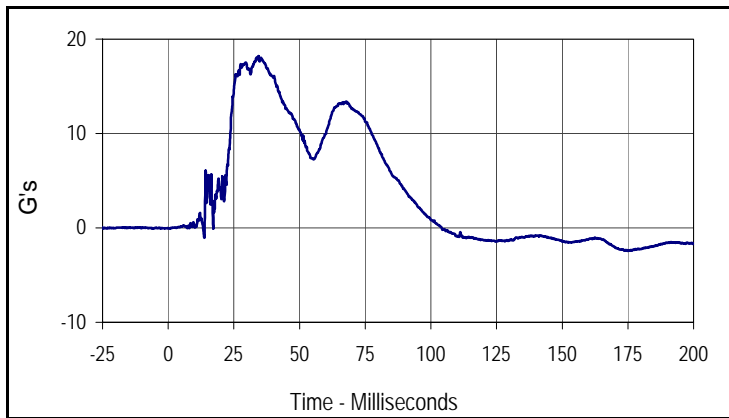
MDB Center of Gravity Acceleration (X)  
MDB Center of Gravity Acceleration (Y)  
MDB Center of Gravity Acceleration (Z)  
MDB Rear Acceleration (X)  
MDB Rear Acceleration (Y)  
Left MDB Contact Switch  
Right MDB Contact Switch

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

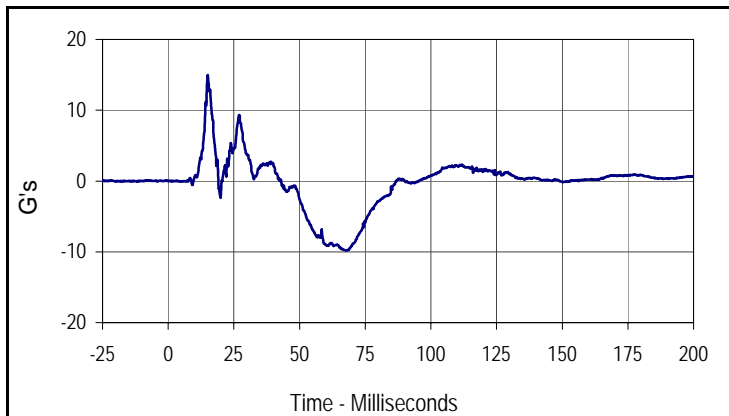
Test Date: 6/17/11  
 NHTSA No.: MB5219



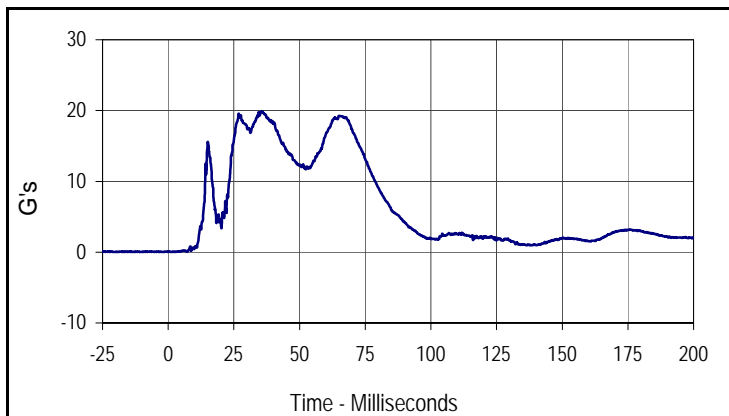
| Curve Description                  |       |           |       |
|------------------------------------|-------|-----------|-------|
| Driver Head Acceleration X Primary |       |           |       |
| CURNO                              | Type  | SAE Class | Units |
| 001                                | FIL   | 1000      | G's   |
| Max                                | Time  | Min       | Time  |
| 2.0                                | 176.1 | -10.8     | 63.5  |



| Curve Description                  |      |           |       |
|------------------------------------|------|-----------|-------|
| Driver Head Acceleration Y Primary |      |           |       |
| CURNO                              | Type | SAE Class | Units |
| 002                                | FIL  | 1000      | G's   |
| Max                                | Time | Min       | Time  |
| 18.2                               | 34.5 | -2.4      | 175.0 |



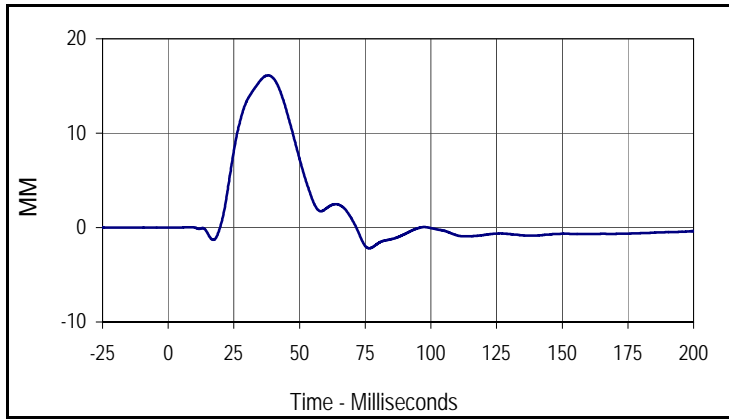
| Curve Description                  |      |           |       |
|------------------------------------|------|-----------|-------|
| Driver Head Acceleration Z Primary |      |           |       |
| CURNO                              | Type | SAE Class | Units |
| 003                                | FIL  | 1000      | G's   |
| Max                                | Time | Min       | Time  |
| 15.0                               | 15.1 | -9.8      | 67.8  |



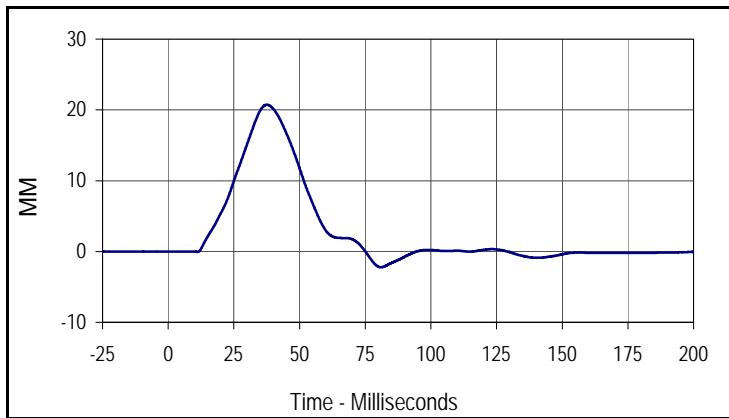
| Curve Description                          |      |           |       |
|--|------|-----------|-------|
| Driver Head Resultant Acceleration Primary |      |           |       |
| CURNO                                      | Type | SAE Class | Units |
| 001  | RES  | 1000      | G's   |
| Max  | Time | Min       | Time  |
| 19.9                                       | 35.7 | 0.0       | 0.9   |

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

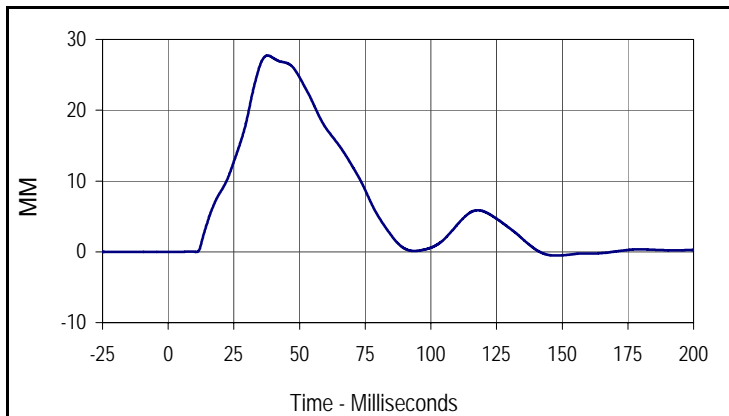
Test Date: 6/17/11  
 NHTSA No.: MB5219



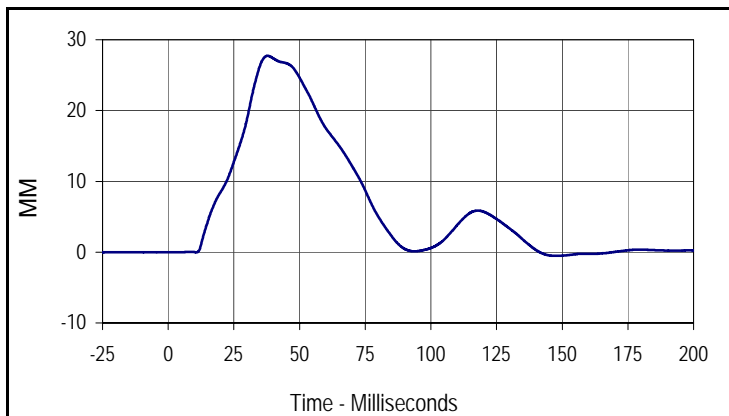
| Curve Description                    |      |           |       |
|--------------------------------------|------|-----------|-------|
| Driver Upper Thorax Rib Deflection Y |      |           |       |
| CURNO                                | Type | SAE Class | Units |
| 007                                  | FIL  | 180       | MM    |
| Max                                  | Time | Min       | Time  |
| 16.1                                 | 38.1 | -2.2      | 76.5  |



| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Driver Middle Thorax Rib Deflection Y |      |           |       |
| CURNO                                 | Type | SAE Class | Units |
| 008                                   | FIL  | 180       | MM    |
| Max                                   | Time | Min       | Time  |
| 20.7                                  | 37.6 | -2.2      | 81.0  |



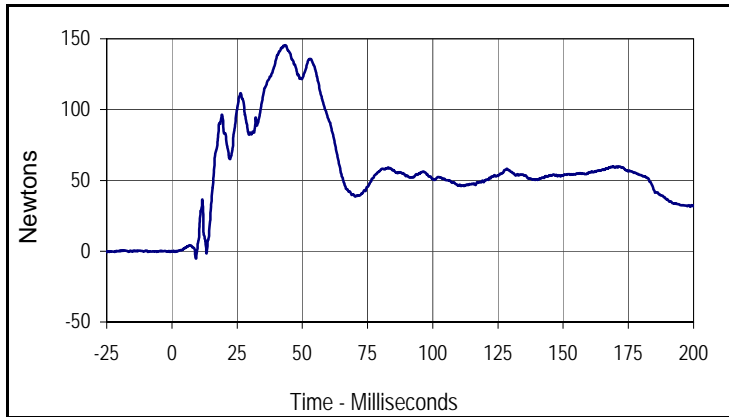
| Curve Description                    |      |           |       |
|--------------------------------------|------|-----------|-------|
| Driver Lower Thorax Rib Deflection Y |      |           |       |
| CURNO                                | Type | SAE Class | Units |
| 009                                  | FIL  | 180       | MM    |
| Max                                  | Time | Min       | Time  |
| 27.7                                 | 37.8 | -0.5      | 147.6 |



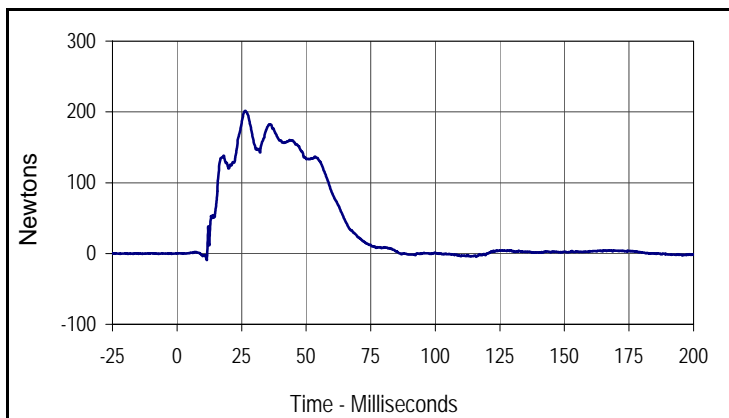
| Curve Description                    |      |           |       |
|--------------------------------------|------|-----------|-------|
| Driver Thorax Rib Deflection Maximum |      |           |       |
| CURNO                                | Type | SAE Class | Units |
| 010                                  | FIL  | 180       | MM    |
| Max                                  | Time | Min       | Time  |
| 27.7                                 | 37.8 | -0.5      | 147.6 |

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

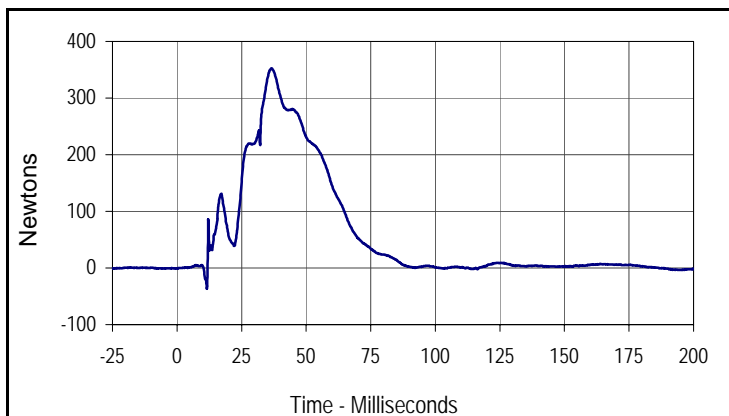
Test Date: 6/17/11  
 NHTSA No.: MB5219



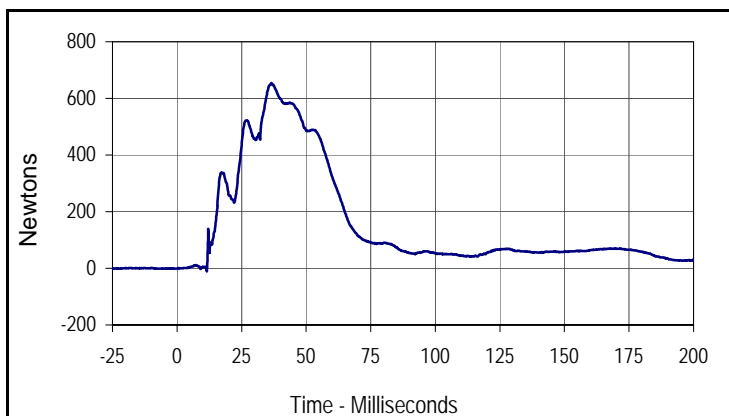
| Curve Description                 |      |           |         |
|-----------------------------------|------|-----------|---------|
| Driver Anterior Abdominal Force Y |      |           |         |
| CURNO                             | Type | SAE Class | Units   |
| 013                               | FIL  | 600       | Newtons |
| Max                               | Time | Min       | Time    |
| 145.5                             | 43.6 | -5.4      | 9.2     |



| Curve Description               |      |           |         |
|---------------------------------|------|-----------|---------|
| Driver Middle Abdominal Force Y |      |           |         |
| CURNO                           | Type | SAE Class | Units   |
| 014                             | FIL  | 600       | Newtons |
| Max                             | Time | Min       | Time    |
| 201.6                           | 26.4 | -9.3      | 11.5    |



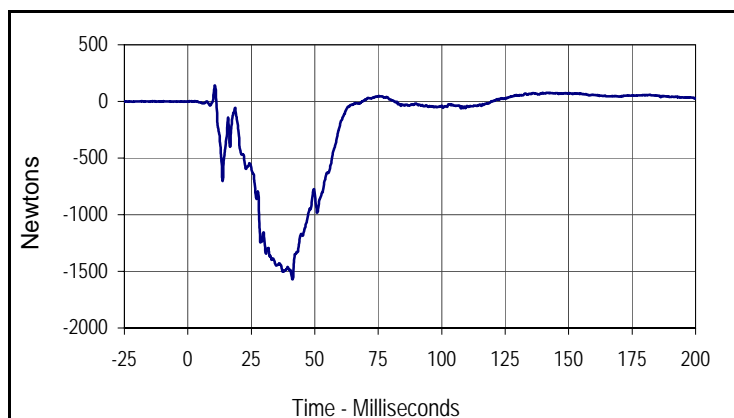
| Curve Description                  |      |           |         |
|------------------------------------|------|-----------|---------|
| Driver Posterior Abdominal Force Y |      |           |         |
| CURNO                              | Type | SAE Class | Units   |
| 015                                | FIL  | 600       | Newtons |
| Max                                | Time | Min       | Time    |
| 352.6                              | 36.6 | -36.7     | 11.6    |



| Curve Description            |      |           |         |
|------------------------------|------|-----------|---------|
| Driver Total Abdominal Force |      |           |         |
| CURNO                        | Type | SAE Class | Units   |
| 013                          | RES  | 600       | Newtons |
| Max                          | Time | Min       | Time    |
| 653.8                        | 36.6 | -10.6     | 11.5    |

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

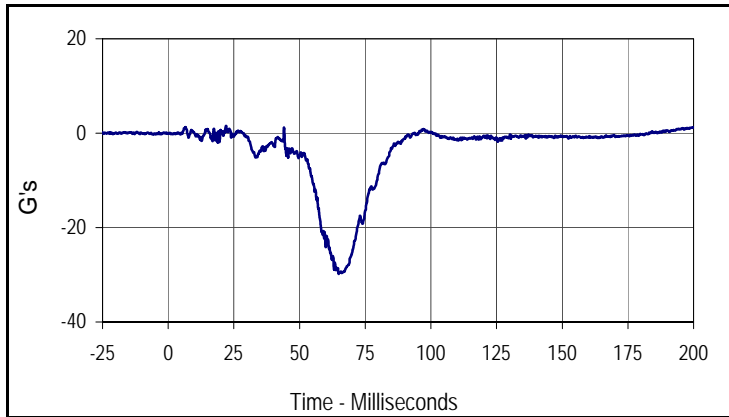
Test Date: 6/17/11  
 NHTSA No.: MB5219



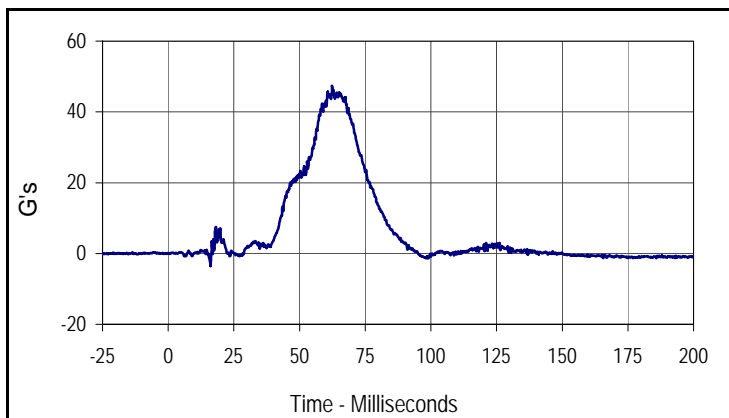
| Curve Description              |      |           |         |
|--------------------------------|------|-----------|---------|
| Driver Pubic Symphysis Force Y |      |           |         |
| CURNO                          | Type | SAE Class | Units   |
| 016                            | FIL  | 600       | Newtons |
| Max                            | Time | Min       | Time    |
| 142.3                          | 10.7 | -1570.2   | 41.2    |

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

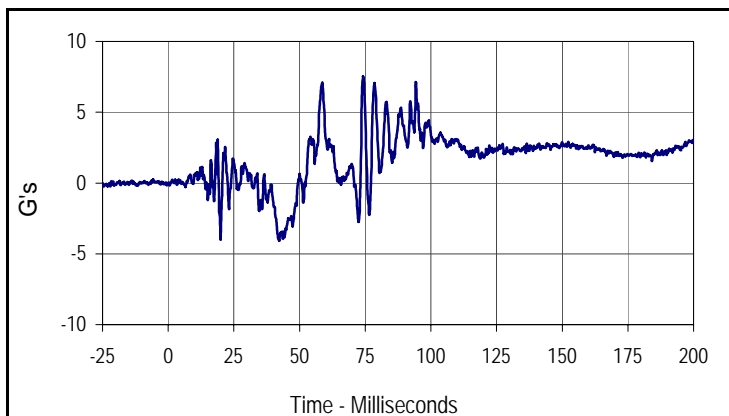
Test Date: 6/17/11  
 NHTSA No.: MB5219



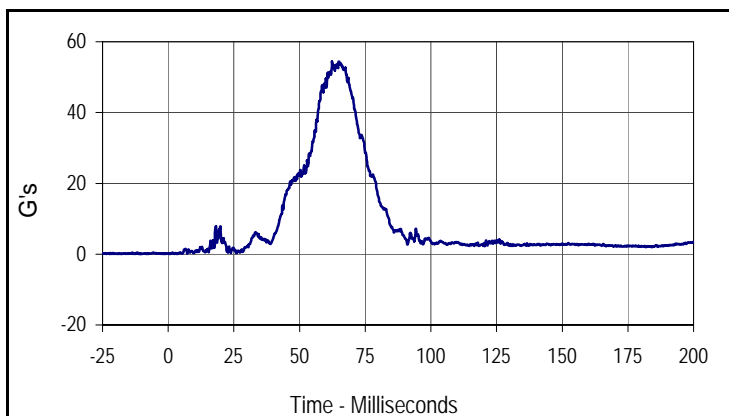
| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration X Primary |      |           |       |
| CURNO                                 | Type | SAE Class | Units |
| 021                                   | FIL  | 1000      | G's   |
| Max                                   | Time | Min       | Time  |
| 1.6                                   | 22.0 | -29.8     | 64.9  |



| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration Y Primary |      |           |       |
| CURNO                                 | Type | SAE Class | Units |
| 022                                   | FIL  | 1000      | G's   |
| Max                                   | Time | Min       | Time  |
| 47.4                                  | 62.4 | -3.6      | 16.1  |



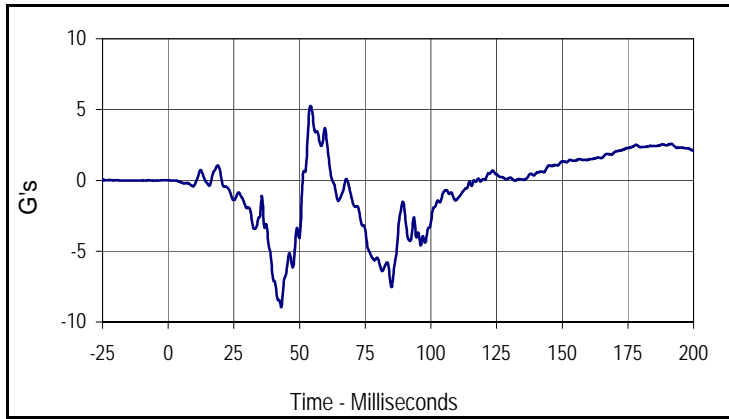
| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration Z Primary |      |           |       |
| CURNO                                 | Type | SAE Class | Units |
| 023                                   | FIL  | 1000      | G's   |
| Max                                   | Time | Min       | Time  |
| 7.5                                   | 74.2 | -4.1      | 42.3  |



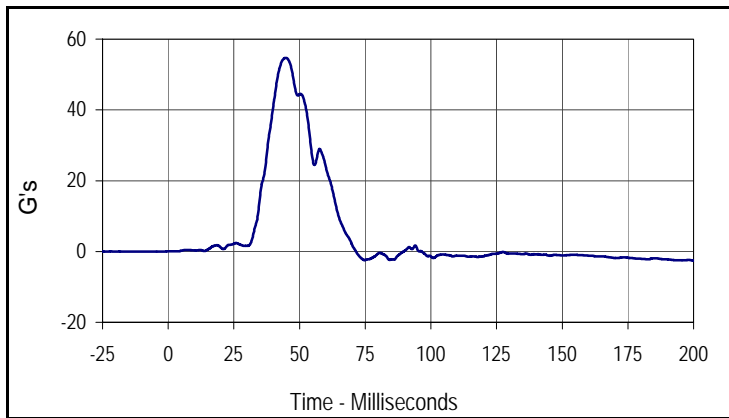
| Curve Description                             |      |           |       |
|---|------|-----------|-------|
| Passenger Head Acceleration Resultant Primary |      |           |       |
| CURNO   | Type | SAE Class | Units |
| 021   | RES  | 1000      | G's   |
| Max   | Time | Min       | Time  |
| 54.4  | 62.4 | 0.0       | 2.3   |

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

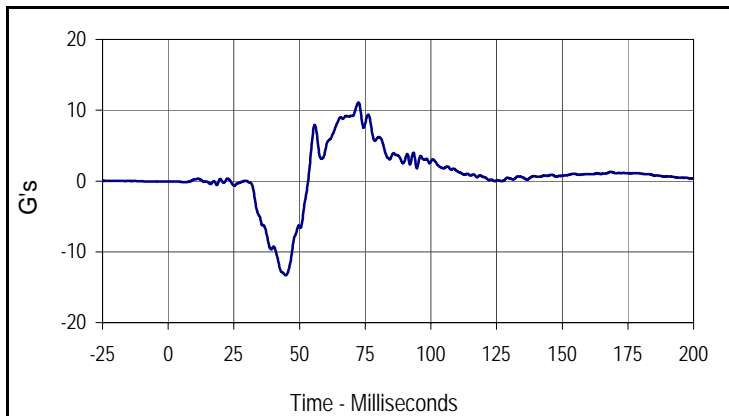
Test Date: 6/17/11  
 NHTSA No.: MB5219



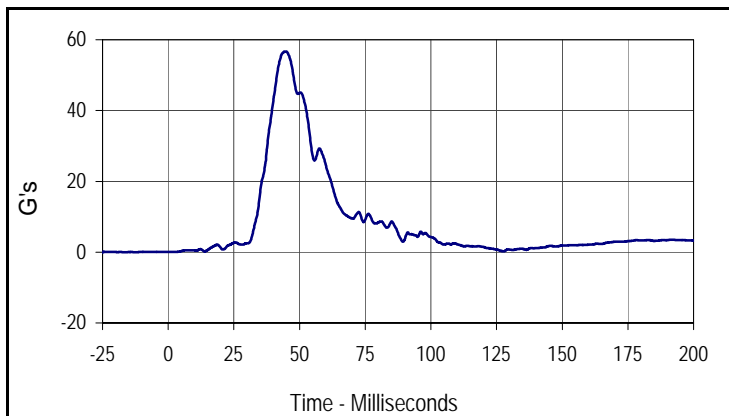
| Curve Description                        |      |           |       |
|--|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration X |      |           |       |
| CURNO                                    | Type | SAE Class | Units |
| 037                                      | FIL  | 180       | G's   |
| Max                                      | Time | Min       | Time  |
| 5.3                                      | 54.1 | -9.0      | 43.0  |



| Curve Description                        |      |           |       |
|--|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration Y |      |           |       |
| CURNO                                    | Type | SAE Class | Units |
| 038                                      | FIL  | 180       | G's   |
| Max                                      | Time | Min       | Time  |
| 54.7                                     | 45.0 | -2.6      | 200.0 |



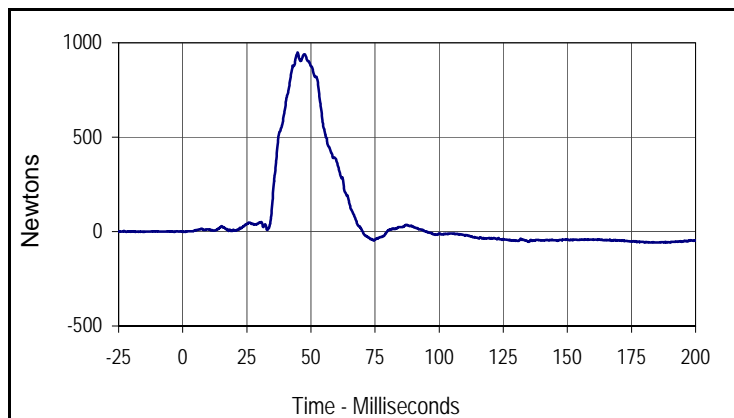
| Curve Description                        |      |           |       |
|--|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration Z |      |           |       |
| CURNO                                    | Type | SAE Class | Units |
| 039                                      | FIL  | 180       | G's   |
| Max                                      | Time | Min       | Time  |
| 11.1                                     | 72.5 | -13.3     | 44.7  |



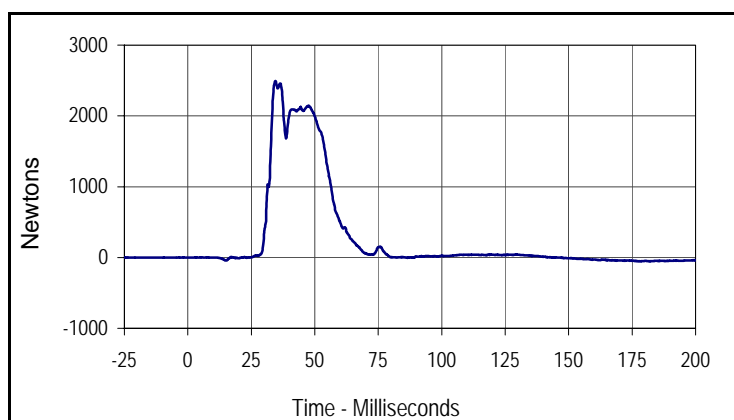
| Curve Description                                |      |           |       |
|--|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration Resultant |      |           |       |
| CURNO  | Type | SAE Class | Units |
| 037  | RES  | 180       | G's   |
| Max  | Time | Min       | Time  |
| 56.7   | 44.8 | 0.1       | 2.9   |

Test Vehicle: 2011 Nissan Leaf SL 5-Door Hatchback  
 Test Program: 61 km/h (38 mph) Side Impact NCAP 27° Moving Deformable Barrier Test

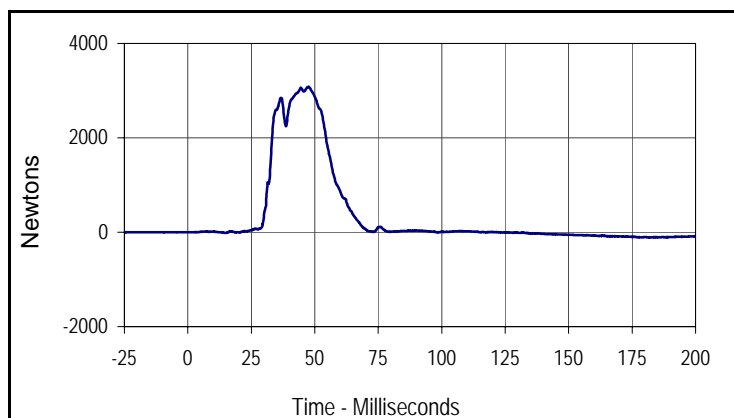
Test Date: 6/17/11  
 NHTSA No.: MB5219



| Curve Description                           |      |           |         |
|---|------|-----------|---------|
| Passenger Iliac Wing Force on Impact Side Y |      |           |         |
| CURNO                                       | Type | SAE Class | Units   |
| 043   | FIL  | 600       | Newtons |
| Max   | Time | Min       | Time    |
| 948.3                                       | 44.8 | -58.3     | 182.7   |



| Curve Description                           |      |           |         |
|---|------|-----------|---------|
| Passenger Acetabulum Force on Impact Side Y |      |           |         |
| CURNO                                       | Type | SAE Class | Units   |
| 042   | FIL  | 600       | Newtons |
| Max   | Time | Min       | Time    |
| 2492.6                                      | 34.5 | -54.5     | 182.0   |



| Curve Description            |      |           |         |
|------------------------------|------|-----------|---------|
| Passenger Total Pelvic Force |      |           |         |
| CURNO                        | Type | SAE Class | Units   |
| 042                          | SUM  | 600       | Newtons |
| Max                          | Time | Min       | Time    |
| 3083.0                       | 47.5 | -112.3    | 182.0   |

**APPENDIX C**  
**DUMMY CALIBRATION DATA**

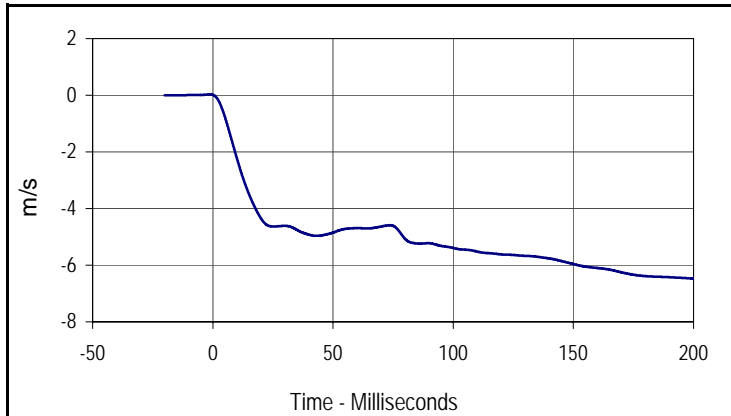
**APPENDIX C**  
**PRE-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

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

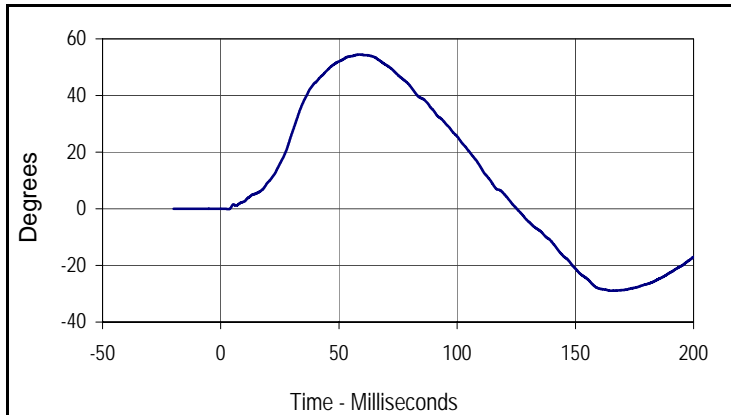
Test Date: 6/14/11  
 Test I.D.: F035NB012



| Tested Parameter                       | Units   | Specification | Result         | Pass/Fail |      |
|--|---------|---------------|----------------|-----------|------|
| Laboratory Temperature                 | °C      | 20.6 to 22.2  | 21.26          | Pass      |      |
| Laboratory Relative Humidity           | %       | 10 to 70      | 21.25          | Pass      |      |
| Pendulum Velocity                      | m/s     | 3.30 to 3.50  | 3.40           | Pass      |      |
| Pendulum Deceleration                  | 1 msec  | m/s           | 0.0 to -.050   | -0.035    | Pass |
|  | 3 msec  | m/s           | -.250 to -.375 | -0.295    | Pass |
|  | 14 msec | m/s           | -3.20 to -3.70 | -3.27     | Pass |
| Headform Rotation                      | Max     | Degrees       | 49.0 to 58.0   | 54.5      | Pass |
|  | Time    | msec          | 54.0 to 66.0   | 59.0      | Pass |
| Maximum Rotation To Time Zero Crossing | msec    | 53.0 to 88.0  | 66.3           | Pass      |      |
| Overall Test Results                   |         |               |                | Pass      |      |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Pendulum Velocity |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 60        | m/s   |
| Max               | Time | Min       | Time  |
| 0.0               | -1.3 | -6.5      | 200.0 |



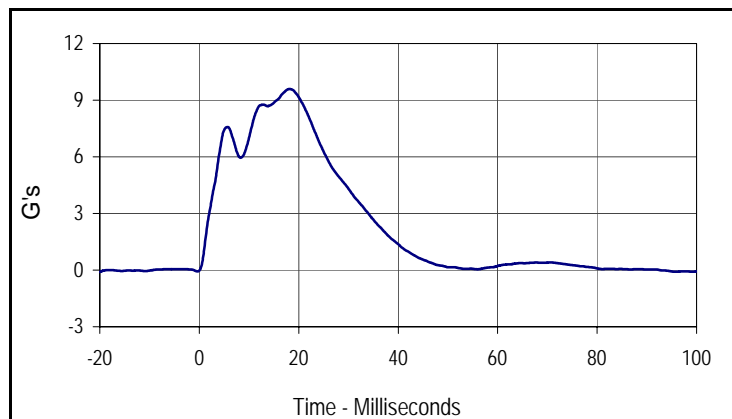
| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Headform Rotation |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 002               | FIL  | 180       | Degrees |
| Max               | Time | Min       | Time    |
| 54.5              | 59.0 | -28.9     | 164.8   |

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

Test Date: 6/14/11  
 Test I.D.: F035SH012



| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2  | 21.26  | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 21.25  | Pass      |
| Probe Velocity               | m/s   | 4.20 to 4.40  | 4.25   | Pass      |
| Peak Impactor Acceleration   | G's   | 7.5 to 10.5   | 9.59   | Pass      |
| Overall Test Results         |       |               |        | Pass      |



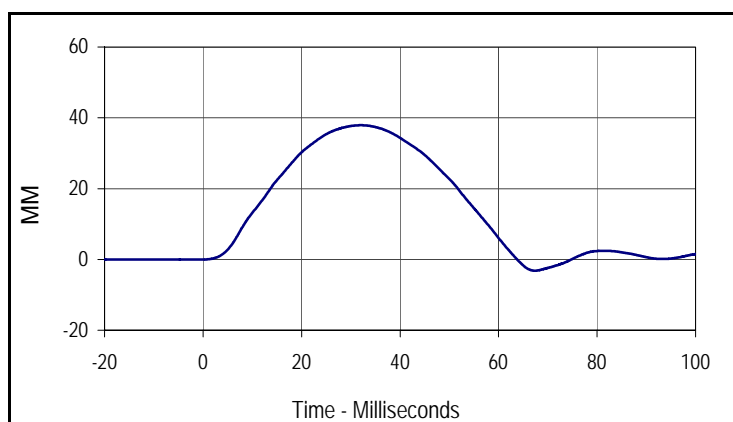
| Curve Description            |      |           |       |
|------------------------------|------|-----------|-------|
| <u>Impactor Acceleration</u> |      |           |       |
| CURNO                        | Type | SAE Class | Units |
| 001                          | FIL  | 180       | G's   |
| Max                          | Time | Min       | Time  |
| 9.6                          | 18.1 | -0.1      | -20.0 |

Test Program: ES2re Rib Module Calibration  
 ATD Serial No.: F035 Rib #1

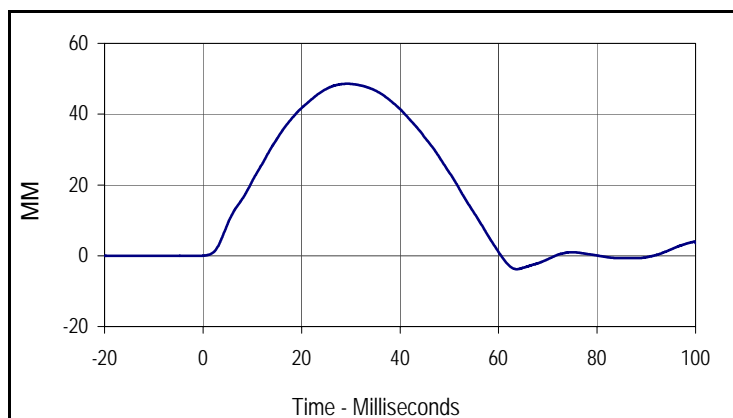
Test Date: 6/14/11  
 Test I.D.: F035RIB1012



| Tested Parameter                          | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Laboratory Temperature                    | °C    | 20.6 to 22.2  | 21.29  | Pass      |
| Laboratory Relative Humidity              | %     | 10 to 70      | 22.05  | Pass      |
| Peak Rib Deflection at 459 MM Drop Height | MM    | 36 to 40      | 37.9   | Pass      |
| Peak Rib Deflection at 815 MM Drop Height | MM    | 46 to 51      | 48.6   | Pass      |
| Overall Test Results                      |       |               |        | Pass      |



| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Upper Rib Deflection (459 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 37.9                                      | 32.1 | -3.2      | 67.4  |



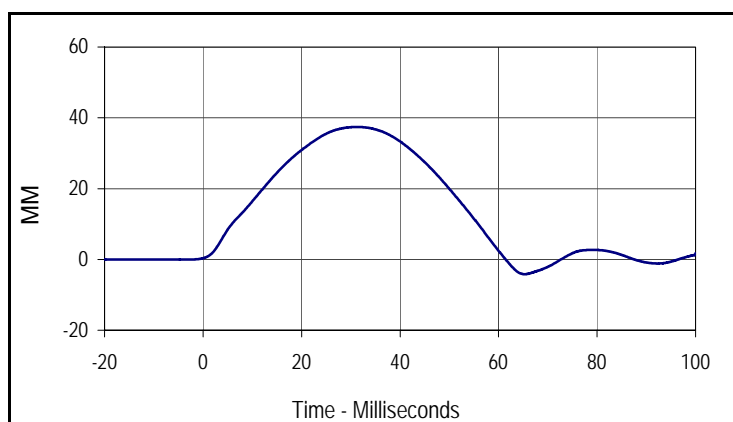
| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Upper Rib Deflection (815 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 48.6                                      | 29.3 | -3.8      | 63.7  |

Test Program: ES2re Rib Module Calibration  
 ATD Serial No.: F035 Rib #2

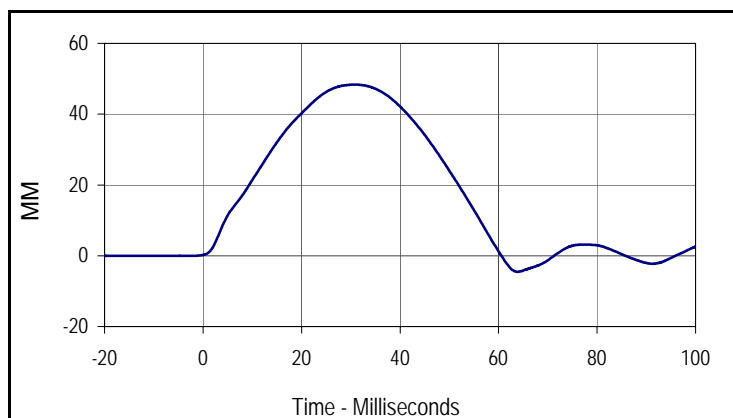
Test Date: 6/14/11  
 Test I.D.: F035RIB2012



| Tested Parameter                          | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Laboratory Temperature                    | °C    | 20.6 to 22.2  | 21.23  | Pass      |
| Laboratory Relative Humidity              | %     | 10 to 70      | 21.92  | Pass      |
| Peak Rib Deflection at 459 MM Drop Height | MM    | 36 to 40      | 37.4   | Pass      |
| Peak Rib Deflection at 815 MM Drop Height | MM    | 46 to 51      | 48.3   | Pass      |
| Overall Test Results                      |       |               |        | Pass      |



| Curve Description                          |      |           |       |
|--|------|-----------|-------|
| Middle Rib Deflection (459 MM Drop Height) |      |           |       |
| CURNO                                      | Type | SAE Class | Units |
| 001  | FIL  | 180       | MM    |
| Max  | Time | Min       | Time  |
| 37.4                                       | 31.3 | -4.2      | 65.3  |



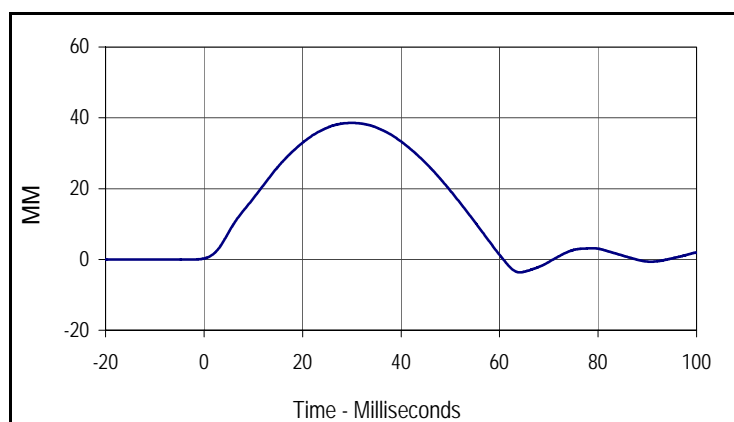
| Curve Description                          |      |           |       |
|--|------|-----------|-------|
| Middle Rib Deflection (815 MM Drop Height) |      |           |       |
| CURNO                                      | Type | SAE Class | Units |
| 001  | FIL  | 180       | MM    |
| Max  | Time | Min       | Time  |
| 48.3                                       | 30.8 | -4.5      | 63.9  |

Test Program: ES2re Rib Module Calibration  
 ATD Serial No.: F035 Rib #3

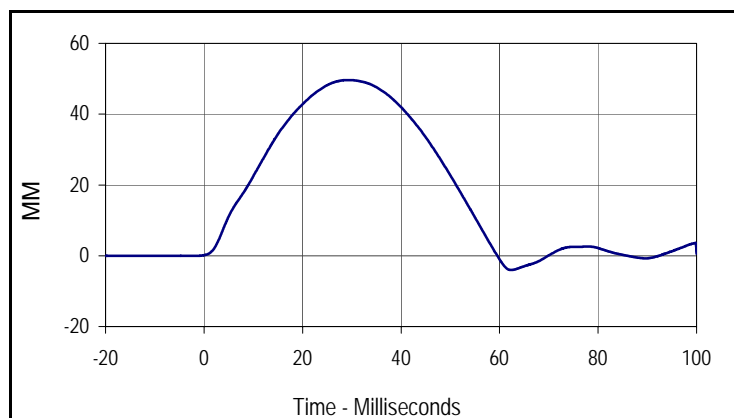
Test Date: 6/14/11  
 Test I.D.: F035RIB3012



| Tested Parameter                          | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Laboratory Temperature                    | °C    | 20.6 to 22.2  | 21.21  | Pass      |
| Laboratory Relative Humidity              | %     | 10 to 70      | 21.85  | Pass      |
| Peak Rib Deflection at 459 MM Drop Height | MM    | 36 to 40      | 38.6   | Pass      |
| Peak Rib Deflection at 815 MM Drop Height | MM    | 46 to 51      | 49.6   | Pass      |
| Overall Test Results                      |       |               | Pass   | Pass      |



| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Lower Rib Deflection (459 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 38.6                                      | 30.0 | -3.6      | 64.1  |



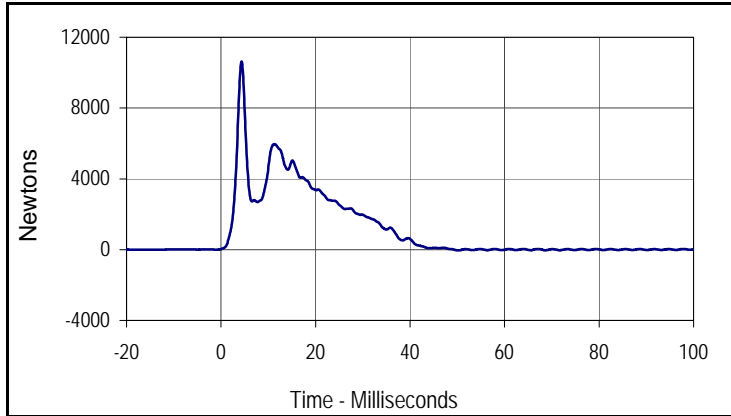
| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Lower Rib Deflection (815 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 49.6                                      | 29.4 | -4.0      | 62.4  |

Test Program: ES2re Thorax Calibration  
 ATD Serial No.: F035

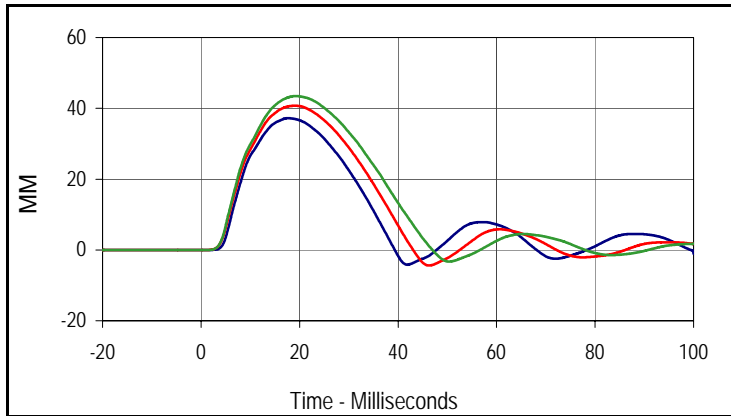
Test Date: 6/14/11  
 Test I.D.: F035TH012



| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2  | 21.39  | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 22.02  | Pass      |
| Probe Velocity               | m/s   | 5.40 to 5.60  | 5.46   | Pass      |
| Impactor Force               | N     | 5100 to 6200  | 5957.3 | Pass      |
|                              | msec  | > 6.0 msec    | 11.3   | Pass      |
| Upper Rib Deflection         | MM    | 34 to 41      | 37.2   | Pass      |
| Middle Rib Deflection        | MM    | 37 to 45      | 40.7   | Pass      |
| Lower Rib Deflection         | MM    | 37 to 44      | 43.5   | Pass      |
| Overall Test Results         |       |               |        | Pass      |



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Impactor Force    |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 001               | FIL  | 180       | Newtons |
| Max               | Time | Min       | Time    |
| 10622.0           | 4.4  | -44.7     | 50.3    |



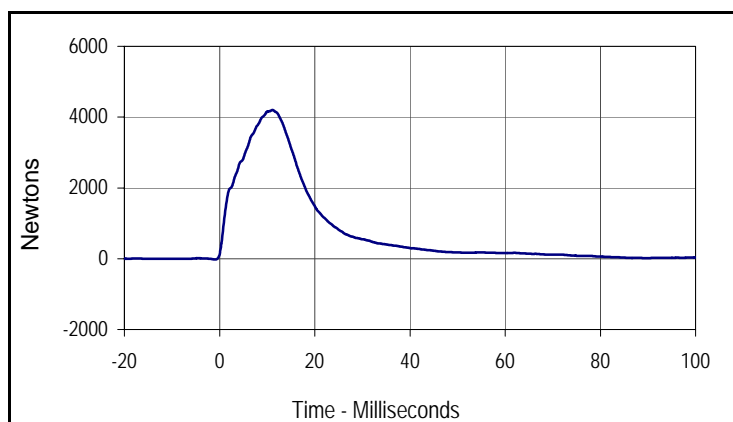
| Curve Description                    |      |              |       |
|--------------------------------------|------|--------------|-------|
| Upper, Middle, Lower Rib Deflections |      |              |       |
| CURNO(s)                             | Type | SAE Class    | Units |
| 002-003-004                          | FIL  | 180          | MM    |
| Max (Upper)                          | Time | Min (Upper)  | Time  |
| 37.2                                 | 17.6 | -4.2         | 41.9  |
| Max (Middle)                         | Time | Min (Middle) | Time  |
| 40.7                                 | 19.1 | -4.4         | 46.3  |
| Max (Lower)                          | Time | Min (Lower)  | Time  |
| 43.5                                 | 19.3 | -3.3         | 50.4  |

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

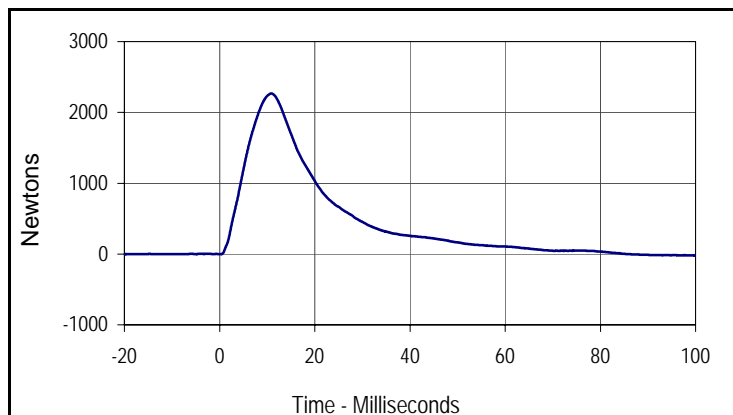
Test Date: 6/14/11  
 Test I.D.: F035ABD012



| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2  | 21.46  | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 22.06  | Pass      |
| Probe Velocity               | m/s   | 3.90 to 4.10  | 3.97   | Pass      |
| Impactor Force               | N     | 4000 to 4800  | 4199.6 | Pass      |
|                              | msec  | 10.6 to 13.0  | 11.1   | Pass      |
| Abdominal Force              | N     | 2200 to 2700  | 2267.5 | Pass      |
|                              | msec  | 10.0 to 12.3  | 10.9   | Pass      |
| Overall Test Results         |       |               |        | Pass      |



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Impactor Force    |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 001               | FIL  | 180       | Newtons |
| Max               | Time | Min       | Time    |
| 4199.6            | 11.1 | -23.4     | -0.9    |



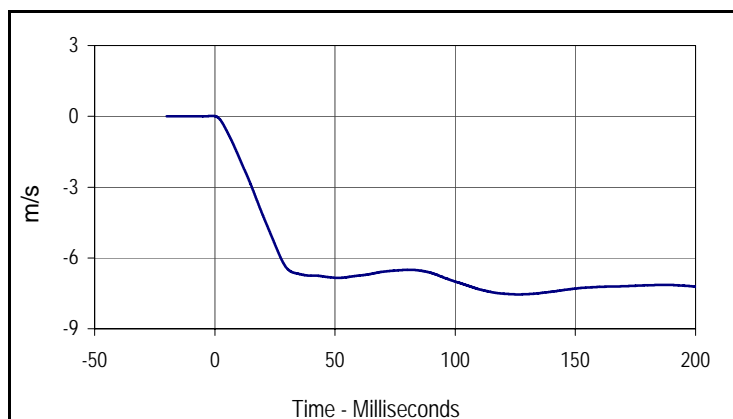
| Curve Description     |      |           |         |
|-----------------------|------|-----------|---------|
| Abdomen Sum Resultant |      |           |         |
| CURNO                 | Type | SAE Class | Units   |
| 002                   | RES  | 600       | Newtons |
| Max                   | Time | Min       | Time    |
| 2267.5                | 10.9 | -18.7     | 98.8    |

Test Program: ES2re Lumbar Spine Calibration  
 ATD Serial No.: F035

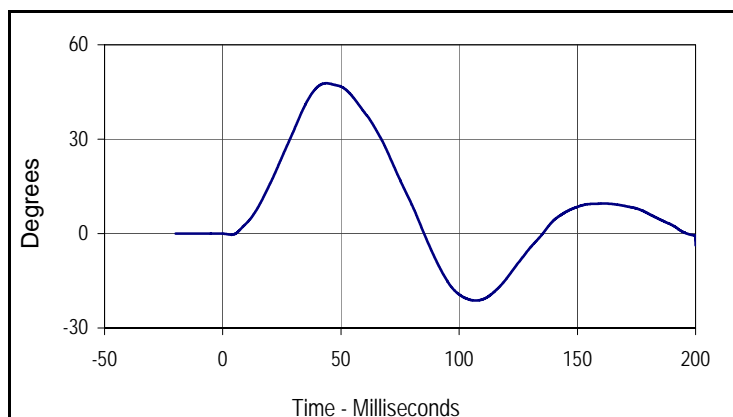
Test Date: 6/14/11  
 Test I.D.: F035SP012



| Tested Parameter                       | Units    | Specification | Result         | Pass/Fail |      |
|--|----------|---------------|----------------|-----------|------|
| Laboratory Temperature                 | °C       | 20.6 to 22.2  | 21.49          | Pass      |      |
| Laboratory Relative Humidity           | %        | 10 to 70      | 21.24          | Pass      |      |
| Pendulum Velocity                      | m/s      | 5.95 to 6.15  | 6.06           | Pass      |      |
| Pendulum Deceleration                  | 1 msec   | m/s           | 0.0 to -.050   | -0.028    | Pass |
|  | 3.7 msec | m/s           | -.240 to -.425 | -0.376    | Pass |
|  | 27 msec  | m/s           | -5.80 to -6.50 | -5.90     | Pass |
|  | 30 msec  | m/s           | < -6.50        | -6.44     | Pass |
| Headform Rotation                      | Max      | Degrees       | 45.0 to 55.0   | 47.8      | Pass |
|  | Time     | msec          | 39.0 to 53.0   | 43.9      | Pass |
| Maximum Rotation To Time Zero Crossing | msec     | 37.0 to 57.0  | 41.3           | Pass      |      |
| Overall Test Results                   |          |               |                | Pass      |      |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Pendulum Velocity |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 60        | m/s   |
| Max               | Time | Min       | Time  |
| 0.0               | -1.0 | -7.5      | 126.3 |



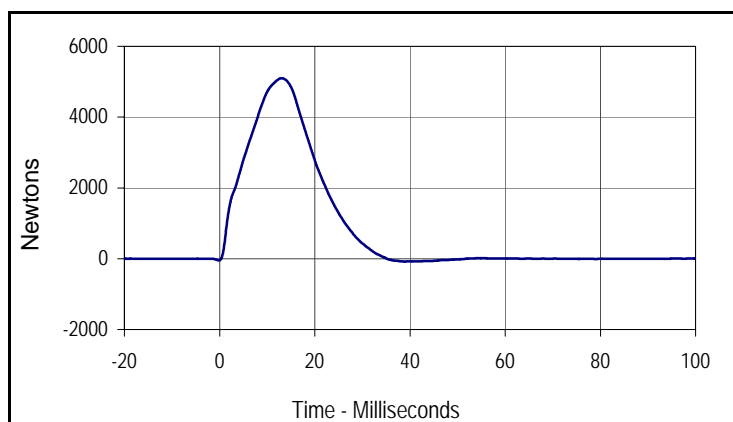
| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Headform Rotation |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 002               | FIL  | 180       | Degrees |
| Max               | Time | Min       | Time    |
| 47.8              | 43.9 | -21.3     | 107.0   |

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

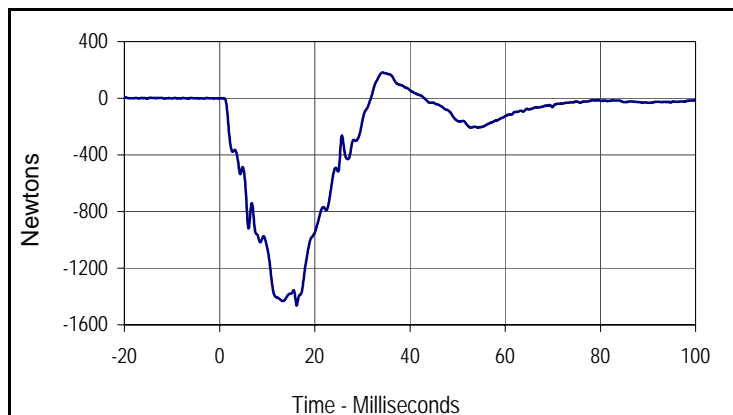
Test Date: 6/14/11  
 Test I.D.: F035PL012



| Tested Parameter             | Units | Specification  | Result  | Pass/Fail |
|------------------------------|-------|----------------|---------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2   | 21.43   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70       | 22.12   | Pass      |
| Probe Velocity               | m/s   | 4.20 to 4.40   | 4.29    | Pass      |
| Impactor Force               | N     | 4700 to 5400   | 5099.0  | Pass      |
|                              | msec  | 11.8 to 16.1   | 13.1    | Pass      |
| Pubic Symphysis Load         | N     | -1230 to -1590 | -1464.8 | Pass      |
|                              | msec  | 12.2 to 17.0   | 16.2    | Pass      |
| Overall Test Results         |       |                |         | Pass      |



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Impactor Force    |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 001               | FIL  | 180       | Newtons |
| Max               | Time | Min       | Time    |
| 5099.0            | 13.1 | -81.0     | 38.9    |



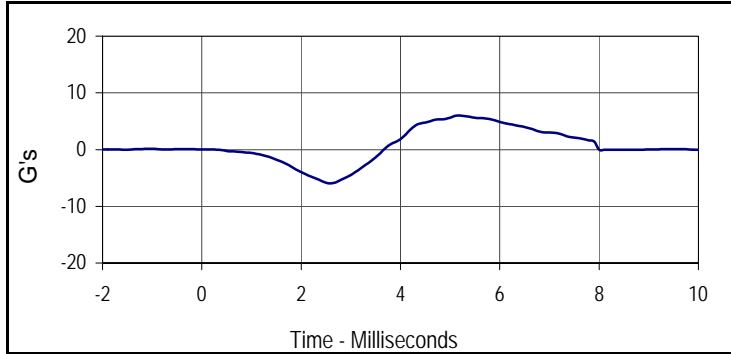
| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Pubic FY          |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 002               | FIL  | 600       | Newtons |
| Max               | Time | Min       | Time    |
| 182.3             | 34.2 | -1464.8   | 16.2    |

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

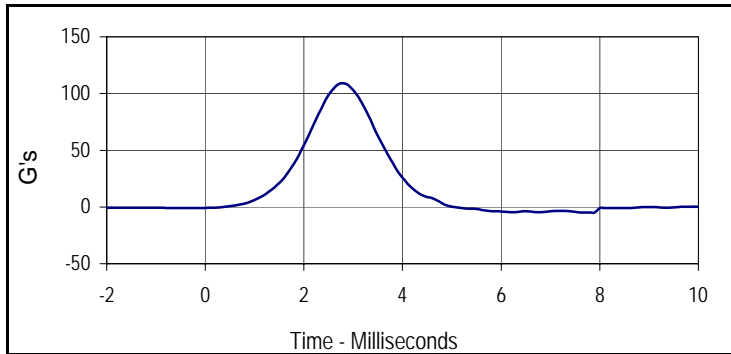
Test Date: 6/14/11  
 Test I.D.: F035HD012



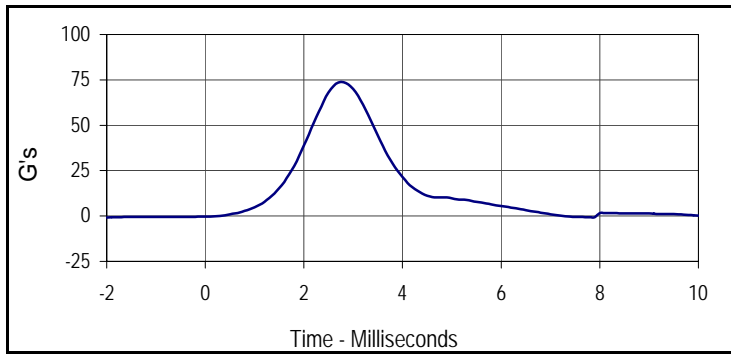
| Tested Parameter               | Units  | Specification | Result      | Pass/Fail |
|--------------------------------|--------|---------------|-------------|-----------|
| Laboratory Temperature         | °C     | 20.6 to 22.2  | 21.42       | Pass      |
| Laboratory Relative Humidity   | %      | 10 to 70      | 22.21       | Pass      |
| Peak Resultant Acceleration    | G's    | 125 to 155    | 131.8       | Pass      |
| Peak Longitudinal Acceleration | G's    | ≤15           | 6.0         | Pass      |
| Is Acceleration Unimodal?      | Yes/No | Yes           | Yes         | Pass      |
| Oscillations After Main Pulse  | %      | <15           | 8.5         | Pass      |
| <b>Overall Test Results</b>    |        |               | <b>Pass</b> |           |



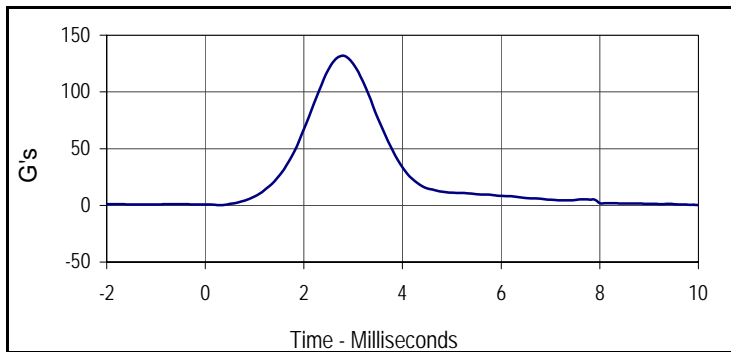
| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head X            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 6.0               | 5.2  | -6.0      | 2.6   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Y            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 002               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 109.2             | 2.8  | -4.9      | 7.7   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Z            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 003               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 73.7              | 2.8  | -0.8      | -2.0  |



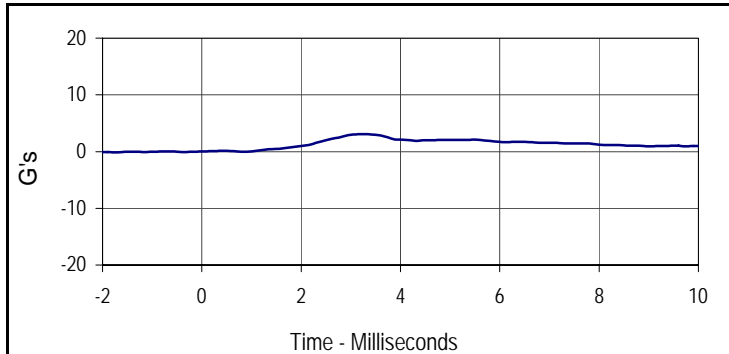
| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Resultant    |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | RES  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 131.8             | 2.8  | 0.2       | 0.3   |

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

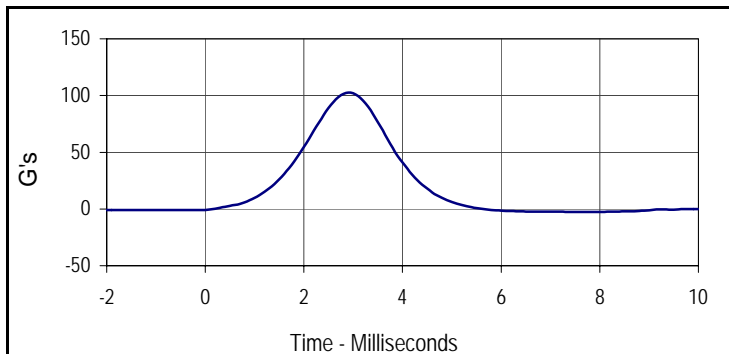
Test Date: 6/15/11  
 Test I.D.: 299HD012



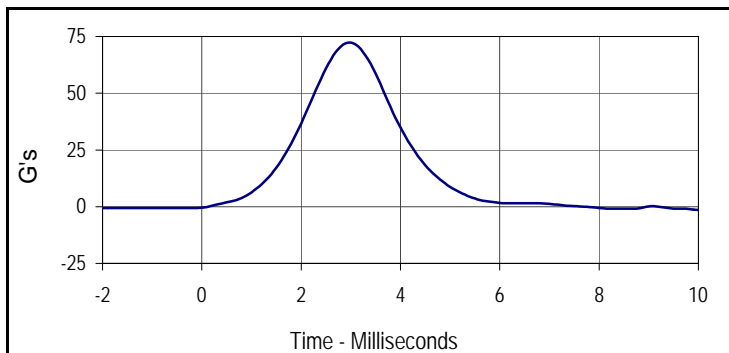
| Tested Parameter               | Units  | Specification | Result | Pass/Fail   |
|--------------------------------|--------|---------------|--------|-------------|
| Laboratory Temperature         | °C     | 20.6 to 22.2  | 21.29  | Pass        |
| Laboratory Relative Humidity   | %      | 10 to 70      | 19.62  | Pass        |
| Peak Resultant Acceleration    | G's    | 115 to 137    | 125.3  | Pass        |
| Peak Longitudinal Acceleration | G's    | ≤15           | 3.1    | Pass        |
| Is Acceleration Unimodal?      | Yes/No | Yes           | Yes    | Pass        |
| Oscillations After Main Pulse  | %      | <15           | 8.7    | Pass        |
| <b>Overall Test Results</b>    |        |               |        | <b>Pass</b> |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head X            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 3.1               | 3.2  | -0.1      | -1.8  |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Y            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 002               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 102.6             | 2.9  | -2.7      | 8.0   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Z            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 003               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 72.3              | 3.0  | -1.4      | 10.0  |



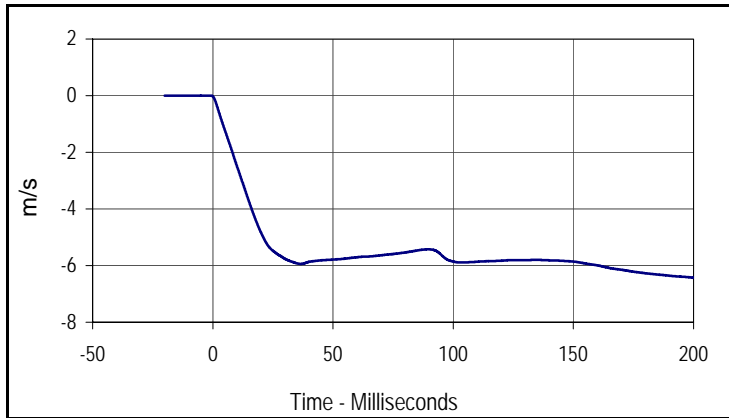
| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Resultant    |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | RES  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 125.3             | 2.9  | 0.4       | 0.1   |

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

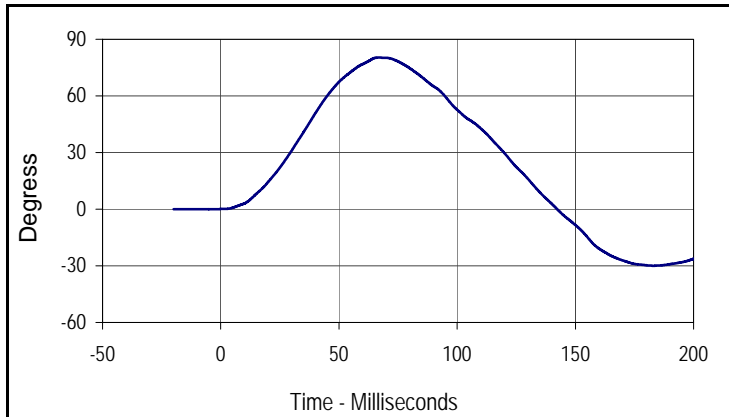
Test Date: 6/15/11  
 Test I.D.: 299NB012



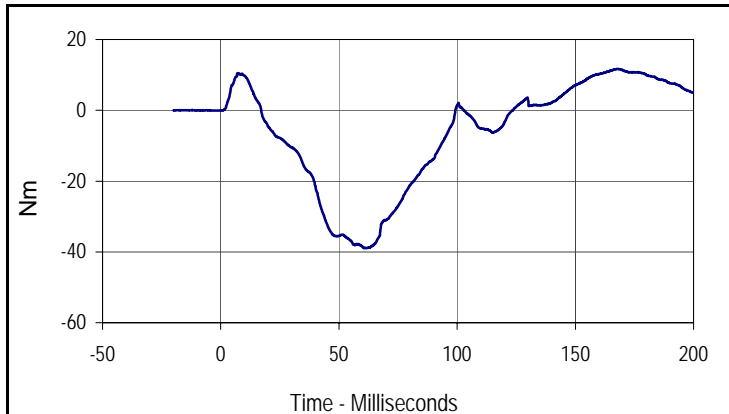
| Tested Parameter                   | Units       | Specification  | Result         | Pass/Fail   |      |
|------------------------------------|-------------|----------------|----------------|-------------|------|
| Laboratory Temperature             | °C          | 20.6 to 22.2   | 21.40          | Pass        |      |
| Laboratory Relative Humidity       | %           | 10 to 70       | 19.60          | Pass        |      |
| Pendulum Velocity                  | m/s         | 5.51 to 5.63   | 5.59           | Pass        |      |
| Pendulum Deceleration              | 10 msec     | m/s            | -2.20 to -2.80 | -2.48       | Pass |
|                                    | 15 msec     | m/s            | -3.30 to -4.10 | -3.73       | Pass |
|                                    | 20 msec     | m/s            | -4.40 to -5.40 | -4.83       | Pass |
|                                    | 25 msec     | m/s            | -5.40 to -6.10 | -5.48       | Pass |
|                                    | 25-100 msec | m/s            | -5.50 to -6.20 | -5.94       | Pass |
| Translation-Rotation               | Max         | Degrees        | 71.0 to 81.0   | 80.3        | Pass |
|                                    | Time        | msec           | 50.0 to 70.0   | 66.7        | Pass |
| Peak Occipital Condyle Moment      | Nm          | -36.0 to -44.0 | -38.9          | Pass        |      |
| Decaying Moment Time to Cross 0 Nm | msec        | 102.0 to 126.0 | 123.6          | Pass        |      |
| <b>Overall Test Results</b>        |             |                |                | <b>Pass</b> |      |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Pendulum Velocity |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 180       | m/s   |
| Max               | Time | Min       | Time  |
| 0.0               | -1.0 | -6.4      | 200.0 |



| Curve Description            |      |           |        |
|------------------------------|------|-----------|--------|
| Maximum Translation Rotation |      |           |        |
| CURNO                        | Type | SAE Class | Units  |
| 002                          | FIL  | 60        | Degree |
| Max                          | Time | Min       | Time   |
| 80.3                         | 66.7 | -29.9     | 183.0  |



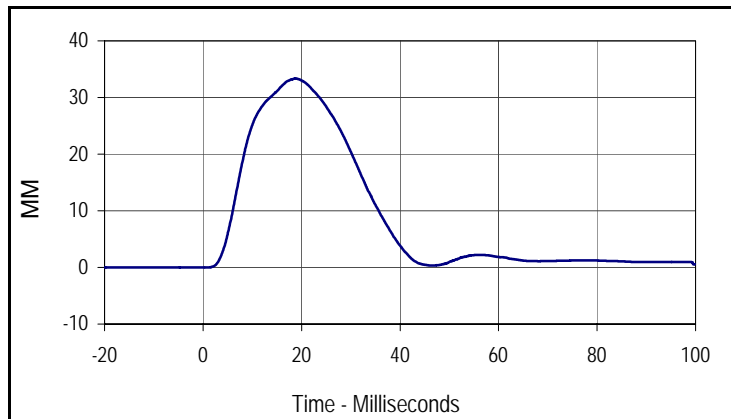
| Curve Description              |       |           |       |
|--------------------------------|-------|-----------|-------|
| Moment About Occipital Condyle |       |           |       |
| CURNO                          | Type  | SAE Class | Units |
| 003                            | FIL   | 600       | Nm    |
| Max                            | Time  | Min       | Time  |
| 11.7                           | 168.1 | -38.9     | 61.6  |

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

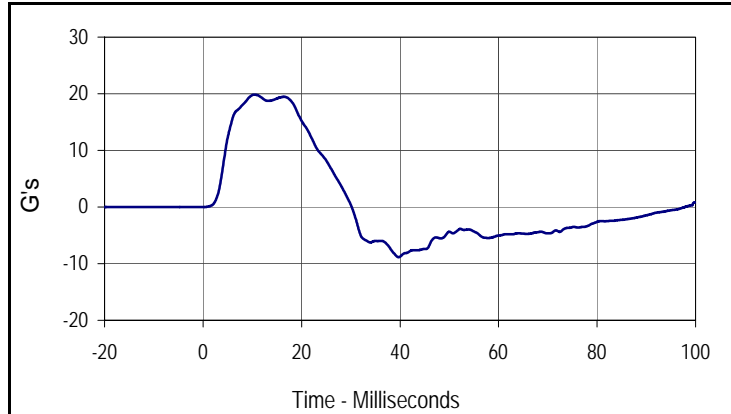
Test Date: 6/15/11  
 Test I.D.: 299SH012



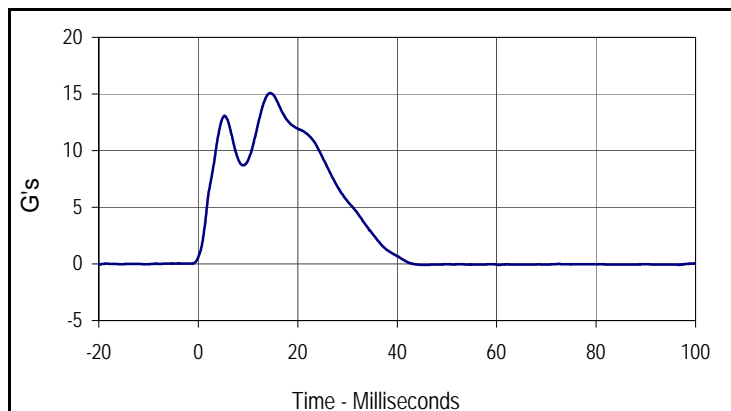
| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6 to 22.2  | 21.58  | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 19.72  | Pass      |
| Pendulum Velocity               | m/s   | 4.20 to 4.40  | 4.28   | Pass      |
| Shoulder Deflection             | MM    | 28 to 37      | 33.4   | Pass      |
| Peak Upper Spine Y Acceleration | G's   | 17 to 22      | 19.8   | Pass      |
| Peak Impactor Acceleration      | G's   | 13 to 18      | 15.1   | Pass      |
| Overall Test Results            |       |               | Pass   |           |



| Curve Description   |      |           |       |
|---------------------|------|-----------|-------|
| Shoulder Deflection |      |           |       |
| CURNO               | Type | SAE Class | Units |
| 001                 | FIL  | 600       | MM    |
| Max                 | Time | Min       | Time  |
| 33.4                | 18.8 | 0.0       | -13.4 |



| Curve Description          |      |           |       |
|----------------------------|------|-----------|-------|
| Upper Spine Y Acceleration |      |           |       |
| CURNO                      | Type | SAE Class | Units |
| 002                        | FIL  | 180       | G's   |
| Max                        | Time | Min       | Time  |
| 19.8                       | 10.4 | -8.8      | 39.7  |



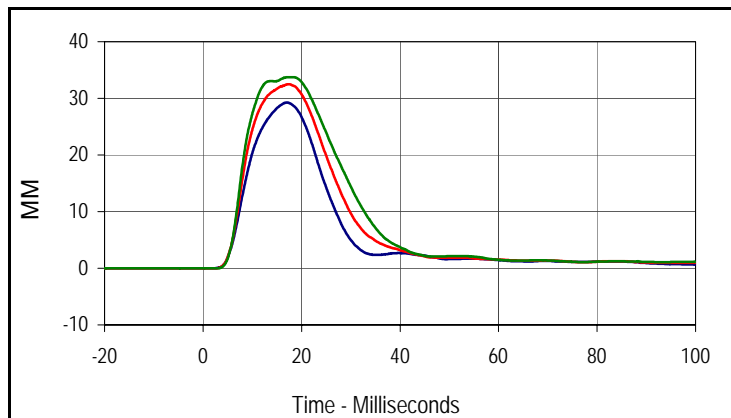
| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 003                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 15.1                  | 14.5 | -0.1      | 45.2  |

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

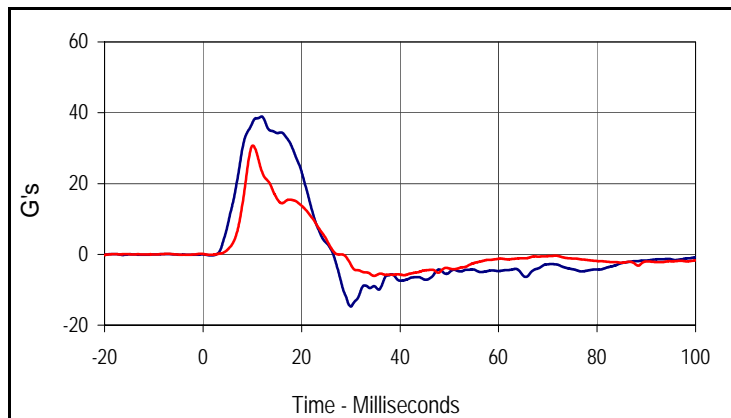
Test Date: 6/15/11  
 Test I.D.: 299TWA012



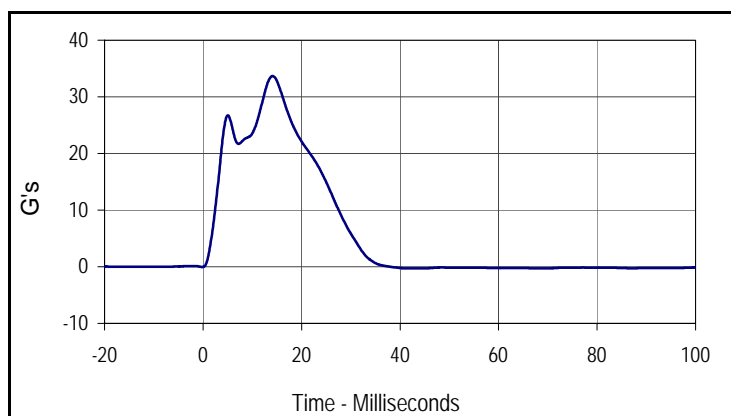
| Tested Parameter                         | Units | Specification | Result | Pass/Fail |
|--|-------|---------------|--------|-----------|
| Laboratory Temperature                   | °C    | 20.6 to 22.2  | 21.4   | Pass      |
| Laboratory Relative Humidity             | %     | 10 to 70      | 20     | Pass      |
| Pendulum Velocity                        | m/s   | 6.60 to 6.80  | 6.74   | Pass      |
| Shoulder Deflection                      | MM    | 31 to 40      | 36.5   | Pass      |
| Upper Thorax Rib Deflection              | MM    | 25 to 32      | 29.2   | Pass      |
| Middle Thorax Rib Deflection             | MM    | 30 to 36      | 32.5   | Pass      |
| Lower Thorax Rib Deflection              | MM    | 32 to 38      | 33.7   | Pass      |
| Peak Upper Spine Y Acceleration          | G's   | 34 to 43      | 39.0   | Pass      |
| Peak Lower Spine Y Acceleration          | G's   | 29 to 37      | 30.7   | Pass      |
| Peak Impactor Acceleration After 5 msec. | G's   | 30 to 36      | 33.7   | Pass      |
| Overall Test Results                     |       |               |        | Pass      |



| Curve Description               |      |           |       |
|---------------------------------|------|-----------|-------|
| <b>Upper Thorax Deflection</b>  |      |           |       |
| CURNO                           | Type | SAE Class | Units |
| 001                             | FIL  | 600       | MM    |
| Max                             | Time | Min       | Time  |
| 29.2                            | 17.0 | 0.0       | -8.3  |
| <b>Middle Thorax Deflection</b> |      |           |       |
| Max                             | Time | Min       | Time  |
| 32.5                            | 17.4 | 0.0       | -15.2 |
| <b>Lower Thorax Deflection</b>  |      |           |       |
| Max                             | Time | Min       | Time  |
| 33.7                            | 17.7 | 0.0       | -10.2 |



| Curve Description                 |      |           |       |
|-----------------------------------|------|-----------|-------|
| <b>Upper Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 004                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 39.0                              | 11.9 | -14.7     | 30.0  |
| <b>Lower Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 005                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 30.7                              | 10.1 | -6.1      | 34.7  |



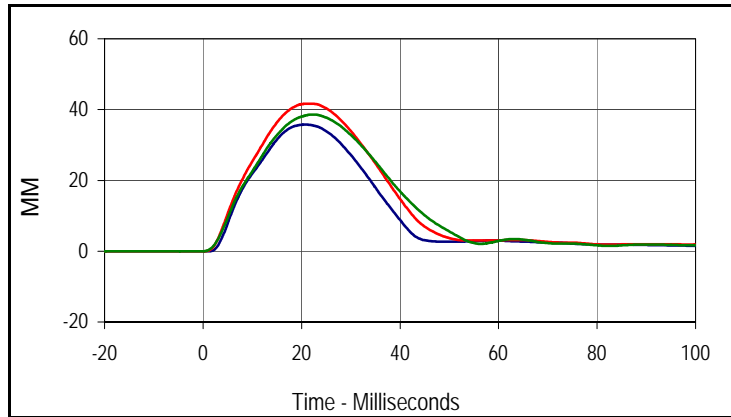
| Curve Description            |      |           |       |
|------------------------------|------|-----------|-------|
| <b>Impactor Acceleration</b> |      |           |       |
| CURNO                        | Type | SAE Class | Units |
| 006                          | FIL  | 180       | G's   |
| Max                          | Time | Min       | Time  |
| 33.7                         | 14.1 | -0.3      | 41.3  |

Test Program: SID IIs Thorax w/o Arm Calibration  
 ATD Serial No.: 299

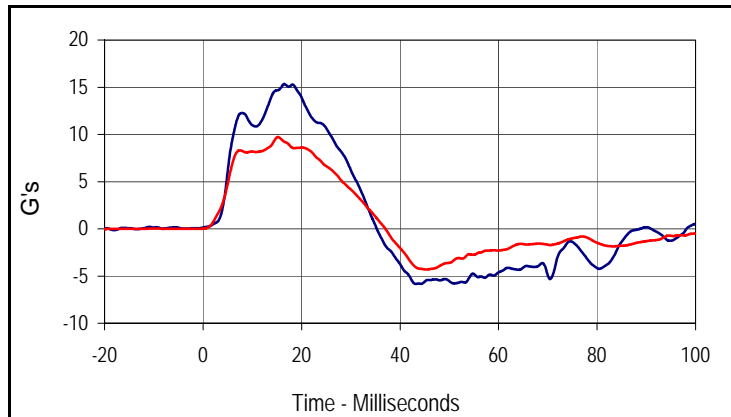
Test Date: 6/15/11  
 Test I.D.: 299TOA012



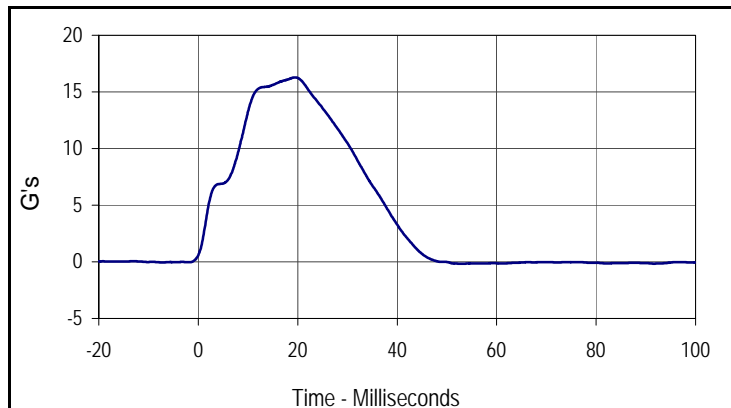
| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6 to 22.2  | 21.44  | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 19.76  | Pass      |
| Pendulum Velocity               | m/s   | 4.20 to 4.40  | 4.29   | Pass      |
| Upper Thorax Rib Deflection     | MM    | 32 to 40      | 35.8   | Pass      |
| Middle Thorax Rib Deflection    | MM    | 39 to 45      | 41.7   | Pass      |
| Lower Thorax Rib Deflection     | MM    | 35 to 43      | 38.6   | Pass      |
| Peak Upper Spine Y Acceleration | G's   | 13 to 17      | 15.3   | Pass      |
| Peak Lower Spine Y Acceleration | G's   | 7 to 11       | 9.7    | Pass      |
| Peak Impactor Acceleration      | G's   | 14 to 18      | 16.3   | Pass      |
| Overall Test Results            |       |               | Pass   |           |



| Curve Description               |      |           |       |
|---------------------------------|------|-----------|-------|
| <b>Upper Thorax Deflection</b>  |      |           |       |
| CURNO                           | Type | SAE Class | Units |
| 001                             | FIL  | 600       | MM    |
| Max                             | Time | Min       | Time  |
| 35.8                            | 20.8 | 0.0       | 0.5   |
| <b>Middle Thorax Deflection</b> |      |           |       |
| Max                             | Time | Min       | Time  |
| 41.7                            | 21.6 | 0.0       | -3.5  |
| <b>Lower Thorax Deflection</b>  |      |           |       |
| Max                             | Time | Min       | Time  |
| 38.6                            | 22.3 | 0.0       | -5.2  |



| Curve Description                 |      |           |       |
|-----------------------------------|------|-----------|-------|
| <b>Upper Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 004                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 15.3                              | 16.5 | -5.8      | 43.2  |
| <b>Lower Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 005                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 9.7                               | 15.2 | -4.3      | 45.4  |



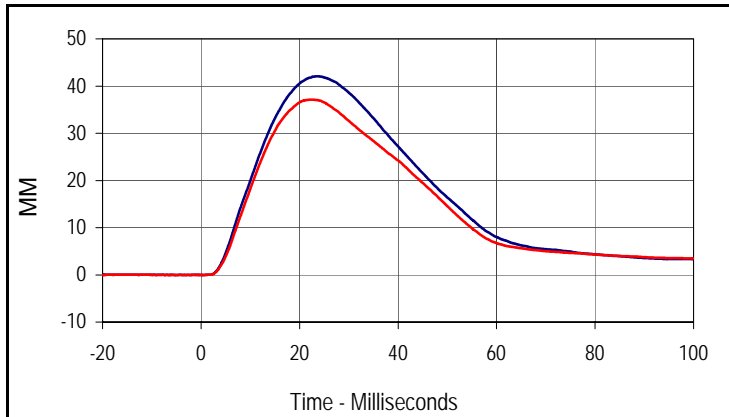
| Curve Description            |      |           |       |
|------------------------------|------|-----------|-------|
| <b>Impactor Acceleration</b> |      |           |       |
| CURNO                        | Type | SAE Class | Units |
| 006                          | FIL  | 180       | G's   |
| Max                          | Time | Min       | Time  |
| 16.3                         | 19.5 | -0.2      | 53.0  |

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

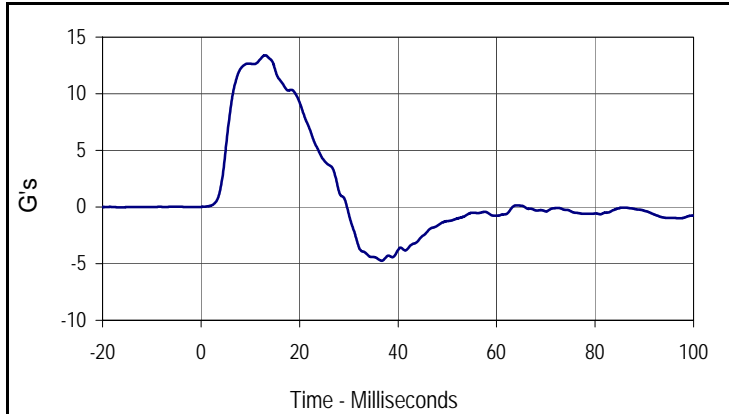
Test Date: 6/15/11  
 Test I.D.: 299ABD012



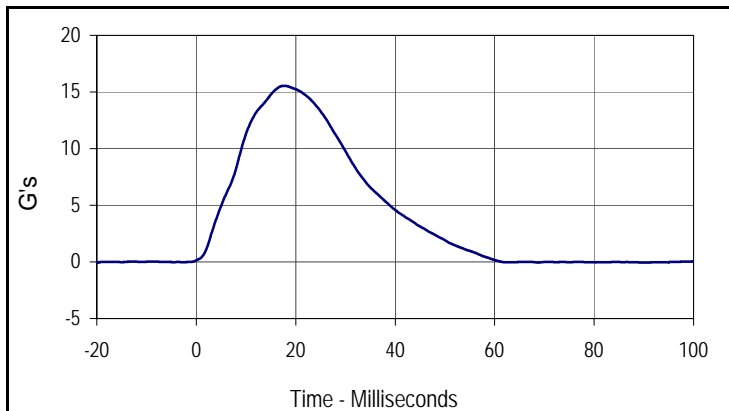
| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6 to 22.2  | 21.51  | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 19.92  | Pass      |
| Pendulum Velocity               | m/s   | 4.20 to 4.40  | 4.26   | Pass      |
| Upper Abdominal Rib Deflection  | MM    | 36 to 47      | 42.0   | Pass      |
| Lower Abdominal Rib Deflection  | MM    | 33 to 44      | 37.1   | Pass      |
| Peak Lower Spine Y Acceleration | G's   | 9 to 14       | 13.4   | Pass      |
| Peak Impactor Acceleration      | G's   | 12 to 16      | 15.5   | Pass      |
| Overall Test Results            |       |               | Pass   |           |



| Curve Description              |      |           |       |
|--------------------------------|------|-----------|-------|
| Upper Abdominal Rib Deflection |      |           |       |
| CURNO                          | Type | SAE Class | Units |
| 001                            | FIL  | 600       | MM    |
| Max                            | Time | Min       | Time  |
| 42.0                           | 23.5 | 0.0       | -6.3  |
| Curve Description              |      |           |       |
| Lower Abdominal Rib Deflection |      |           |       |
| CURNO                          | Type | SAE Class | Units |
| 002                            | FIL  | 600       | MM    |
| Max                            | Time | Min       | Time  |
| 37.1                           | 22.3 | 0.0       | -5.6  |



| Curve Description          |      |           |       |
|----------------------------|------|-----------|-------|
| Lower Spine Y Acceleration |      |           |       |
| CURNO                      | Type | SAE Class | Units |
| 003                        | FIL  | 180       | G's   |
| Max                        | Time | Min       | Time  |
| 13.4                       | 13.0 | -4.7      | 36.7  |



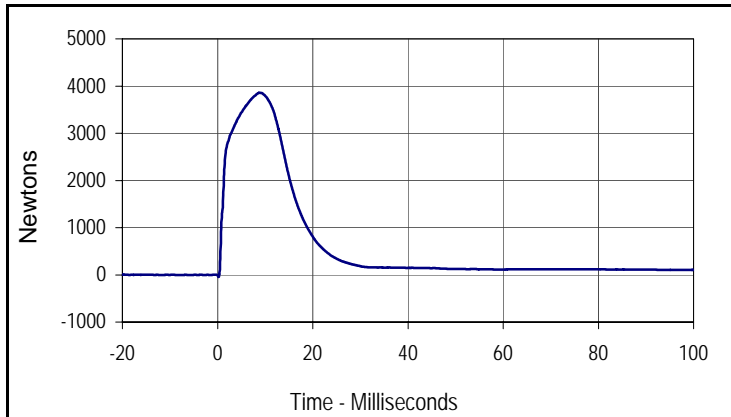
| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 004                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 15.5                  | 17.7 | -0.1      | -20.0 |

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

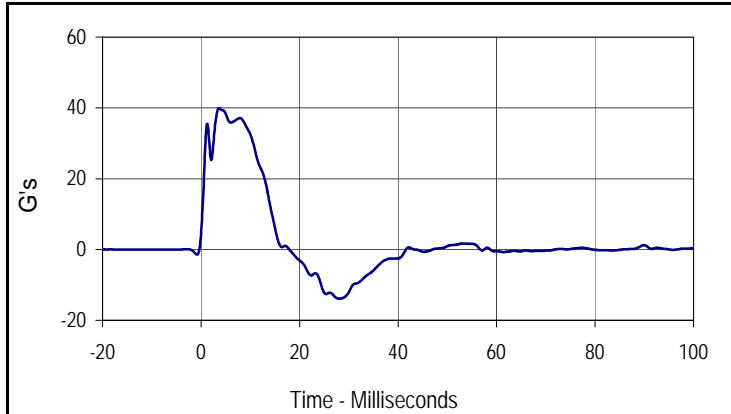
Test Date: 6/15/11  
 Test I.D.: 299PA012



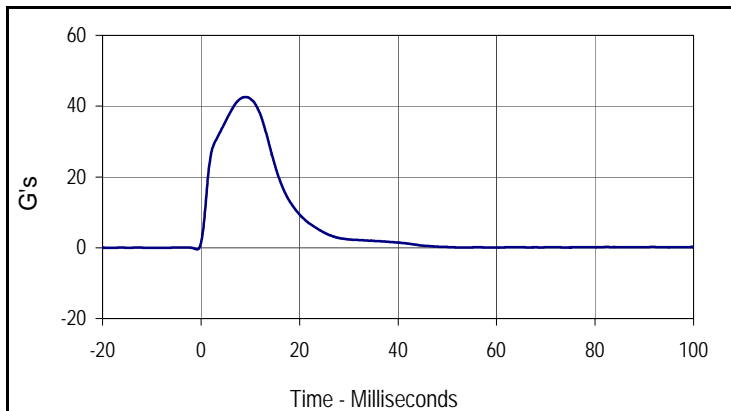
| Tested Parameter                         | Units   | Specification | Result | Pass/Fail |
|--|---------|---------------|--------|-----------|
| Laboratory Temperature                   | °C      | 20.6 to 22.2  | 21.54  | Pass      |
| Laboratory Relative Humidity             | %       | 10 to 70      | 19.86  | Pass      |
| Pendulum Velocity                        | m/s     | 6.60 to 6.80  | 6.66   | Pass      |
| Peak Acetabulum Force                    | Newtons | 3600 to 4300  | 3857.7 | Pass      |
| Peak Pelvis Y Acceleration After 6 msec. | G's     | 34 to 42      | 37.1   | Pass      |
| Peak Impactor Acceleration               | G's     | 38 to 47      | 42.6   | Pass      |
| Overall Test Results                     |         |               | Pass   |           |



| Curve Description       |      |           |         |
|-------------------------|------|-----------|---------|
| Pelvis Acetabulum Force |      |           |         |
| CURNO                   | Type | SAE Class | Units   |
| 001                     | FIL  | 600       | Newtons |
| Max                     | Time | Min       | Time    |
| 3857.7                  | 8.8  | -41.6     | 0.2     |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Pelvis Y Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 002                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 39.9                  | 3.6  | -13.9     | 28.0  |



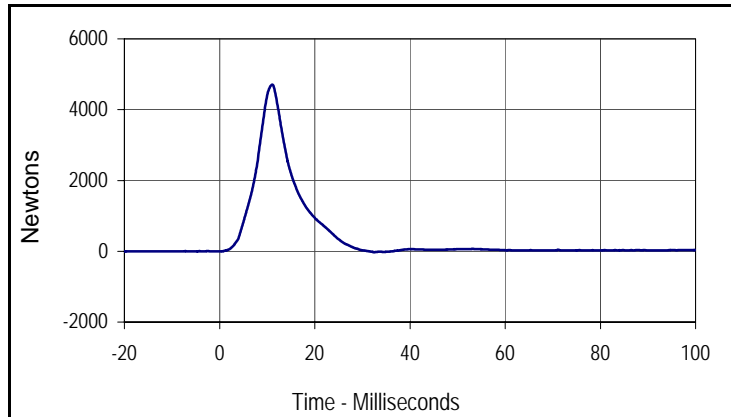
| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 003                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 42.6                  | 9.1  | -0.4      | -0.8  |

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

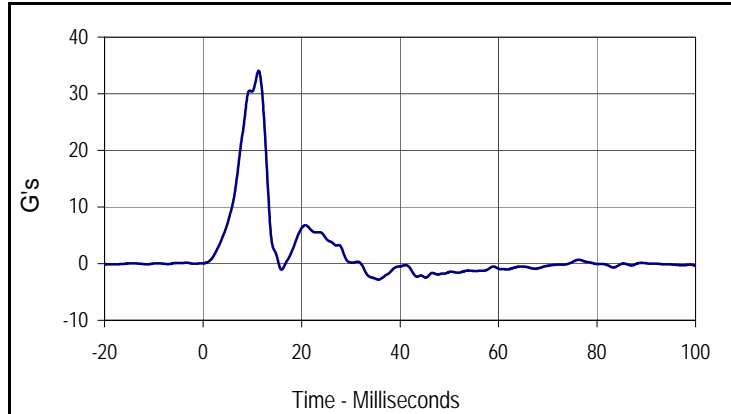
Test Date: 6/15/11  
 Test I.D.: 299PL012



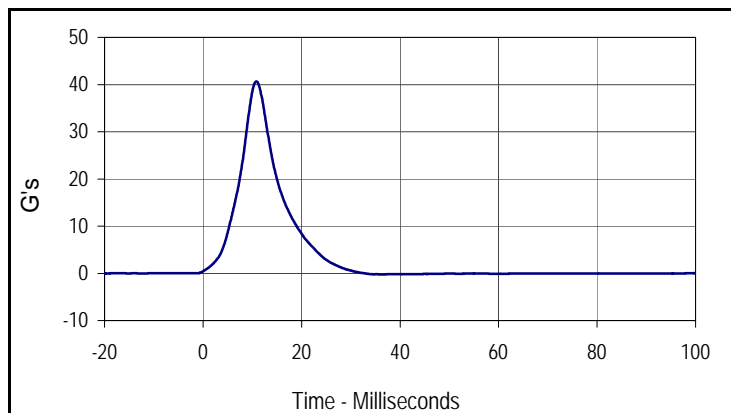
| Tested Parameter             | Units   | Specification | Result | Pass/Fail |
|------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature       | °C      | 20.6 to 22.2  | 21.57  | Pass      |
| Laboratory Relative Humidity | %       | 10 to 70      | 19.75  | Pass      |
| Pendulum Velocity            | m/s     | 4.2 to 4.4    | 4.32   | Pass      |
| Peak Iliac Force             | Newtons | 4100 to 5100  | 4709.3 | Pass      |
| Peak Pelvis Y Acceleration   | G's     | 28 to 39      | 34.1   | Pass      |
| Peak Impactor Acceleration   | G's     | 36 to 45      | 40.7   | Pass      |
| Overall Test Results         |         |               | Pass   | Pass      |



| Curve Description  |      |           |         |
|--------------------|------|-----------|---------|
| Pelvis Iliac Force |      |           |         |
| CURNO              | Type | SAE Class | Units   |
| 001                | FIL  | 600       | Newtons |
| Max                | Time | Min       | Time    |
| 4709.3             | 11.1 | -26.2     | 32.5    |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Pelvis Y Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 002                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 34.1                  | 11.3 | -2.8      | 35.6  |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 003                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 40.7                  | 10.8 | -0.2      | 36.7  |

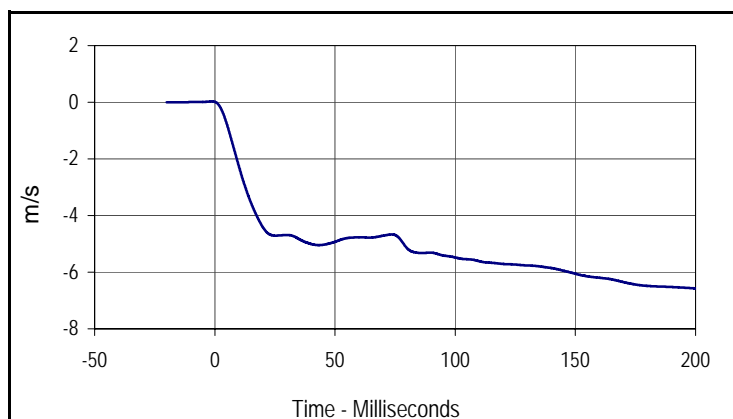
**APPENDIX C**  
**POST-TEST / ATD CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

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

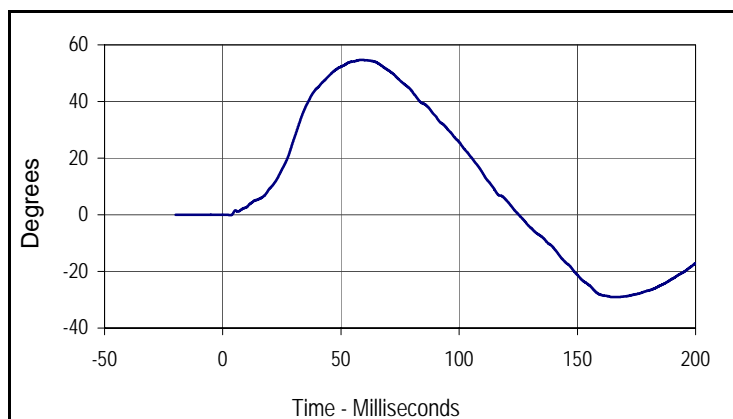
Test Date: 6/21/11  
 Test I.D.: F035NB013



| Tested Parameter                       | Units   | Specification | Result         | Pass/Fail |      |
|--|---------|---------------|----------------|-----------|------|
| Laboratory Temperature                 | °C      | 20.6 to 22.2  | 21.43          | Pass      |      |
| Laboratory Relative Humidity           | %       | 10 to 70      | 20.08          | Pass      |      |
| Pendulum Velocity                      | m/s     | 3.30 to 3.50  | 3.42           | Pass      |      |
| Pendulum Deceleration                  | 1 msec  | m/s           | 0.0 to -.050   | -0.035    | Pass |
|  | 3 msec  | m/s           | -.250 to -.375 | -0.300    | Pass |
|  | 14 msec | m/s           | -3.20 to -3.70 | -3.32     | Pass |
| Headform Rotation                      | Max     | Degrees       | 49.0 to 58.0   | 54.7      | Pass |
|  | Time    | msec          | 54.0 to 66.0   | 59.0      | Pass |
| Maximum Rotation To Time Zero Crossing | msec    | 53.0 to 88.0  | 66.3           | Pass      |      |
| Overall Test Results                   |         |               |                | Pass      |      |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Pendulum Velocity |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 60        | m/s   |
| Max               | Time | Min       | Time  |
| 0.0               | -1.3 | -6.6      | 200.0 |



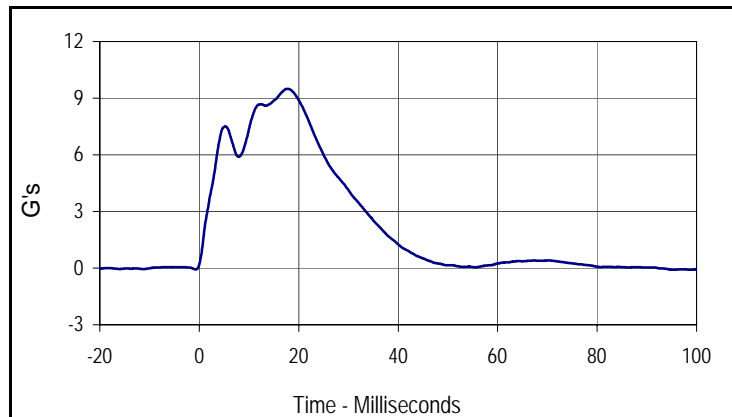
| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Headform Rotation |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 002               | FIL  | 180       | Degrees |
| Max               | Time | Min       | Time    |
| 54.7              | 59.0 | -29.1     | 164.8   |

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

Test Date: 6/21/11  
 Test I.D.: F035SH013



| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2  | 21.43  | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 20.08  | Pass      |
| Probe Velocity               | m/s   | 4.20 to 4.40  | 4.28   | Pass      |
| Peak Impactor Acceleration   | G's   | 7.5 to 10.5   | 9.49   | Pass      |
| Overall Test Results         |       |               |        | Pass      |



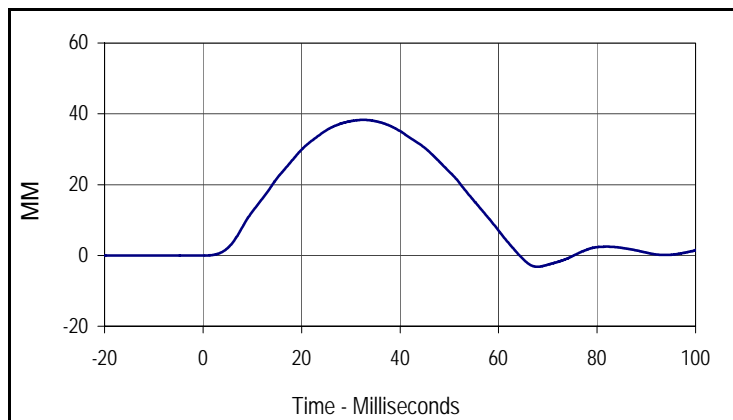
| Curve Description            |      |           |       |
|------------------------------|------|-----------|-------|
| <u>Impactor Acceleration</u> |      |           |       |
| CURNO                        | Type | SAE Class | Units |
| 001                          | FIL  | 180       | G's   |
| Max                          | Time | Min       | Time  |
| 9.5                          | 17.7 | -0.1      | 98.7  |

Test Program: ES2re Rib Module Calibration  
 ATD Serial No.: F035 Rib #1

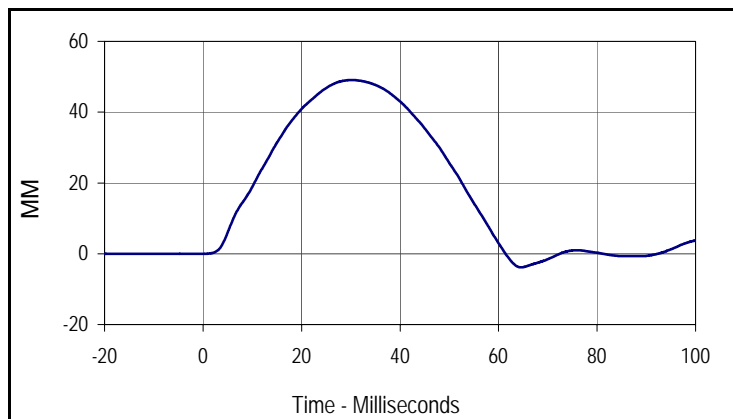
Test Date: 6/21/11  
 Test I.D.: F035RIB1013



| Tested Parameter                          | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Laboratory Temperature                    | °C    | 20.6 to 22.2  | 21.30  | Pass      |
| Laboratory Relative Humidity              | %     | 10 to 70      | 20.12  | Pass      |
| Peak Rib Deflection at 459 MM Drop Height | MM    | 36 to 40      | 38.3   | Pass      |
| Peak Rib Deflection at 815 MM Drop Height | MM    | 46 to 51      | 49.1   | Pass      |
| Overall Test Results                      |       |               | Pass   | Pass      |



| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Upper Rib Deflection (459 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 38.3                                      | 32.6 | -3.2      | 67.9  |



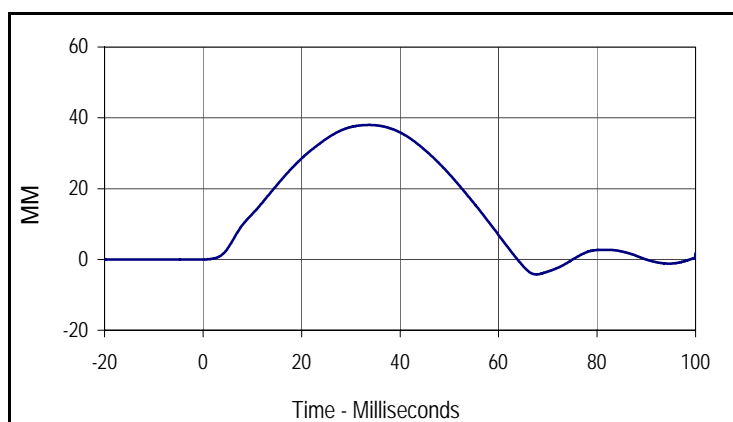
| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Upper Rib Deflection (815 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 49.1                                      | 30.2 | -3.8      | 64.6  |

Test Program: ES2re Rib Module Calibration  
 ATD Serial No.: F035 Rib #2

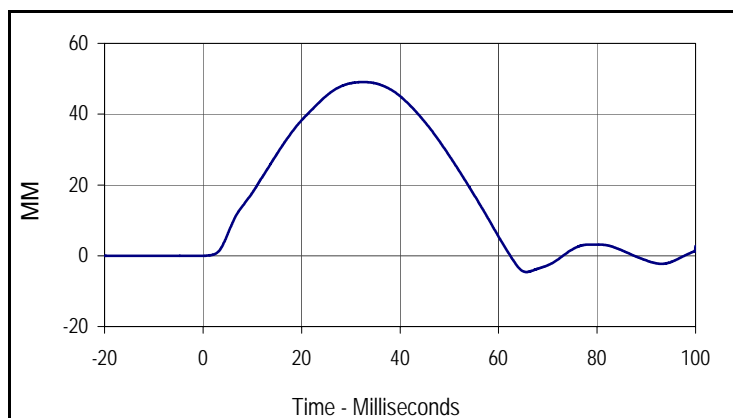
Test Date: 6/21/11  
 Test I.D.: F035RIB2013



| Tested Parameter                          | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Laboratory Temperature                    | °C    | 20.6 to 22.2  | 21.31  | Pass      |
| Laboratory Relative Humidity              | %     | 10 to 70      | 20.27  | Pass      |
| Peak Rib Deflection at 459 MM Drop Height | MM    | 36 to 40      | 38.0   | Pass      |
| Peak Rib Deflection at 815 MM Drop Height | MM    | 46 to 51      | 49.1   | Pass      |
| Overall Test Results                      |       |               |        | Pass      |



| Curve Description                          |      |           |       |
|--|------|-----------|-------|
| Middle Rib Deflection (459 MM Drop Height) |      |           |       |
| CURNO                                      | Type | SAE Class | Units |
| 001  | FIL  | 180       | MM    |
| Max  | Time | Min       | Time  |
| 38.0                                       | 33.7 | -4.2      | 67.7  |



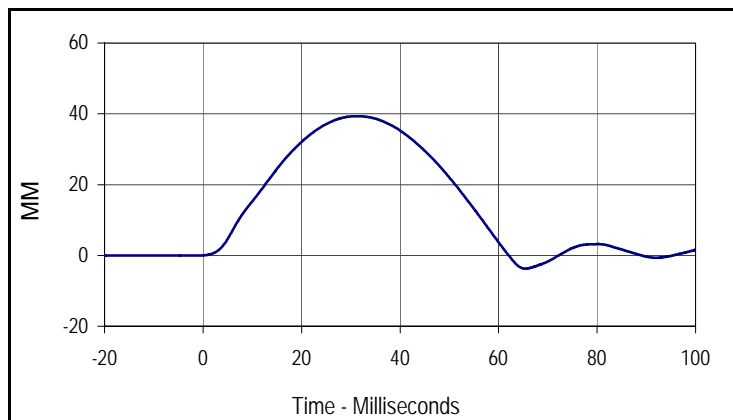
| Curve Description                          |      |           |       |
|--|------|-----------|-------|
| Middle Rib Deflection (815 MM Drop Height) |      |           |       |
| CURNO                                      | Type | SAE Class | Units |
| 001  | FIL  | 180       | MM    |
| Max  | Time | Min       | Time  |
| 49.1                                       | 32.6 | -4.6      | 65.7  |

Test Program: ES2re Rib Module Calibration  
 ATD Serial No.: F035 Rib #3

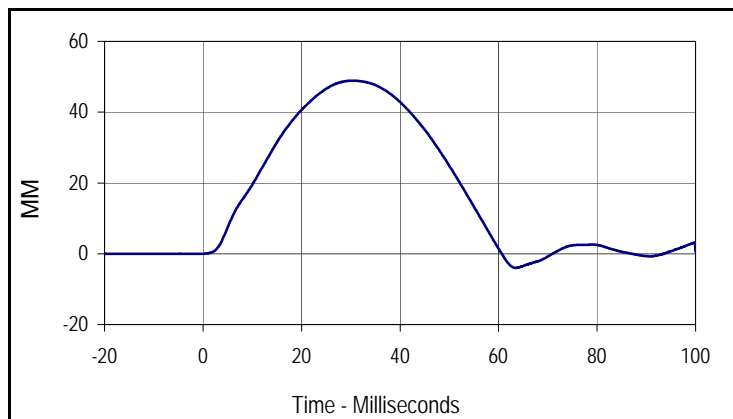
Test Date: 6/21/11  
 Test I.D.: F035RIB3013



| Tested Parameter                          | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Laboratory Temperature                    | °C    | 20.6 to 22.2  | 21.22  | Pass      |
| Laboratory Relative Humidity              | %     | 10 to 70      | 20.43  | Pass      |
| Peak Rib Deflection at 459 MM Drop Height | MM    | 36 to 40      | 39.3   | Pass      |
| Peak Rib Deflection at 815 MM Drop Height | MM    | 46 to 51      | 48.9   | Pass      |
| Overall Test Results                      |       |               | Pass   | Pass      |



| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Lower Rib Deflection (459 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 39.3                                      | 31.3 | -3.7      | 65.4  |



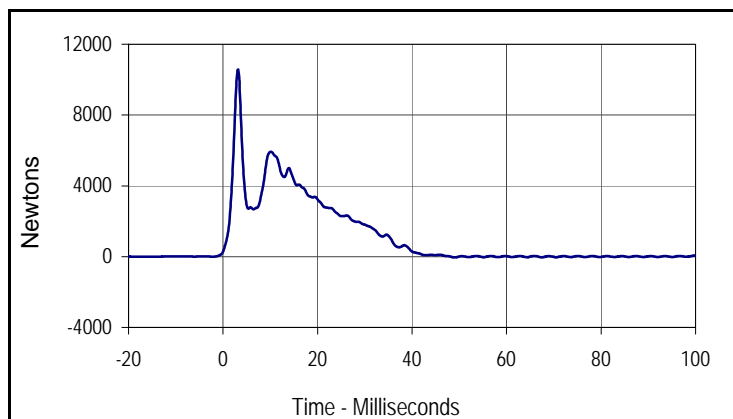
| Curve Description                         |      |           |       |
|---|------|-----------|-------|
| Lower Rib Deflection (815 MM Drop Height) |      |           |       |
| CURNO                                     | Type | SAE Class | Units |
| 001                                       | FIL  | 180       | MM    |
| Max                                       | Time | Min       | Time  |
| 48.9                                      | 30.5 | -4.0      | 63.5  |

Test Program: ES2re Thorax Calibration  
 ATD Serial No.: F035

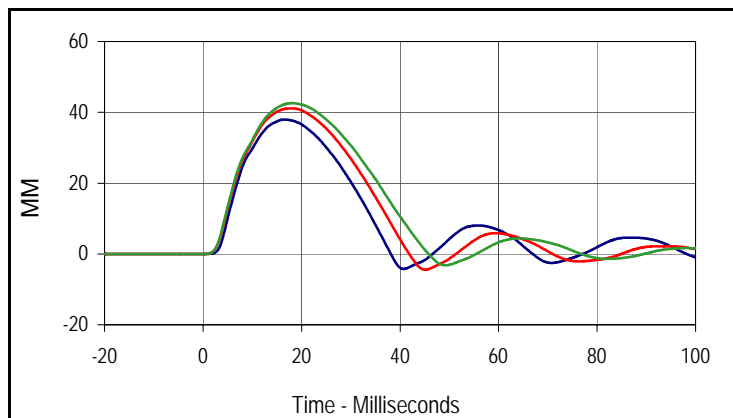
Test Date: 6/21/11  
 Test I.D.: F035TH013



| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2  | 21.26  | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 20.02  | Pass      |
| Probe Velocity               | m/s   | 5.40 to 5.60  | 5.50   | Pass      |
| Impactor Force               | N     | 5100 to 6200  | 5927.0 | Pass      |
|                              | msec  | > 6.0 msec    | 10.1   | Pass      |
| Upper Rib Deflection         | MM    | 34 to 41      | 38.0   | Pass      |
| Middle Rib Deflection        | MM    | 37 to 45      | 41.1   | Pass      |
| Lower Rib Deflection         | MM    | 37 to 44      | 42.6   | Pass      |
| Overall Test Results         |       |               |        | Pass      |



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Impactor Force    |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 001               | FIL  | 180       | Newtons |
| Max               | Time | Min       | Time    |
| 10569.2           | 3.2  | -44.7     | 49.1    |



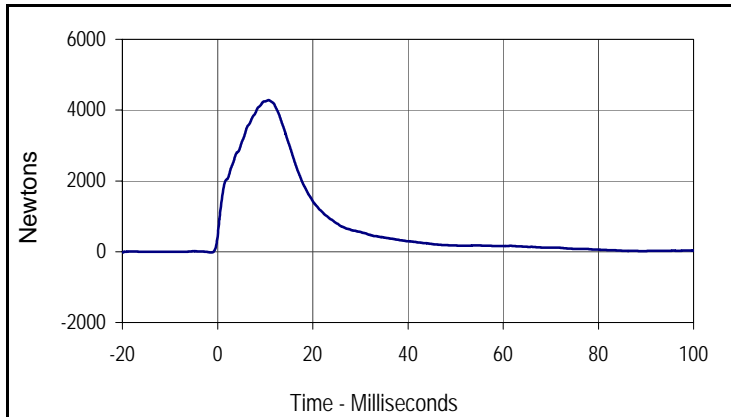
| Curve Description                    |      |              |       |
|--------------------------------------|------|--------------|-------|
| Upper, Middle, Lower Rib Deflections |      |              |       |
| CURNO(s)                             | Type | SAE Class    | Units |
| 002-003-004                          | FIL  | 180          | MM    |
| Max (Upper)                          | Time | Min (Upper)  | Time  |
| 38.0                                 | 16.4 | -4.2         | 40.7  |
| Max (Middle)                         | Time | Min (Middle) | Time  |
| 41.1                                 | 17.9 | -4.4         | 45.1  |
| Max (Lower)                          | Time | Min (Lower)  | Time  |
| 42.6                                 | 18.1 | -3.2         | 49.2  |

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

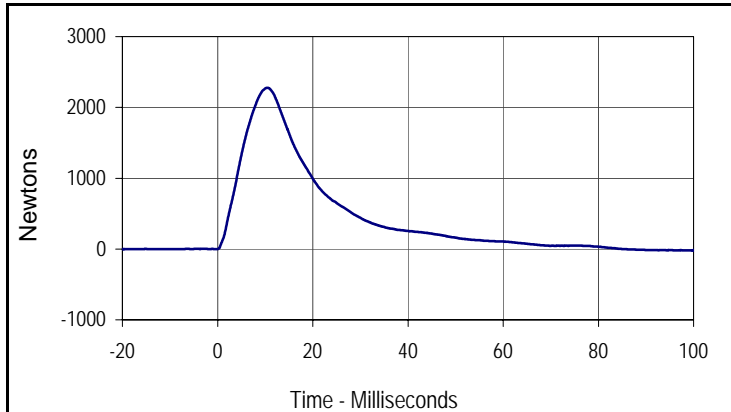
Test Date: 6/21/11  
 Test I.D.: F035ABD013



| Tested Parameter             | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2  | 21.46  | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70      | 20.21  | Pass      |
| Probe Velocity               | m/s   | 3.90 to 4.10  | 3.95   | Pass      |
| Impactor Force               | N     | 4000 to 4800  | 4283.2 | Pass      |
|                              | msec  | 10.6 to 13.0  | 10.7   | Pass      |
| Abdominal Force              | N     | 2200 to 2700  | 2278.6 | Pass      |
|                              | msec  | 10.0 to 12.3  | 10.5   | Pass      |
| Overall Test Results         |       |               |        | Pass      |



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Impactor Force    |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 001               | FIL  | 180       | Newtons |
| Max               | Time | Min       | Time    |
| 4283.2            | 10.7 | -24.4     | -1.3    |



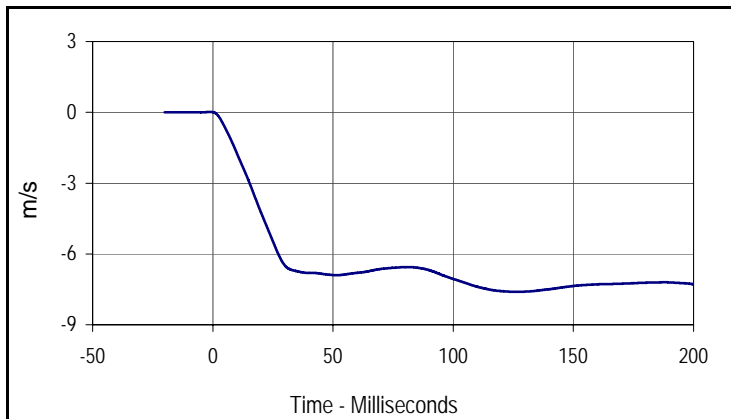
| Curve Description     |      |           |         |
|-----------------------|------|-----------|---------|
| Abdomen Sum Resultant |      |           |         |
| CURNO                 | Type | SAE Class | Units   |
| 002                   | RES  | 600       | Newtons |
| Max                   | Time | Min       | Time    |
| 2278.6                | 10.5 | -18.7     | 98.4    |

Test Program: ES2re Lumbar Spine Calibration  
 ATD Serial No.: F035

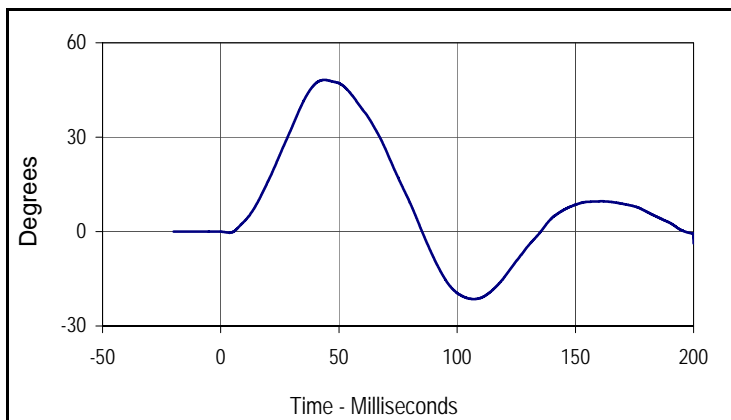
Test Date: 6/21/11  
 Test I.D.: F035SP013



| Tested Parameter                       | Units    | Specification | Result         | Pass/Fail |      |
|--|----------|---------------|----------------|-----------|------|
| Laboratory Temperature                 | °C       | 20.6 to 22.2  | 21.45          | Pass      |      |
| Laboratory Relative Humidity           | %        | 10 to 70      | 20.17          | Pass      |      |
| Pendulum Velocity                      | m/s      | 5.95 to 6.15  | 6.03           | Pass      |      |
| Pendulum Deceleration                  | 1 msec   | m/s           | 0.0 to -.050   | -0.029    | Pass |
|  | 3.7 msec | m/s           | -.240 to -.425 | -0.379    | Pass |
|  | 27 msec  | m/s           | -5.80 to -6.50 | -5.95     | Pass |
|  | 30 msec  | m/s           | < -6.50        | -6.49     | Pass |
| Headform Rotation                      | Max      | Degrees       | 45.0 to 55.0   | 48.2      | Pass |
|  | Time     | msec          | 39.0 to 53.0   | 43.9      | Pass |
| Maximum Rotation To Time Zero Crossing | msec     | 37.0 to 57.0  | 41.3           | Pass      |      |
| Overall Test Results                   |          |               |                | Pass      |      |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Pendulum Velocity |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 60        | m/s   |
| Max               | Time | Min       | Time  |
| 0.0               | -1.0 | -7.6      | 126.3 |



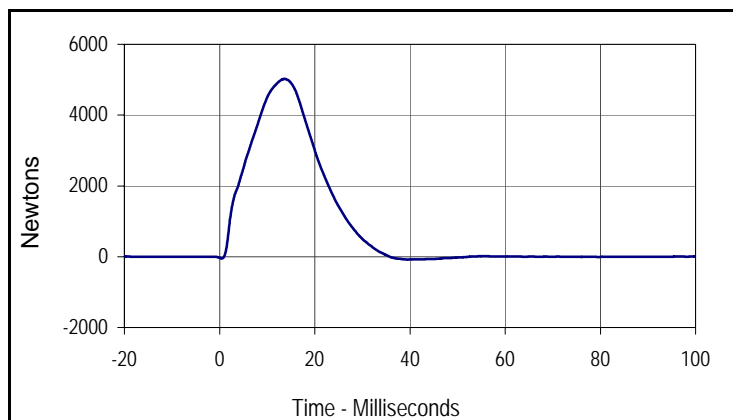
| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Headform Rotation |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 002               | FIL  | 180       | Degrees |
| Max               | Time | Min       | Time    |
| 48.2              | 43.9 | -21.5     | 107.0   |

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

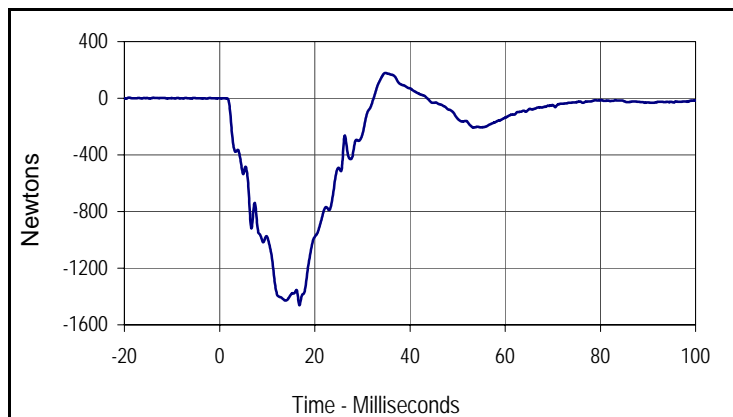
Test Date: 6/21/11  
 Test I.D.: F035PL013



| Tested Parameter             | Units | Specification  | Result  | Pass/Fail |
|------------------------------|-------|----------------|---------|-----------|
| Laboratory Temperature       | °C    | 20.6 to 22.2   | 21.58   | Pass      |
| Laboratory Relative Humidity | %     | 10 to 70       | 20.37   | Pass      |
| Probe Velocity               | m/s   | 4.20 to 4.40   | 4.31    | Pass      |
| Impactor Force               | N     | 4700 to 5400   | 5022.8  | Pass      |
|                              | msec  | 11.8 to 16.1   | 13.7    | Pass      |
| Pubic Symphysis Load         | N     | -1230 to -1590 | -1461.5 | Pass      |
|                              | msec  | 12.2 to 17.0   | 16.8    | Pass      |
| Overall Test Results         |       |                |         | Pass      |



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Impactor Force    |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 001               | FIL  | 180       | Newtons |
| Max               | Time | Min       | Time    |
| 5022.8            | 13.7 | -81.0     | 39.5    |



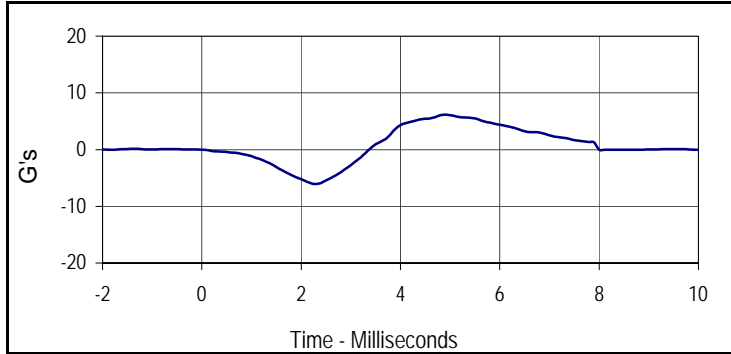
| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Pubic FY          |      |           |         |
| CURNO             | Type | SAE Class | Units   |
| 002               | FIL  | 600       | Newtons |
| Max               | Time | Min       | Time    |
| 179.0             | 34.8 | -1461.5   | 16.8    |

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

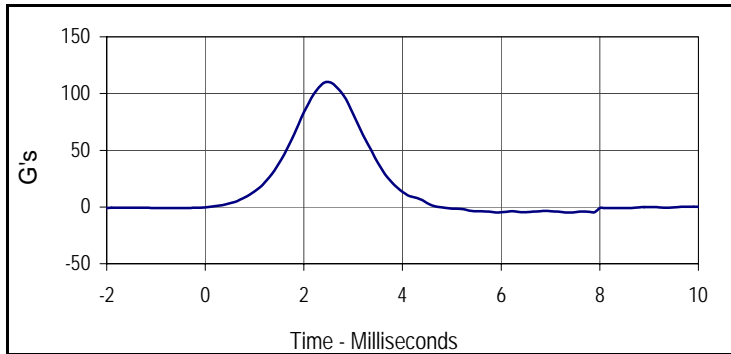
Test Date: 6/21/11  
 Test I.D.: F035HD013



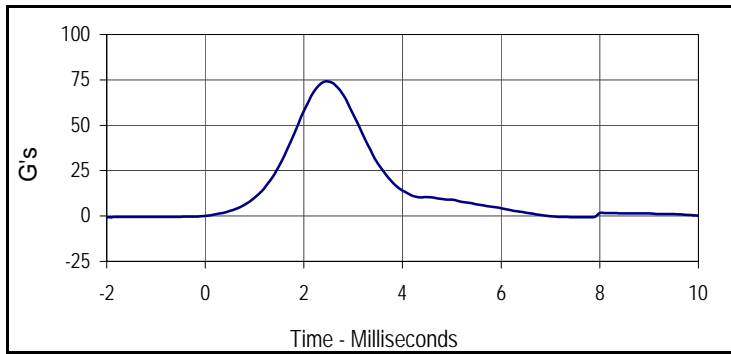
| Tested Parameter               | Units  | Specification | Result | Pass/Fail   |
|--------------------------------|--------|---------------|--------|-------------|
| Laboratory Temperature         | °C     | 20.6 to 22.2  | 21.47  | Pass        |
| Laboratory Relative Humidity   | %      | 10 to 70      | 20.62  | Pass        |
| Peak Resultant Acceleration    | G's    | 125 to 155    | 133.0  | Pass        |
| Peak Longitudinal Acceleration | G's    | ≤15           | 6.2    | Pass        |
| Is Acceleration Unimodal?      | Yes/No | Yes           | Yes    | Pass        |
| Oscillations After Main Pulse  | %      | <15           | 8.2    | Pass        |
| <b>Overall Test Results</b>    |        |               |        | <b>Pass</b> |



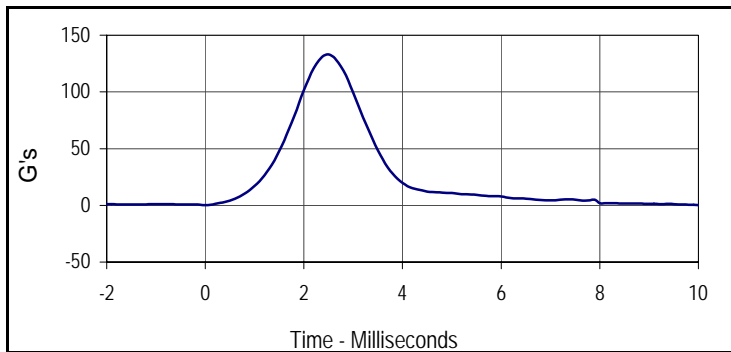
| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head X            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 6.2               | 4.9  | -6.1      | 2.3   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Y            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 002               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 110.3             | 2.5  | -4.9      | 7.4   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Z            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 003               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 74.1              | 2.5  | -0.7      | 7.6   |



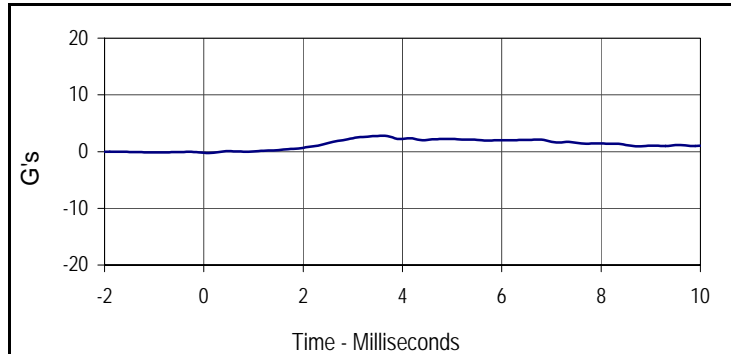
| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Resultant    |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | RES  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 133.0             | 2.5  | 0.2       | 0.0   |

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

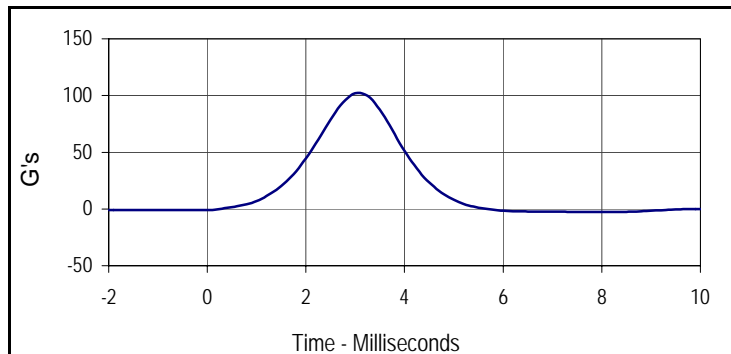
Test Date: 6/20/11  
 Test I.D.: 299HD013



| Tested Parameter               | Units  | Specification | Result      | Pass/Fail |
|--------------------------------|--------|---------------|-------------|-----------|
| Laboratory Temperature         | °C     | 20.6 to 22.2  | 21.17       | Pass      |
| Laboratory Relative Humidity   | %      | 10 to 70      | 20.12       | Pass      |
| Peak Resultant Acceleration    | G's    | 115 to 137    | 124.7       | Pass      |
| Peak Longitudinal Acceleration | G's    | ≤15           | 2.8         | Pass      |
| Is Acceleration Unimodal?      | Yes/No | Yes           | Yes         | Pass      |
| Oscillations After Main Pulse  | %      | <15           | 11.1        | Pass      |
| <b>Overall Test Results</b>    |        |               | <b>Pass</b> |           |



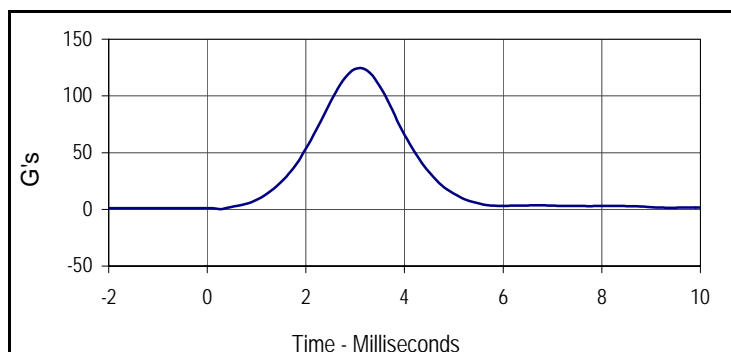
| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head X            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 2.8               | 3.6  | -0.2      | 0.1   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Y            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 002               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 102.4             | 3.1  | -2.7      | 8.2   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Z            |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 003               | FIL  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 71.2              | 3.1  | -1.3      | 10.0  |



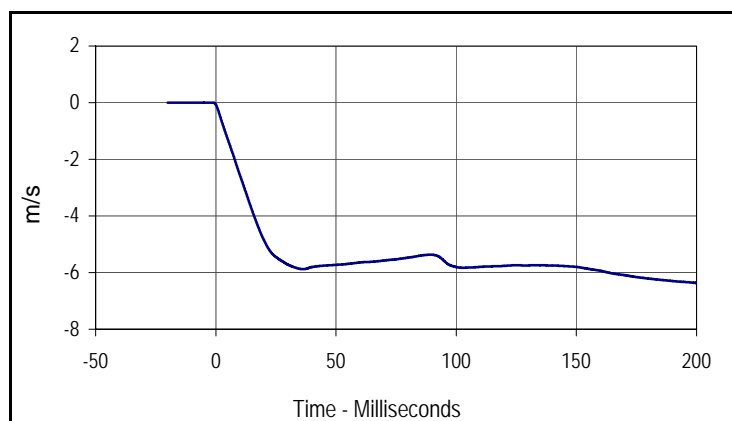
| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Head Resultant    |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | RES  | 1000      | G's   |
| Max               | Time | Min       | Time  |
| 124.7             | 3.1  | 0.3       | 0.3   |

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

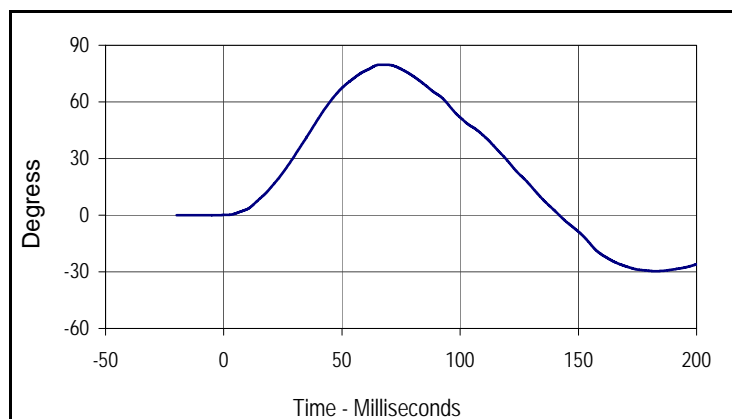
Test Date: 6/20/11  
 Test I.D.: 299NB013



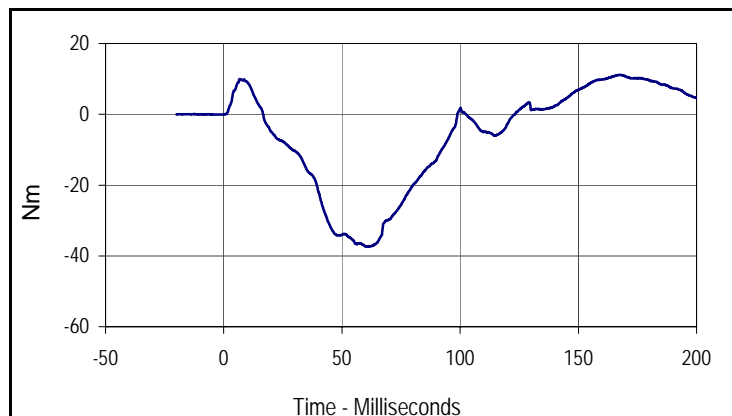
| Tested Parameter                   | Units       | Specification  | Result         | Pass/Fail   |      |
|------------------------------------|-------------|----------------|----------------|-------------|------|
| Laboratory Temperature             | °C          | 20.6 to 22.2   | 21.21          | Pass        |      |
| Laboratory Relative Humidity       | %           | 10 to 70       | 20.36          | Pass        |      |
| Pendulum Velocity                  | m/s         | 5.51 to 5.63   | 5.60           | Pass        |      |
| Pendulum Deceleration              | 10 msec     | m/s            | -2.20 to -2.80 | -2.55       | Pass |
|                                    | 15 msec     | m/s            | -3.30 to -4.10 | -3.79       | Pass |
|                                    | 20 msec     | m/s            | -4.40 to -5.40 | -4.85       | Pass |
|                                    | 25 msec     | m/s            | -5.40 to -6.10 | -5.45       | Pass |
|                                    | 25-100 msec | m/s            | -5.50 to -6.20 | -5.88       | Pass |
| Translation-Rotation               | Max         | Degrees        | 71.0 to 81.0   | 79.7        | Pass |
|                                    | Time        | msec           | 50.0 to 70.0   | 66.4        | Pass |
| Peak Occipital Condyle Moment      | Nm          | -36.0 to -44.0 | -37.4          | Pass        |      |
| Decaying Moment Time to Cross 0 Nm | msec        | 102.0 to 126.0 | 123.2          | Pass        |      |
| <b>Overall Test Results</b>        |             |                |                | <b>Pass</b> |      |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Pendulum Velocity |      |           |       |
| CURNO             | Type | SAE Class | Units |
| 001               | FIL  | 180       | m/s   |
| Max               | Time | Min       | Time  |
| 0.0               | -1.4 | -6.4      | 200.0 |



| Curve Description            |      |           |         |
|------------------------------|------|-----------|---------|
| Maximum Translation Rotation |      |           |         |
| CURNO                        | Type | SAE Class | Units   |
| 002                          | FIL  | 60        | Degress |
| Max                          | Time | Min       | Time    |
| 79.7                         | 66.4 | -29.6     | 182.6   |



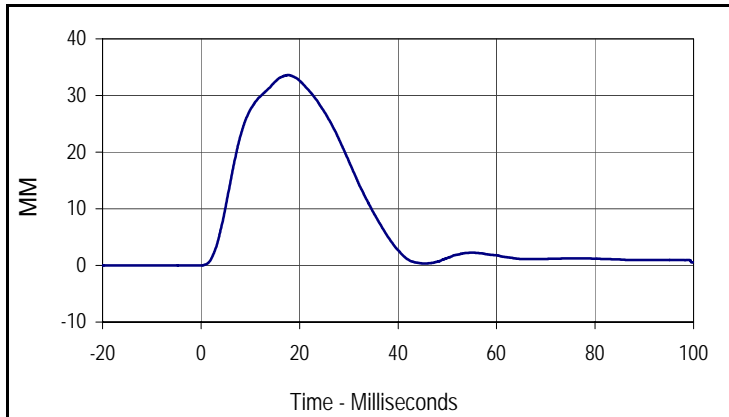
| Curve Description              |       |           |       |
|--------------------------------|-------|-----------|-------|
| Moment About Occipital Condyle |       |           |       |
| CURNO                          | Type  | SAE Class | Units |
| 003                            | FIL   | 600       | Nm    |
| Max                            | Time  | Min       | Time  |
| 11.1                           | 167.7 | -37.4     | 61.2  |

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

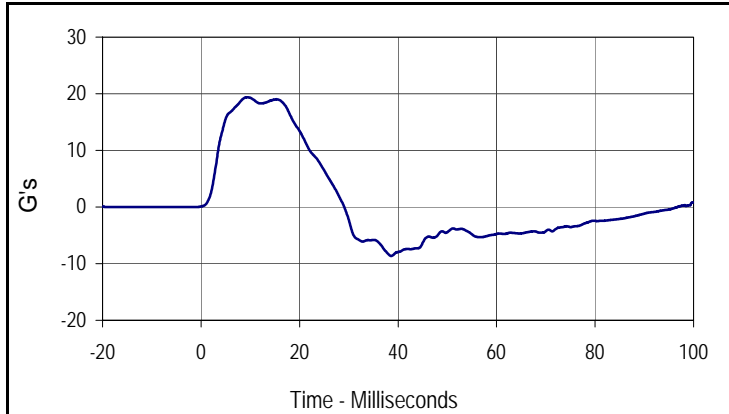
Test Date: 6/20/11  
 Test I.D.: 299SH013



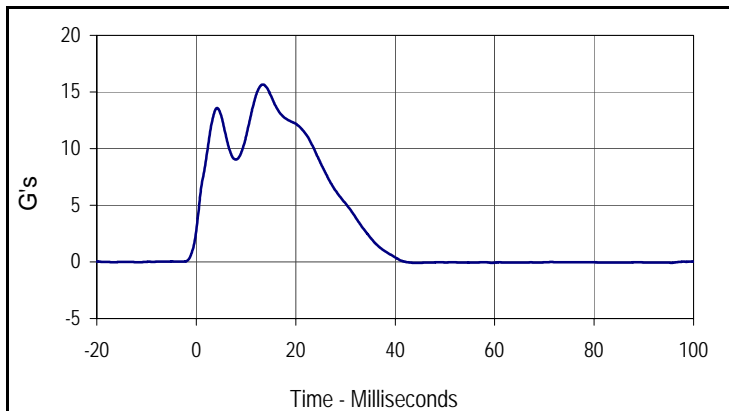
| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6 to 22.2  | 21.18  | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 20.22  | Pass      |
| Pendulum Velocity               | m/s   | 4.20 to 4.40  | 4.33   | Pass      |
| Shoulder Deflection             | MM    | 28 to 37      | 33.6   | Pass      |
| Peak Upper Spine Y Acceleration | G's   | 17 to 22      | 19.4   | Pass      |
| Peak Impactor Acceleration      | G's   | 13 to 18      | 15.7   | Pass      |
| Overall Test Results            |       |               | Pass   |           |



| Curve Description   |      |           |       |
|---------------------|------|-----------|-------|
| Shoulder Deflection |      |           |       |
| CURNO               | Type | SAE Class | Units |
| 001                 | FIL  | 600       | MM    |
| Max                 | Time | Min       | Time  |
| 33.6                | 17.7 | 0.0       | -14.5 |



| Curve Description          |      |           |       |
|----------------------------|------|-----------|-------|
| Upper Spine Y Acceleration |      |           |       |
| CURNO                      | Type | SAE Class | Units |
| 002                        | FIL  | 180       | G's   |
| Max                        | Time | Min       | Time  |
| 19.4                       | 9.3  | -8.6      | 38.6  |



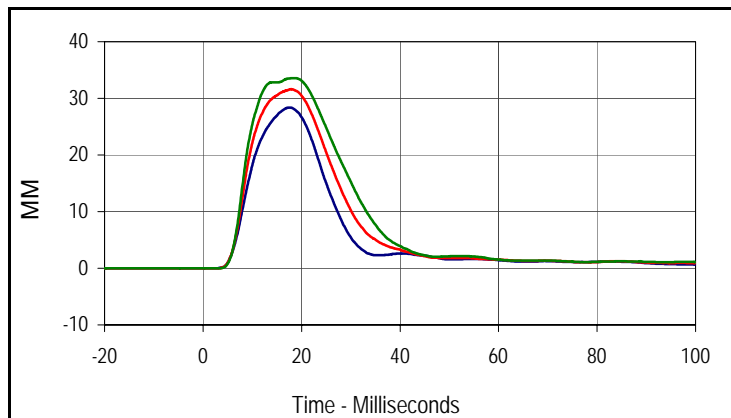
| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 003                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 15.7                  | 13.4 | -0.1      | 44.1  |

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

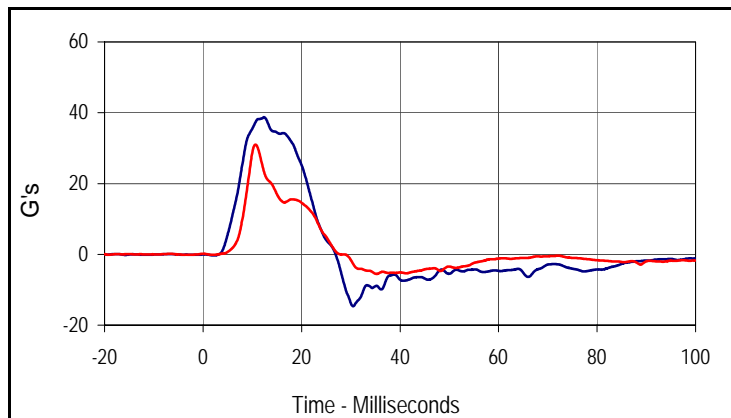
Test Date: 6/20/11  
 Test I.D.: 299TWA013



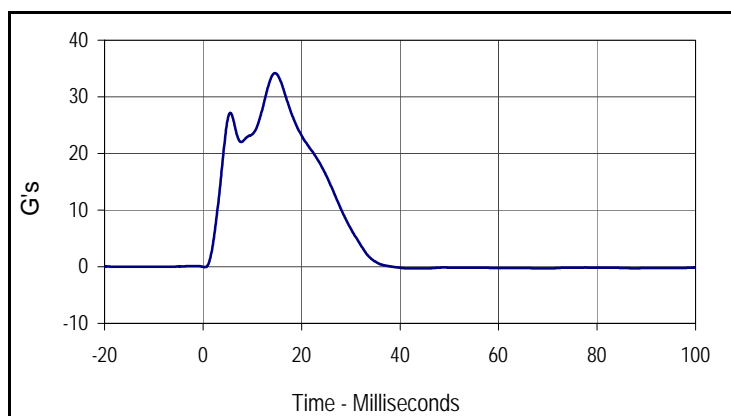
| Tested Parameter                         | Units | Specification | Result | Pass/Fail |
|--|-------|---------------|--------|-----------|
| Laboratory Temperature                   | °C    | 20.6 to 22.2  | 21.4   | Pass      |
| Laboratory Relative Humidity             | %     | 10 to 70      | 20     | Pass      |
| Pendulum Velocity                        | m/s   | 6.60 to 6.80  | 6.72   | Pass      |
| Shoulder Deflection                      | MM    | 31 to 40      | 36.5   | Pass      |
| Upper Thorax Rib Deflection              | MM    | 25 to 32      | 28.4   | Pass      |
| Middle Thorax Rib Deflection             | MM    | 30 to 36      | 31.6   | Pass      |
| Lower Thorax Rib Deflection              | MM    | 32 to 38      | 33.5   | Pass      |
| Peak Upper Spine Y Acceleration          | G's   | 34 to 43      | 38.8   | Pass      |
| Peak Lower Spine Y Acceleration          | G's   | 29 to 37      | 31.0   | Pass      |
| Peak Impactor Acceleration After 5 msec. | G's   | 30 to 36      | 34.2   | Pass      |
| Overall Test Results                     |       |               |        | Pass      |



| Curve Description               |      |           |       |
|---------------------------------|------|-----------|-------|
| <b>Upper Thorax Deflection</b>  |      |           |       |
| CURNO                           | Type | SAE Class | Units |
| 001                             | FIL  | 600       | MM    |
| Max                             | Time | Min       | Time  |
| 28.4                            | 17.5 | 0.0       | -7.8  |
| <b>Middle Thorax Deflection</b> |      |           |       |
| Max                             | Time | Min       | Time  |
| 31.6                            | 17.9 | 0.0       | -14.7 |
| <b>Lower Thorax Deflection</b>  |      |           |       |
| Max                             | Time | Min       | Time  |
| 33.5                            | 18.2 | 0.0       | -9.7  |



| Curve Description                 |      |           |       |
|-----------------------------------|------|-----------|-------|
| <b>Upper Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 004                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 38.8                              | 12.4 | -14.7     | 30.5  |
| <b>Lower Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 005                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 31.0                              | 10.6 | -5.5      | 35.2  |



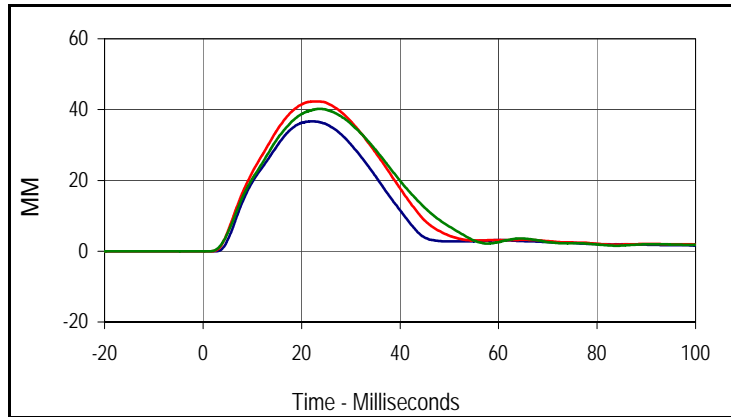
| Curve Description            |      |           |       |
|------------------------------|------|-----------|-------|
| <b>Impactor Acceleration</b> |      |           |       |
| CURNO                        | Type | SAE Class | Units |
| 006                          | FIL  | 180       | G's   |
| Max                          | Time | Min       | Time  |
| 34.2                         | 14.6 | -0.3      | 41.8  |

Test Program: SID IIs Thorax w/o Arm Calibration  
 ATD Serial No.: 299

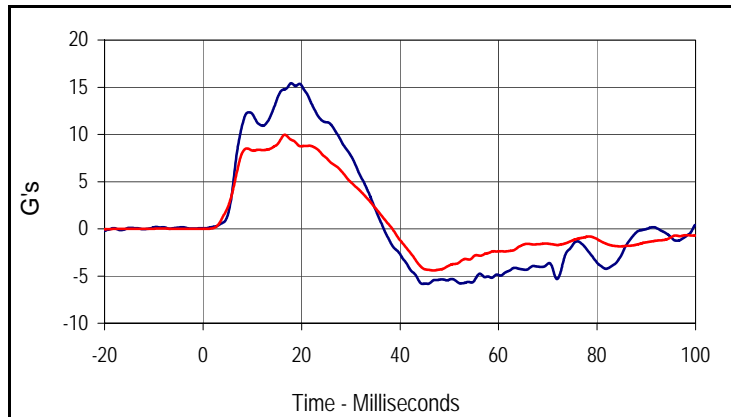
Test Date: 6/20/11  
 Test I.D.: 299TOA013



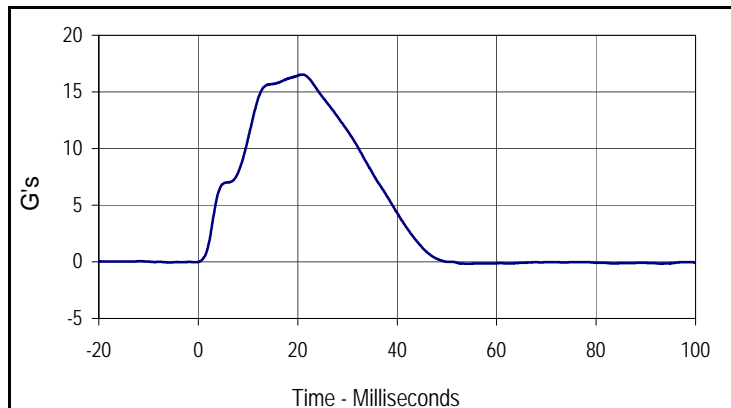
| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6 to 22.2  | 21.32  | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 20.31  | Pass      |
| Pendulum Velocity               | m/s   | 4.20 to 4.40  | 4.31   | Pass      |
| Upper Thorax Rib Deflection     | MM    | 32 to 40      | 36.7   | Pass      |
| Middle Thorax Rib Deflection    | MM    | 39 to 45      | 42.3   | Pass      |
| Lower Thorax Rib Deflection     | MM    | 35 to 43      | 40.2   | Pass      |
| Peak Upper Spine Y Acceleration | G's   | 13 to 17      | 15.4   | Pass      |
| Peak Lower Spine Y Acceleration | G's   | 7 to 11       | 10.0   | Pass      |
| Peak Impactor Acceleration      | G's   | 14 to 18      | 16.5   | Pass      |
| Overall Test Results            |       |               |        | Pass      |



| Curve Description               |      |           |       |
|---------------------------------|------|-----------|-------|
| <b>Upper Thorax Deflection</b>  |      |           |       |
| CURNO                           | Type | SAE Class | Units |
| 001                             | FIL  | 600       | MM    |
| Max                             | Time | Min       | Time  |
| 36.7                            | 22.2 | 0.0       | 1.9   |
| <b>Middle Thorax Deflection</b> |      |           |       |
| Max                             | Time | Min       | Time  |
| 42.3                            | 23.0 | 0.0       | -2.1  |
| <b>Lower Thorax Deflection</b>  |      |           |       |
| Max                             | Time | Min       | Time  |
| 40.2                            | 23.7 | 0.0       | -3.8  |



| Curve Description                 |      |           |       |
|-----------------------------------|------|-----------|-------|
| <b>Upper Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 004                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 15.4                              | 17.9 | -5.8      | 44.6  |
| <b>Lower Spine Y Acceleration</b> |      |           |       |
| CURNO                             | Type | SAE Class | Units |
| 005                               | FIL  | 180       | G's   |
| Max                               | Time | Min       | Time  |
| 10.0                              | 16.6 | -4.4      | 46.8  |



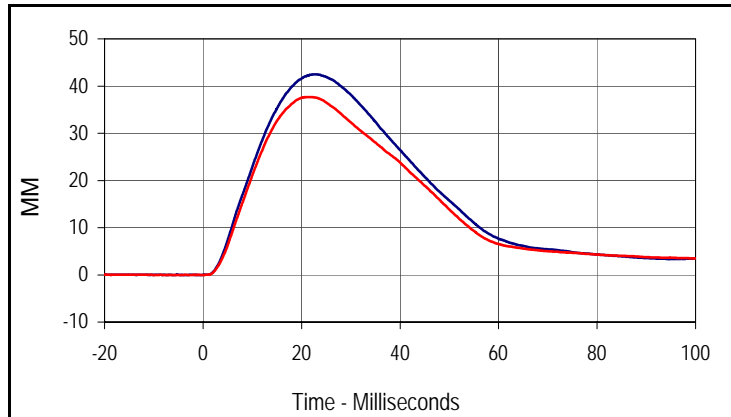
| Curve Description            |      |           |       |
|------------------------------|------|-----------|-------|
| <b>Impactor Acceleration</b> |      |           |       |
| CURNO                        | Type | SAE Class | Units |
| 006                          | FIL  | 180       | G's   |
| Max                          | Time | Min       | Time  |
| 16.5                         | 20.9 | -0.2      | 54.4  |

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

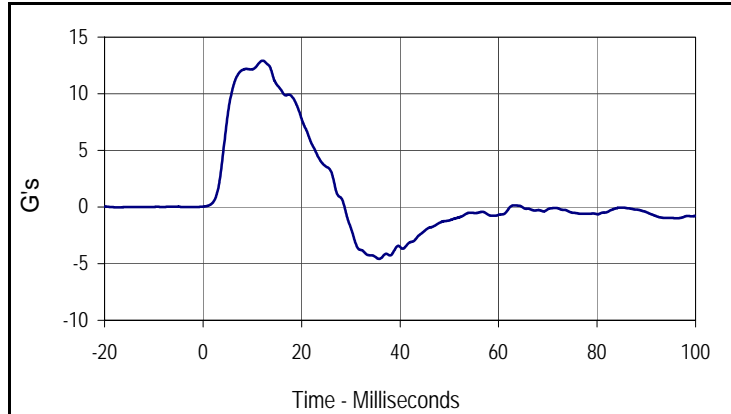
Test Date: 6/20/11  
 Test I.D.: 299ABD013



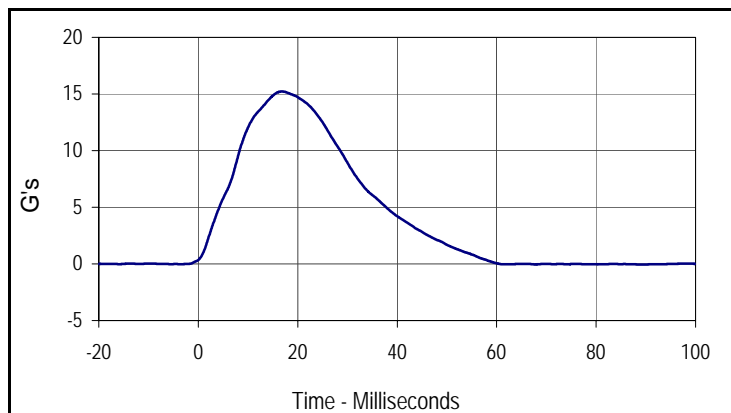
| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6 to 22.2  | 21.39  | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 20.33  | Pass      |
| Pendulum Velocity               | m/s   | 4.20 to 4.40  | 4.29   | Pass      |
| Upper Abdominal Rib Deflection  | MM    | 36 to 47      | 42.5   | Pass      |
| Lower Abdominal Rib Deflection  | MM    | 33 to 44      | 37.7   | Pass      |
| Peak Lower Spine Y Acceleration | G's   | 9 to 14       | 12.9   | Pass      |
| Peak Impactor Acceleration      | G's   | 12 to 16      | 15.2   | Pass      |
| Overall Test Results            |       |               | Pass   |           |



| Curve Description              |      |           |       |
|--------------------------------|------|-----------|-------|
| Upper Abdominal Rib Deflection |      |           |       |
| CURNO                          | Type | SAE Class | Units |
| 001                            | FIL  | 600       | MM    |
| Max                            | Time | Min       | Time  |
| 42.5                           | 22.6 | 0.0       | -7.2  |
| Curve Description              |      |           |       |
| Lower Abdominal Rib Deflection |      |           |       |
| CURNO                          | Type | SAE Class | Units |
| 002                            | FIL  | 600       | MM    |
| Max                            | Time | Min       | Time  |
| 37.7                           | 21.4 | 0.0       | -6.5  |



| Curve Description          |      |           |       |
|----------------------------|------|-----------|-------|
| Lower Spine Y Acceleration |      |           |       |
| CURNO                      | Type | SAE Class | Units |
| 003                        | FIL  | 180       | G's   |
| Max                        | Time | Min       | Time  |
| 12.9                       | 12.1 | -4.6      | 35.8  |



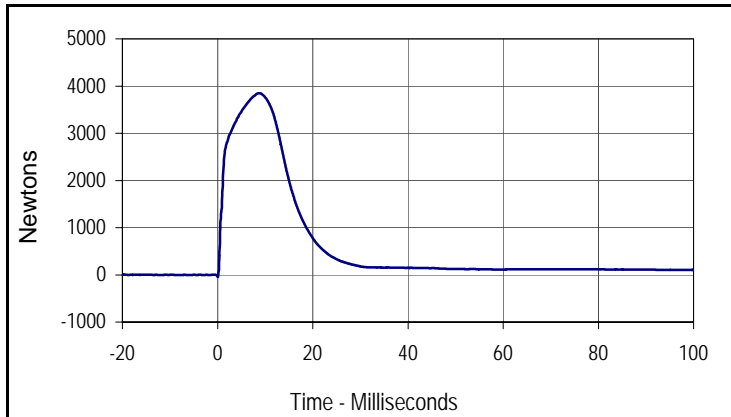
| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 004                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 15.2                  | 16.8 | -0.1      | 89.7  |

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

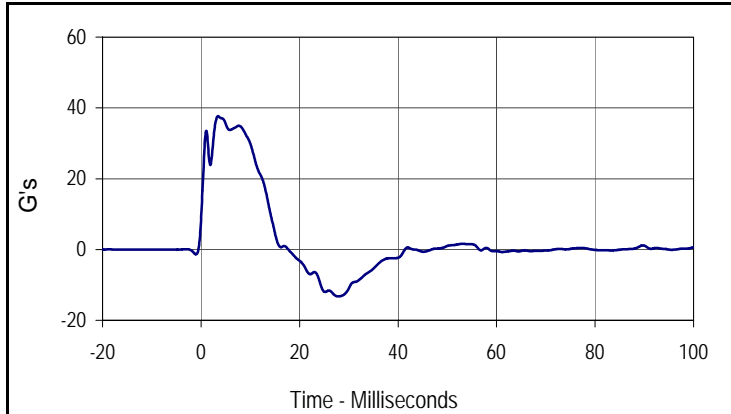
Test Date: 6/20/11  
 Test I.D.: 299PA013



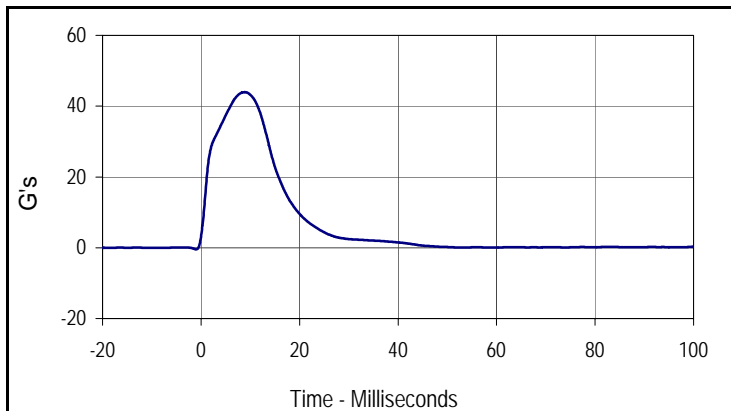
| Tested Parameter                         | Units   | Specification | Result | Pass/Fail |
|--|---------|---------------|--------|-----------|
| Laboratory Temperature                   | °C      | 20.6 to 22.2  | 21.26  | Pass      |
| Laboratory Relative Humidity             | %       | 10 to 70      | 20.19  | Pass      |
| Pendulum Velocity                        | m/s     | 6.60 to 6.80  | 6.74   | Pass      |
| Peak Acetabulum Force                    | Newtons | 3600 to 4300  | 3848.6 | Pass      |
| Peak Pelvis Y Acceleration After 6 msec. | G's     | 34 to 42      | 35.0   | Pass      |
| Peak Impactor Acceleration               | G's     | 38 to 47      | 44.0   | Pass      |
| Overall Test Results                     |         |               | Pass   | Pass      |



| Curve Description       |      |           |         |
|-------------------------|------|-----------|---------|
| Pelvis Acetabulum Force |      |           |         |
| CURNO                   | Type | SAE Class | Units   |
| 001                     | FIL  | 600       | Newtons |
| Max                     | Time | Min       | Time    |
| 3848.6                  | 8.6  | -41.5     | 0.0     |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Pelvis Y Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 002                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 37.7                  | 3.4  | -13.2     | 27.8  |



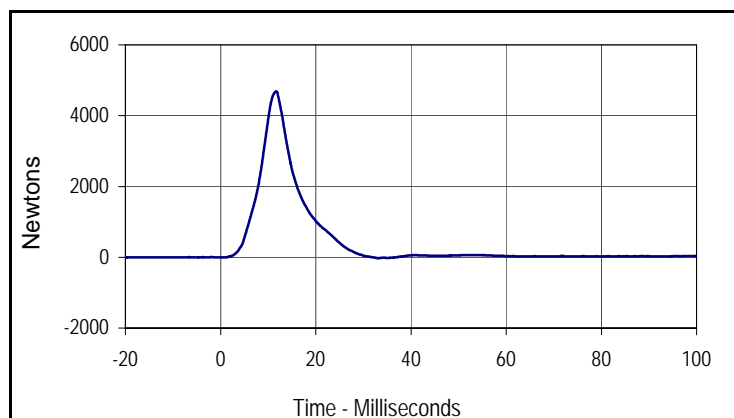
| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 003                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 44.0                  | 8.9  | -0.4      | -1.0  |

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

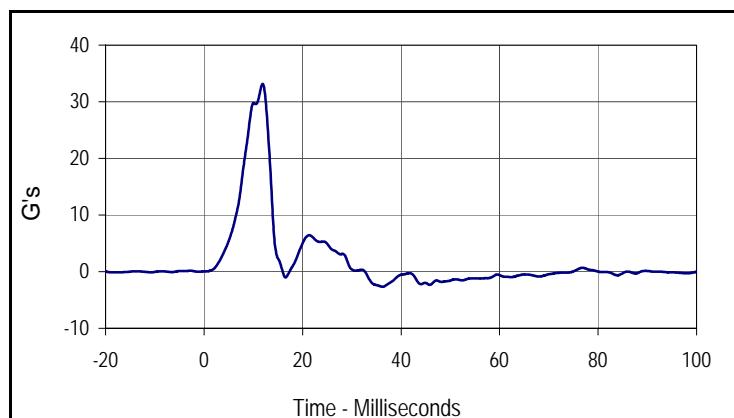
Test Date: 6/20/11  
 Test I.D.: 299PL013



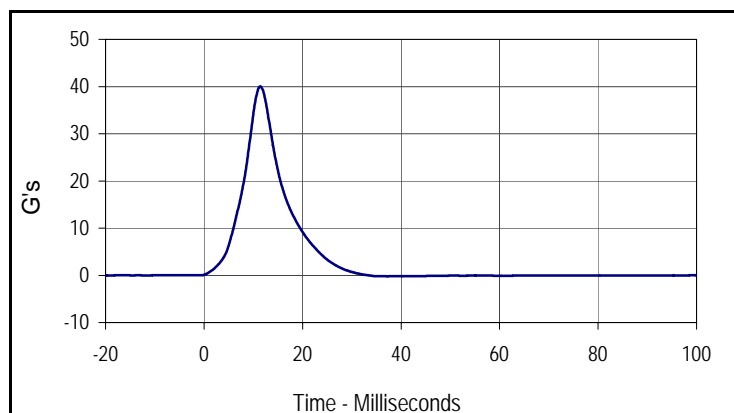
| Tested Parameter             | Units   | Specification | Result | Pass/Fail |
|------------------------------|---------|---------------|--------|-----------|
| Laboratory Temperature       | °C      | 20.6 to 22.2  | 21.28  | Pass      |
| Laboratory Relative Humidity | %       | 10 to 70      | 20.18  | Pass      |
| Pendulum Velocity            | m/s     | 4.2 to 4.4    | 4.26   | Pass      |
| Peak Iliac Force             | Newtons | 4100 to 5100  | 4685.9 | Pass      |
| Peak Pelvis Y Acceleration   | G's     | 28 to 39      | 33.1   | Pass      |
| Peak Impactor Acceleration   | G's     | 36 to 45      | 40.0   | Pass      |
| Overall Test Results         |         |               | Pass   | Pass      |



| Curve Description  |      |           |         |
|--------------------|------|-----------|---------|
| Pelvis Iliac Force |      |           |         |
| CURNO              | Type | SAE Class | Units   |
| 001                | FIL  | 600       | Newtons |
| Max                | Time | Min       | Time    |
| 4685.9             | 11.7 | -26.2     | 33.1    |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Pelvis Y Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 002                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 33.1                  | 11.9 | -2.7      | 36.2  |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| CURNO                 | Type | SAE Class | Units |
| 003                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 40.0                  | 11.4 | -0.2      | 37.3  |