

**REPORT NUMBER: NCAP-KAR-13-052**

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

**TESLA MOTORS, INC.  
2013 TESLA MODEL S 5-DOOR HATCHBACK**

**NHTSA NUMBER: MD5000**

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



**AUGUST 5, 2013**

**FINAL REPORT**

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



# TECHNICAL REPORT DOCUMENTATION PAGE

| <b>1. Report No.</b><br>NCAP-KAR-13-052                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       | <b>2. Government Accession No.</b>                              |         | <b>3. Recipient's Catalog No.</b>                                                                                                                                                                                                                                                          |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
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| <b>4. Title and Subtitle</b><br>Final Report of New Car Assessment Program Testing of a<br>2013 Tesla Model S 5-Door Hatchback<br>NHTSA No. MD5000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |                                                                 |         | <b>5. Report Date</b><br>August 5, 2013                                                                                                                                                                                                                                                    |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
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| <b>9. Performing Organization Name and Address</b><br>KARCO Engineering, LLC.<br>9270 Holly Rd.<br>Adelanto, CA 92301                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                                                 |         | <b>10. Work Unit No.</b>                                                                                                                                                                                                                                                                   |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
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| <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>13. Type of Report and Period Covered</b><br>Final Test Report, Jul. 22 - Aug. 5, 2013                                                                                                                                                                                                  |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
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| <b>15. Supplementary Notes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                                                                 |         |                                                                                                                                                                                                                                                                                            |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| <b>16. Abstract</b><br><p>A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2013 Tesla Model S 5-door hatchback in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on July 22, 2013.</p> <p>The impact velocity of the vehicle was 56.23 km/h and the ambient temperature at the barrier face at the time of impact was 36.5 deg. C. The target vehicle's post-test maximum crush was 445 mm at the vehicle's centerline. The test vehicle's performance is as follows:</p> <table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td>N/A</td> <td>700.0</td> <td>129.2</td> <td>700.0</td> <td>362.0</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>-23</td> <td>52</td> <td>-11</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>0.30</td> <td>1</td> <td>0.30</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>1099.0</td> <td>2620</td> <td>869.7</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>-122.5</td> <td>2520</td> <td>-219.3</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>-2078.3</td> <td>6805</td> <td>-1300.9</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>-1846.1</td> <td>6805</td> <td>-1312.5</td> </tr> </tbody> </table> |       |                                                                 |         |                                                                                                                                                                                                                                                                                            |         | Measurement Description | Units | Driver ATD |  | Passenger ATD |  | Threshold | Result | Threshold | Result | Head Injury Criteria (HIC <sub>15</sub> ) | N/A | 700.0 | 129.2 | 700.0 | 362.0 | Maximum Chest Compression | mm | 63 | -23 | 52 | -11 | Nij | N/A | 1 | 0.30 | 1 | 0.30 | Neck Tension | N | 4170 | 1099.0 | 2620 | 869.7 | Neck Compression | N | 4000 | -122.5 | 2520 | -219.3 | Left Femur Force | N | 10008 | -2078.3 | 6805 | -1300.9 | Right Femur Force | N | 10008 | -1846.1 | 6805 | -1312.5 |
| Measurement Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Units | Driver ATD                                                      |         | Passenger ATD                                                                                                                                                                                                                                                                              |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
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| Head Injury Criteria (HIC <sub>15</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A   | 700.0                                                           | 129.2   | 700.0                                                                                                                                                                                                                                                                                      | 362.0   |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| Maximum Chest Compression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | mm    | 63                                                              | -23     | 52                                                                                                                                                                                                                                                                                         | -11     |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| Nij                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A   | 1                                                               | 0.30    | 1                                                                                                                                                                                                                                                                                          | 0.30    |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| Neck Tension                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N     | 4170                                                            | 1099.0  | 2620                                                                                                                                                                                                                                                                                       | 869.7   |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| Neck Compression                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N     | 4000                                                            | -122.5  | 2520                                                                                                                                                                                                                                                                                       | -219.3  |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| Left Femur Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N     | 10008                                                           | -2078.3 | 6805                                                                                                                                                                                                                                                                                       | -1300.9 |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| Right Femur Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N     | 10008                                                           | -1846.1 | 6805                                                                                                                                                                                                                                                                                       | -1312.5 |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| <b>17. Key Words</b><br>35 mph Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                                                 |         | <b>18. Distribution Statement</b><br>Copies of this report are available from:<br>National Highway Traffic Safety Administration<br>Technical Information Services Division, NPO-411<br>1200 New Jersey Ave., SE<br>Washington, DC 20590<br>e-mail: tis@nhtsa.dot.gov<br>FAX: 202-493-2833 |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
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| <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>134                                                                                                                                                                                                                                                             |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |
| <b>22. Price</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |                                                                 |         |                                                                                                                                                                                                                                                                                            |         |                         |       |            |  |               |  |           |        |           |        |                                           |     |       |       |       |       |                           |    |    |     |    |     |     |     |   |      |   |      |              |   |      |        |      |       |                  |   |      |        |      |        |                  |   |       |         |      |         |                   |   |       |         |      |         |

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## **SECTION 1**

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

#### **PURPOSE**

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program, sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-12-D-00259. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

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

#### **SUMMARY**

A load cell barrier consisting of 176 load cells was impacted by a 2013 Tesla Model S 5-door hatchback at a velocity of 56.23 km/h. The test was performed at KARCO Engineering, LLC. on July 22, 2013. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

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

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

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck force transducers, right / left femur load cells, and lower leg instrumentation. Seat belt load cells were placed on the driver's and passenger's shoulder and lap belts to measure the dummy torso and pelvic section loading. The driver (position 1) ATD (Serial No. 034) and the right-front passenger (position 2) ATD (Serial No. 141) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 110 channels of dummy and vehicle response data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces.

There was 100% windshield retention and no intrusion into the protected zone of the windshield during the event.

The maximum static crush of the test vehicle was 445 mm located at the vehicle's centerline. Both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

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

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

The occupant data is summarized below:

| ATD Position    | HIC <sub>15</sub> | T <sup>1</sup> | T <sup>2</sup> | Chest<br>Disp.<br>(mm) | Nij  | Neck<br>Tension<br>(N) | Neck<br>Comp. (N) | Left<br>Femur (N) | Right<br>Femur (N) |
|-----------------|-------------------|----------------|----------------|------------------------|------|------------------------|-------------------|-------------------|--------------------|
| Driver (50th)   | 129.2             | 51.7           | 66.7           | -23                    | 0.30 | 1099.0                 | -122.5            | -2078.3           | -1846.1            |
| Passenger (5th) | 362.0             | 61.3           | 76.3           | -11                    | 0.30 | 869.7                  | -219.3            | -1300.9           | -1312.5            |

The second row seat pan of the vehicle lifted upon impact. The seat pan did not contact the dummy; thus, the dummy injury readings were not affected. After the crash test was conducted, KARCO informed the COTR that after the placement and installation of sensors, cables, cameras, and other test equipment used to document the crash test, the seat was not fully secured.

## SECTION 2

### OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

### CONVERSION FACTORS

| Quantity           | Typical Application | Std Units           | Metric Unit | Multiply By       |
|--------------------|---------------------|---------------------|-------------|-------------------|
| Mass               | Vehicle Weight      | lb                  | kg          | 0.4536            |
| Linear Velocity    | Impact Velocity     | miles/hr            | km/hr       | 1.609344          |
| Length or Distance | Measurements        | in                  | mm          | 25.4              |
| Volume             | Fuel Systems        | gal                 | liter       | 3.785             |
| Volume             | Small Fluids        | oz                  | mL          | 29.574            |
| Pressure           | Tire Pressures      | lbf/in <sup>2</sup> | kPa         | 6.895             |
| Temperature        | General Use         | °F                  | °C          | $=(T_f - 32)/1.8$ |
| Force              | Dynamic Forces      | lbf                 | N           | 4.448             |
| Moment             | Torque              | lbf-ft              | N•m         | 1.355             |

# DATA SHEET NO. 1

## GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

## TEST VEHICLE INFORMATION AND OPTIONS

|                             |                   |
|-----------------------------|-------------------|
| NHTSA Number                | MD5000            |
| Model Year                  | 2013              |
| Make                        | Tesla             |
| Model                       | Model S           |
| Body Style                  | 5-Door Hatchback  |
| VIN                         | 5YJSA1AGXDFP11283 |
| Body Color                  | Silver            |
| Odometer Reading (km / mi)  | 37 / 23           |
| Engine Displacement (L)     | N/A               |
| Type / No. of Cylinders     | Electric          |
| Engine Placement            | Rear Transverse   |
| Transmission Type           | Automatic         |
| Transmission Speeds         | 1                 |
| Overdrive                   | No                |
| Final Drive                 | Rear              |
| Roof Rack                   | No                |
| Sunroof / T-Top             | No                |
| Running Boards              | No                |
| Tilt Steering Wheel         | Yes               |
| Power Seats                 | Yes               |
| Anti-Lock Brakes (ABS)      | Yes               |
| Automatic Door Locks (ADLs) | Yes               |

|                                    |     |
|------------------------------------|-----|
| Traction Control System            | Yes |
| Power Steering                     | Yes |
| Power Window Auto-Reverse          | Yes |
| Driver Frontal Airbag              | Yes |
| Driver Curtain Airbag              | Yes |
| Driver Head/Torso Airbag           | No  |
| Driver Torso Airbag                | No  |
| Driver Torso/Pelvis Airbag         | Yes |
| Driver Pelvis Airbag               | No  |
| Driver Knee Airbag                 | Yes |
| Front Pass. Frontal Airbag         | Yes |
| Front Pass. Curtain Airbag         | Yes |
| Front Pass. Head/Torso Airbag      | No  |
| Front Pass. Torso Airbag           | No  |
| Front Pass. Torso/Pelvis Airbag    | Yes |
| Front Pass. Pelvis Airbag          | No  |
| Front Pass. Knee Airbag            | Yes |
| Driver Seat Belt Pretensioner      | Yes |
| Driver Load Limiter                | Yes |
| Front Pass. Seat Belt Pretensioner | Yes |
| Front Pass. Load Limiter           | Yes |
| Other                              | No  |

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

Yes

## DATA FROM CERTIFICATION LABEL

|                     |                    |
|---------------------|--------------------|
| Manufactured By     | Tesla Motors, Inc. |
| Date of Manufacture | May-13             |

|                 |      |
|-----------------|------|
| GVWR (kg)       | 2590 |
| GAWR Front (kg) | 1276 |
| GAWR Rear (kg)  | 1500 |

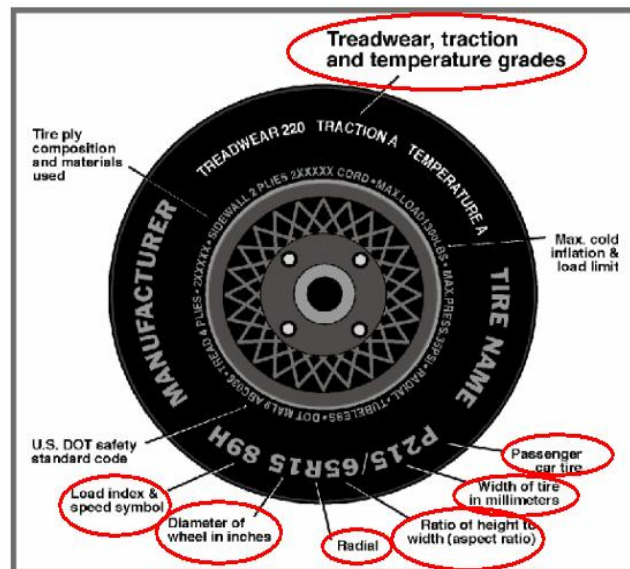
## VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

| Measured Parameter          | Front  | Rear  | Third | Total |     |
|-----------------------------|--------|-------|-------|-------|-----|
| Type of Seats               | Bucket | Bench |       |       |     |
| Designated Seating Capacity | 2      | 3     |       | 5     |     |
| Capacity Weight (VCW) (kg)  |        |       |       | 515.0 | A   |
| DSC x 68.04 (kg)            |        |       |       | 340.2 | B   |
| Cargo Weight (RCLW) (kg)    |        |       |       | 174.8 | A-B |

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

### GENERAL TEST AND VEHICLE PARAMETER DATA

|               |                                     |            |          |
|---------------|-------------------------------------|------------|----------|
| Test Vehicle: | 2013 Tesla Model S 5-Door Hatchback | NHTSA No.: | MD5000   |
| Test Program: | 56 km/h Frontal Impact NCAP Test    | Test Date: | 07/22/13 |



### VEHICLE TIRE INFORMATION

| Measured Parameter        | Front                         | Rear                          |
|---------------------------|-------------------------------|-------------------------------|
| Max. Tire Pressure (kPa)  | 350                           | 350                           |
| Cold Pressure (kPa)       | 290                           | 290                           |
| Recommended Tire Size     | P245/45R19                    | P245/45R19                    |
| Tire Size on Vehicle      | P245/45R19                    | P245/45R19                    |
| Tire Manufacturer         | Goodyear                      | Goodyear                      |
| Tire Model                | Eagle RS-A <sup>2</sup>       | Eagle RS-A <sup>2</sup>       |
| Treadwear                 | 440                           | 440                           |
| Traction                  | A                             | A                             |
| Temperature Grades        | A                             | A                             |
| Tire Plies Sidewall       | 2 Polyester                   | 2 Polyester                   |
| Tire Plies Body           | 2 Polyester, 2 Steel, 1 Nylon | 2 Polyester, 2 Steel, 1 Nylon |
| Load Index / Speed Symbol | 98V                           | 98V                           |
| Tire Material             | Polyester, Steel, Nylon       | Polyester, Steel, Nylon       |
| DOT Safety Code Left      | M67V JEIR 1613                | M67V JEIR 1613                |
| DOT Safety Code Right     | M67V JEIR 1613                | M67V JEIR 1613                |

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

## GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

|       | Units | As Delivered Weights (UVW) |           |        | As Tested Weights (ATW) |           |        |
|-------|-------|----------------------------|-----------|--------|-------------------------|-----------|--------|
|       |       | Front Axle                 | Rear Axle | Total  | Front Axle              | Rear Axle | Total  |
| Left  | kg    | 460.5                      | 530.0     |        | 491.5                   | 671.5     |        |
| Right | kg    | 452.0                      | 521.5     |        | 470.5                   | 639.0     |        |
| Ratio | %     | 46.5%                      | 53.5%     | 100.0% | 42.3%                   | 57.7%     | 100.0% |
| Total | kg    | 912.5                      | 1051.5    | 1964.0 | 962.0                   | 1310.5    | 2272.5 |

## TARGET TEST WEIGHT CALCULATION

| Measured Parameter                      | Units | Value  |       |
|-----------------------------------------|-------|--------|-------|
| Total Delivered Weight (UVW)            | kg    | 1964.0 | A     |
| Weight of 1 P572E ATD & 1 P572O ATD     | kg    | 141.0  | B     |
| Rated Cargo/Luggage Weight (RCLW)       | kg    | 174.8  | C     |
| Calculated Vehicle Target Weight (TVTW) | kg    | 2279.8 | A+B+C |

## TEST VEHICLE ATTITUDES

| Condition    | Units | LF  | RF  | LR  | RR  | CG Aft of Front Axle |
|--------------|-------|-----|-----|-----|-----|----------------------|
| As Delivered | mm    | 758 | 761 | 767 | 762 | 1590                 |
| As Tested    | mm    | 751 | 754 | 733 | 740 | 1713                 |
| Post-Test    | mm    | 727 | 814 | 720 | 758 |                      |

## GENERAL TEST VEHICLE DATA

| Measurement Description                 | Units | Value |
|-----------------------------------------|-------|-------|
| Total Vehicle Wheel Base                | mm    | 2970  |
| Total Vehicle Length at Left Side       | mm    | 4173  |
| Total Vehicle Length at Centerline      | mm    | 4995  |
| Total Vehicle Length at Right Side      | mm    | 4182  |
| Weight of Ballast in Cargo Area         | kg    | 164.0 |
| Weight of Vehicle Components Removed    | kg    | 18.0  |
| Amount of Stoddard Solvent in Fuel Tank | L     |       |

## VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Trunk Soft Trim (18.0 kg.)  
 \_\_\_\_\_  
 \_\_\_\_\_

**DATA SHEET NO. 1 ... (CONTINUED)****GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

**TARGET VEHICLE STRUCTURAL MEASUREMENTS**

| No. | Description                           | Pre-Test |
|-----|---------------------------------------|----------|
| 1   | Total Length                          | 4995     |
| 2   | Total Width                           | 1935     |
| 3   | Bumper Top Height                     | 600      |
| 4   | Bumper Bottom Height                  | 235      |
| 5   | Longitudinal Member Top Height        | 510      |
| 6   | Distance Between Longitudinal Members | 930      |
| 7   | Longitudinal Member Width             | 95       |
| 8   | Engine Top Height                     |          |
| 9   | Engine Bottom Height                  |          |
| 10  | Engine and Gearbox Width              |          |
| 11  | Front Bumper to Engine Distance       |          |
| 12  | Front Shock Absorber Fixing Height    | 840      |
| 13  | Bonnet Leading Edge Height            | 635      |
| 14  | Front Shock Absorber Fixing Width     | 1000     |
| 15  | Front Bumper to Front Axle Distance   | 934      |
| 16  | Front Axle to A-Pillar Distance       | 665      |
| 17  | A-Pillar to B-Pillar Distance         | 930      |
| 18  | B-Pillar to Rear Axle Distance        | 1203     |
| 19  | B-Pillar to C-Pillar Distance         | 800      |
| 20  | Roof Sill Bottom Height               | 1283     |
| 21  | Roof Sill Top Height                  | 1380     |
| 22  | Floor Sill Bottom Height              | 149      |
| 23  | Floor Sill Top Height                 | 220      |

All measurements in millimeters.

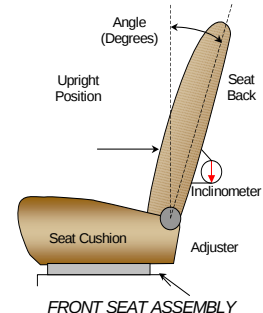
## DATA SHEET NO. 2

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

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

#### NOMINAL DESIGN RIDING POSITION

The procedure for the driver is as follows: the seat back is set to the manufacturer's designated angle. The procedure for the passenger is as follows: the seat back is set to position the transverse instrumentation platform of the dummy's head at  $0^\circ \pm 0.5^\circ$ . Seat back angle is measured on the seat back, 320 mm up from the base of the seat back using a digital inclinometer.

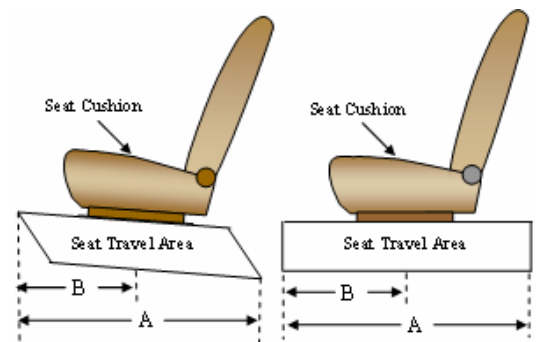


#### SEAT BACK ANGLE

| Seating Position          | Degrees |
|---------------------------|---------|
| Driver Seat Back Angle    | 22.5    |
| Passenger Seat Back Angle | 18.6    |

#### SEAT FORE / AFT POSITIONING

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



#### SEAT FORE/AFT POSITIONS

| Seating Position | Total Fore-Aft Travel | Placed in Position |
|------------------|-----------------------|--------------------|
| Driver Seat      | 305 mm                | 153 mm             |
| Passenger Seat   | 240 mm                | 0 mm               |

#### SEAT BELT UPPER ANCHORAGE

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

#### SEAT BELT UPPER ANCHORAGES

| Seating Position | Total No. of Positions | Placed in Position |
|------------------|------------------------|--------------------|
| Driver Seat      | Fixed                  | Fixed              |
| Passenger Seat   | Fixed                  | Fixed              |

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

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

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test

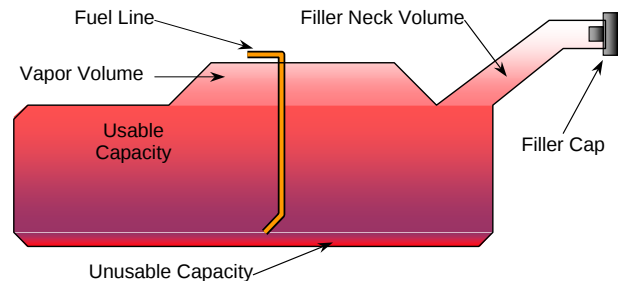
Test Date: 07/22/13

#### FUEL TANK CAPACITY

| Description                            | Liters |
|----------------------------------------|--------|
| Usable Capacity of "Standard Tank"     |        |
| Usable Capacity of "Optional Tank"     |        |
| 92 - 94% of Usable Capacity            |        |
| Actual Amount of Stoddard Solvent Used |        |
| 1/3 of Usable Capacity                 |        |

#### FUEL PUMP

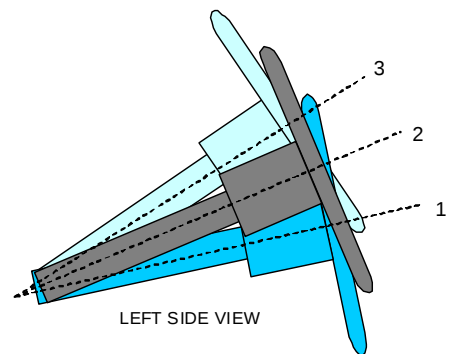
The vehicle is electric and does not have a liquid fuel system.



VEHICLE FUEL TANK ASSEMBLY

#### STEERING COLUMN ADJUSTMENT

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



STEERING COLUMN ASSEMBLY

#### STEERING COLUMN POSITIONING

|                                   | Degrees | Fore-Aft Position (mm) |
|-----------------------------------|---------|------------------------|
| Lowermost Position, No. 1         | 18.2    | 62                     |
| Geometric Center Position, No. 2  | 20.4    | 91                     |
| Uppermost Position, No. 3         | 22.7    | 120                    |
| Telescoping Steering Wheel Travel |         | 58                     |
| Test Position                     | 20.4    | 91                     |

### DATA SHEET NO. 3

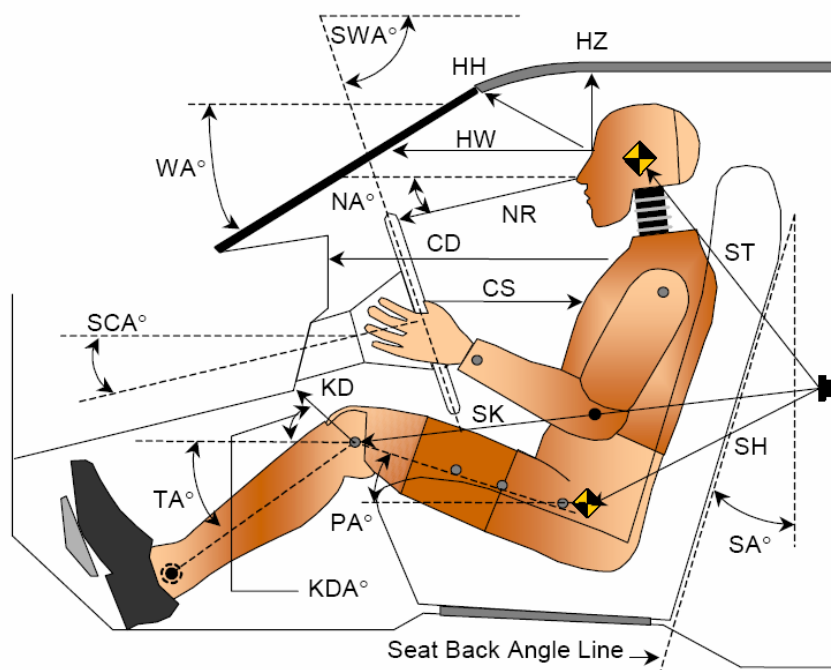
#### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 07/22/13



LEFT SIDE VIEW

| Code | Measurement Description            | Driver      |           | Passenger   |           |
|------|------------------------------------|-------------|-----------|-------------|-----------|
|      |                                    | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| WA°  | Windshield Angle                   |             | 20.6      |             |           |
| SWA° | Steering Wheel Angle               |             | 69.6      |             |           |
| SCA° | Steering Column Angle              |             | 20.4      |             |           |
| SA°  | Seat Back Angle (On Headrest Post) |             | 22.5      |             | 18.6      |
| HZ   | Head to Roof                       | 215         | 90.0      | 194         | 90.0      |
| HH   | Head to Header                     | 335         | 28.3      | 283         | 42.8      |
| HW   | Head to Windshield                 | 685         | 0.0       | 635         | 0.0       |
| NR   | Nose to Rim                        | 369         | 6.9       | 431         | 26.3      |
| CD   | Chest to Dash                      | 509         | 16.6      | 386         | 0.7       |
| CS   | Chest to Steering Hub              | 296         | 0.0       |             |           |
| RA   | Rim to Abdomen                     | 198         | 0.0       |             |           |
| KDL  | Left Knee to Dash                  | 242         | 29.8      | 121         | 30.6      |
| KDR  | Right Knee to Dash                 | 173         | 24.3      | 152         | 39.6      |
| PA°  | Pelvic Angle                       |             | 23.9      |             | 22.0      |
| TA°  | Tibia Angle                        |             | 36.6      |             | 47.2      |
| SK   | Striker to Knee                    | 533         | 1.1       | 609         | 0.5       |
| ST   | Striker to Head                    | 525         | 81.9      | 497         | 78.2      |
| SH   | Striker to H-Point                 | 196         | 40.0      | 309         | 16.0      |

## DATA SHEET NO. 4

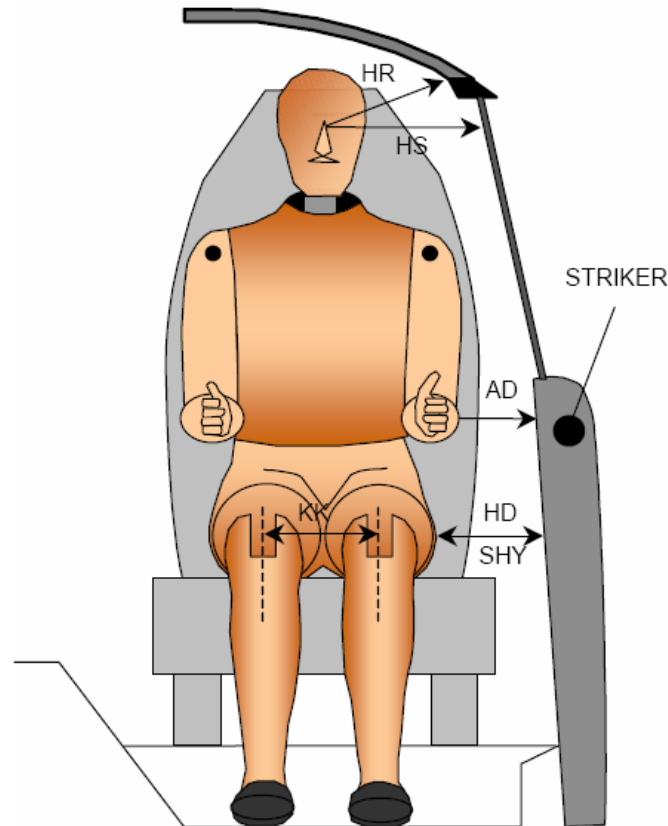
### DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 07/22/13



| Code | Description                      | Driver (mm) | Passenger (mm) |
|------|----------------------------------|-------------|----------------|
| AD   | Arm to Door                      | 126         | 131            |
| HD   | H-Point to Door                  | 138         | 161            |
| HR   | Head to Side Header              | 261         | 282            |
| HS   | Head to Side Window              | 376         | 395            |
| KK   | Knee to Knee                     | 326         | 219            |
| SHY  | Striker to H-Point (Y-Direction) | 270         | 296            |
| AA   | Ankle to Ankle                   | 306         | 195            |

## DATA SHEET NO. 5

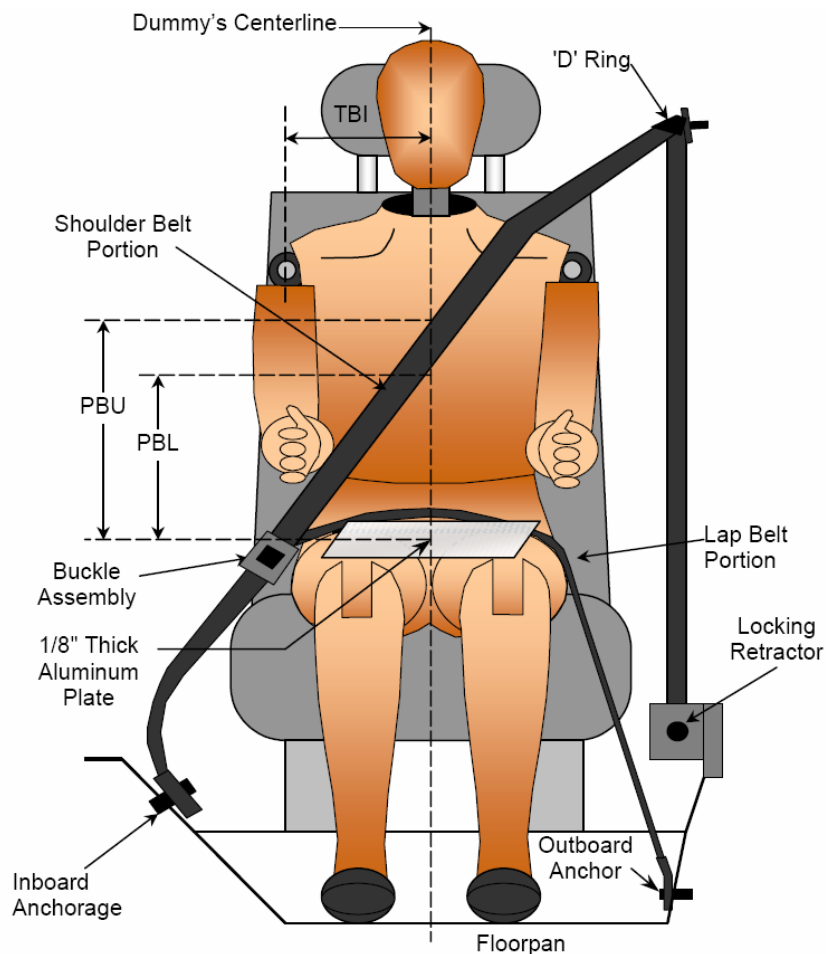
### SEAT BELT POSITIONING DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 07/22/13



**FRONT VIEW OF DUMMY**

### SEAT BELT POSITIONING MEASUREMENTS

| Code | Measurement Description                          | Units | Driver | Passenger |
|------|--------------------------------------------------|-------|--------|-----------|
| PBU  | Top Surface of Aluminum Plate to Belt Upper Edge | mm    | 385    | 359       |
| PBL  | Top Surface of Aluminum Plate to Belt Lower Edge | mm    | 304    | 266       |

### BELT LENGTH DATA

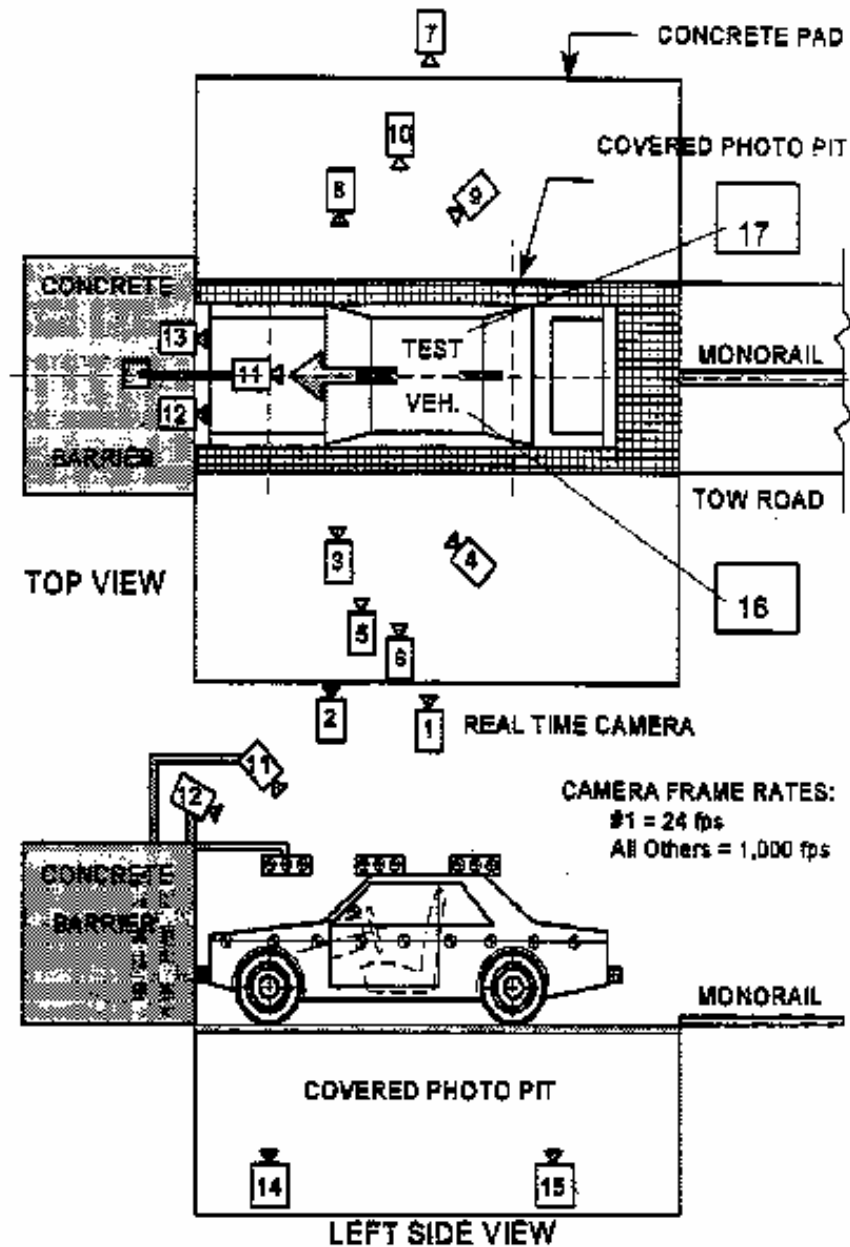
| Measurement Description                          | Units | Driver | Passenger |
|--------------------------------------------------|-------|--------|-----------|
| Shoulder Belt Length as Measured on ATD          | mm    | 863    | 942       |
| Lap Belt Length as Measured on ATD               | mm    | 559    | 637       |
| Remainder of Belt on Reel                        | mm    | 768    | 597       |
| Total Belt Length for Continuous Webbing Systems | mm    | 2190   | 2176      |

## DATA SHEET NO. 6

### HIGH-SPEED CAMERA LOCATIONS AND DATA

|               |                                     |            |          |
|---------------|-------------------------------------|------------|----------|
| Test Vehicle: | 2013 Tesla Model S 5-Door Hatchback | NHTSA No.: | MD5000   |
| Test Program: | 56 km/h Frontal Impact NCAP Test    | Test Date: | 07/22/13 |

### CAMERA POSITIONS FOR FRONTAL IMPACTS



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

## HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

### CAMERA LOCATIONS

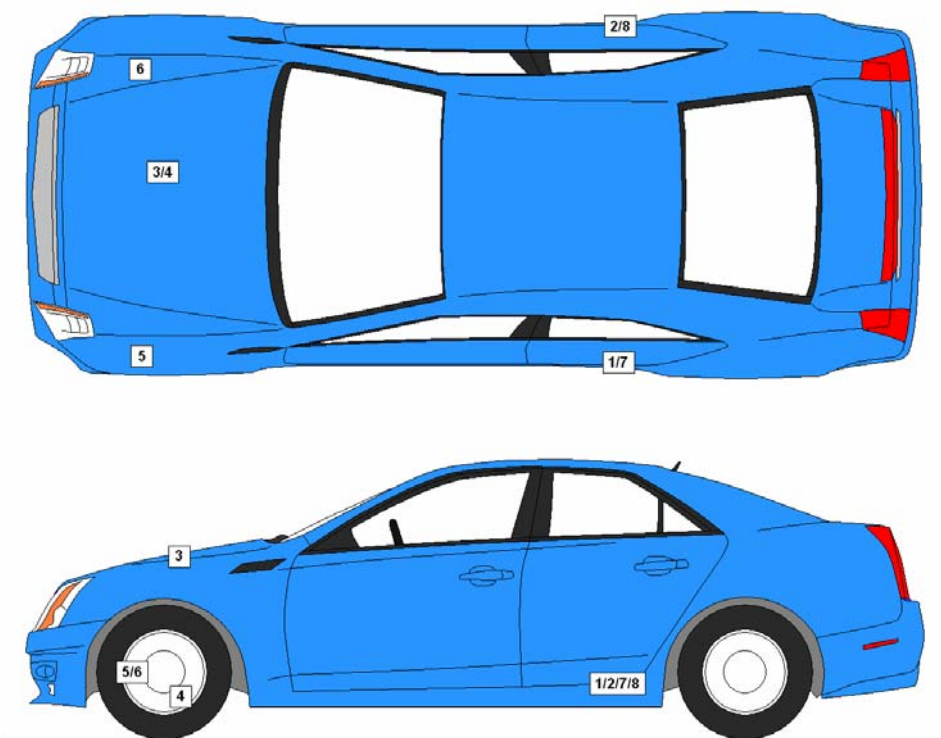
| No. | Description                         | Location (mm) |        |       | Lens (mm) | Speed (fps) |
|-----|-------------------------------------|---------------|--------|-------|-----------|-------------|
|     |                                     | X             | Y      | Z     |           |             |
| 1   | Real-Time Left Overall              | -11412        | -8150  | -1484 |           | 30          |
| 2   | Driver Close-Up                     | -2590         | -7950  | -1371 | 24        | 1000        |
| 3   | Left Front Half                     | -1701         | -6197  | -1701 | 50        | 1000        |
| 4   | Left Angle                          | -6696         | -10308 | -3211 | ZOOM      | 1000        |
| 5   | Steering Column - Top               | -1966         | -10412 | -3688 | 50        | 1000        |
| 6   | Steering Column - Bottom            | -1972         | -10412 | -3379 | 50        | 1000        |
| 7   | Right Overall                       | -2336         | 7569   | -1012 | 24        | 1000        |
| 8   | Passenger Close-Up                  | -1733         | 7581   | -1408 | 50        | 1000        |
| 9   | Right Front Half                    | -1600         | 8214   | -1811 | ZOOM      | 1000        |
| 10  | Right Angle                         | -6217         | 9516   | -4830 | ZOOM      | 1000        |
| 11  | Windshield                          | -354          | 0      | -5749 | 12        | 1000        |
| 12  | Driver Windshield                   | 297           | -366   | -2460 | 12        | 1000        |
| 13  | Passenger Windshield                | 297           | 366    | -2460 | 24        | 1000        |
| 14  | Pit Front                           | -756          | 0      | 1495  | 12        | 1000        |
| 15  | Pit Rear                            | -3398         | 0      | 1495  | 8         | 1000        |
| 16  | Onboard Driver Airbag (Optional)    | -1650         | 300    | -1265 | 12        | 1000        |
| 17  | Onboard Passenger Airbag (Optional) | -1650         | -300   | -1265 | 12        | 1000        |
| 18  | Real-Time Left View of Impact       |               |        |       |           |             |
| 19  | Real-Time Right View of Impact      |               |        |       |           |             |

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

## DATA SHEET NO. 7

### VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13



### VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

| No. | Description                          | Location |      |      |
|-----|--------------------------------------|----------|------|------|
|     |                                      | X        | Y    | Z    |
| 1   | Left Rear Accelerometer X-Direction  | 1846     | -785 | -368 |
| 2   | Right Rear Accelerometer X-Direction | 1846     | 785  | -368 |
| 3   | Engine Top X                         | 3823     | 0    | -444 |
| 4   | Engine Bottom X                      | 4102     | 0    | -140 |
| 5   | Left Rear Accelerometer Z-Direction  | 1846     | -785 | -368 |
| 6   | Right Rear Accelerometer Z-Direction | 1846     | 785  | -368 |

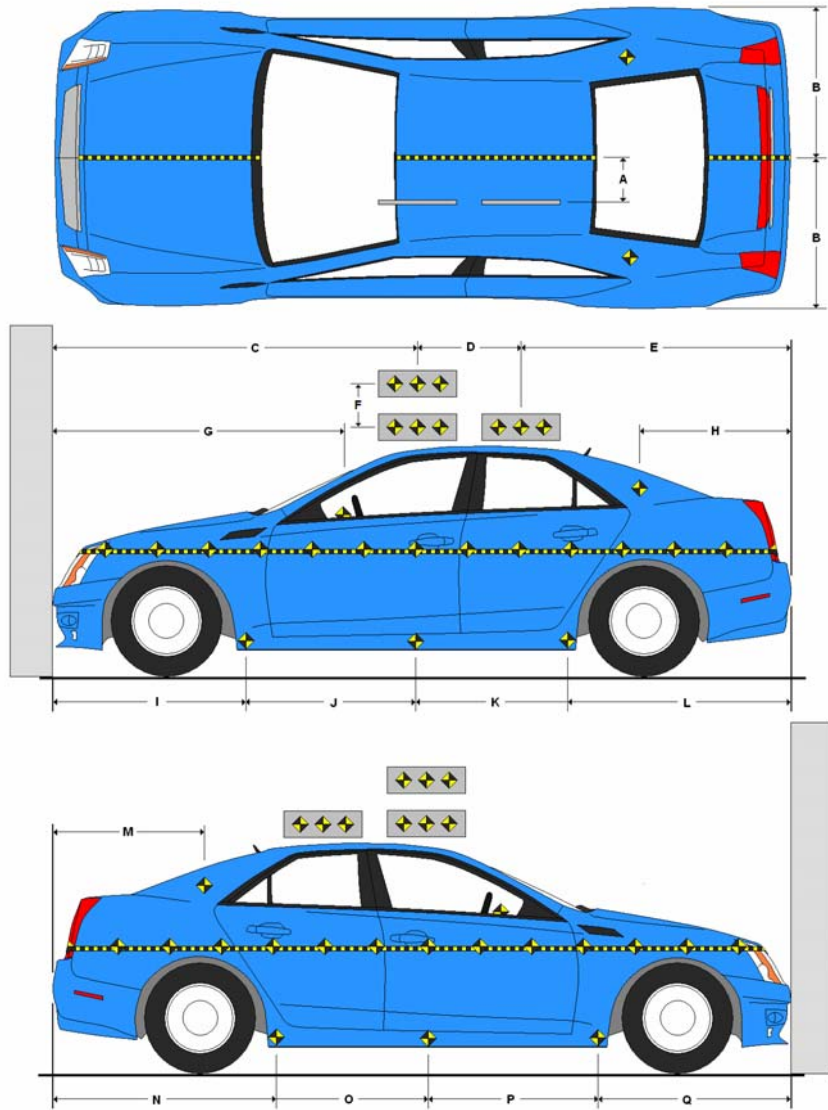
Reference Points: X – Rear Surface of Vehicle (+ forward)  
Y – Vehicle Centerline (+ to right)  
Z – Ground Plane (+ down)

## DATA SHEET NO. 8

### PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

| Item | Value |
|------|-------|
| A    | 425   |
| B    | 968   |
| C    | 2442  |
| D    | 610   |
| E    | 1935  |
| F    | 305   |
| G    | 1985  |
| H    | 960   |
| I    | 1397  |
| J    | 1023  |
| K    | 1023  |
| L    | 1545  |
| M    | 970   |
| N    | 1542  |
| O    | 1020  |
| P    | 1020  |
| Q    | 1395  |



All measurements in millimeters.

# DATA SHEET NO. 9

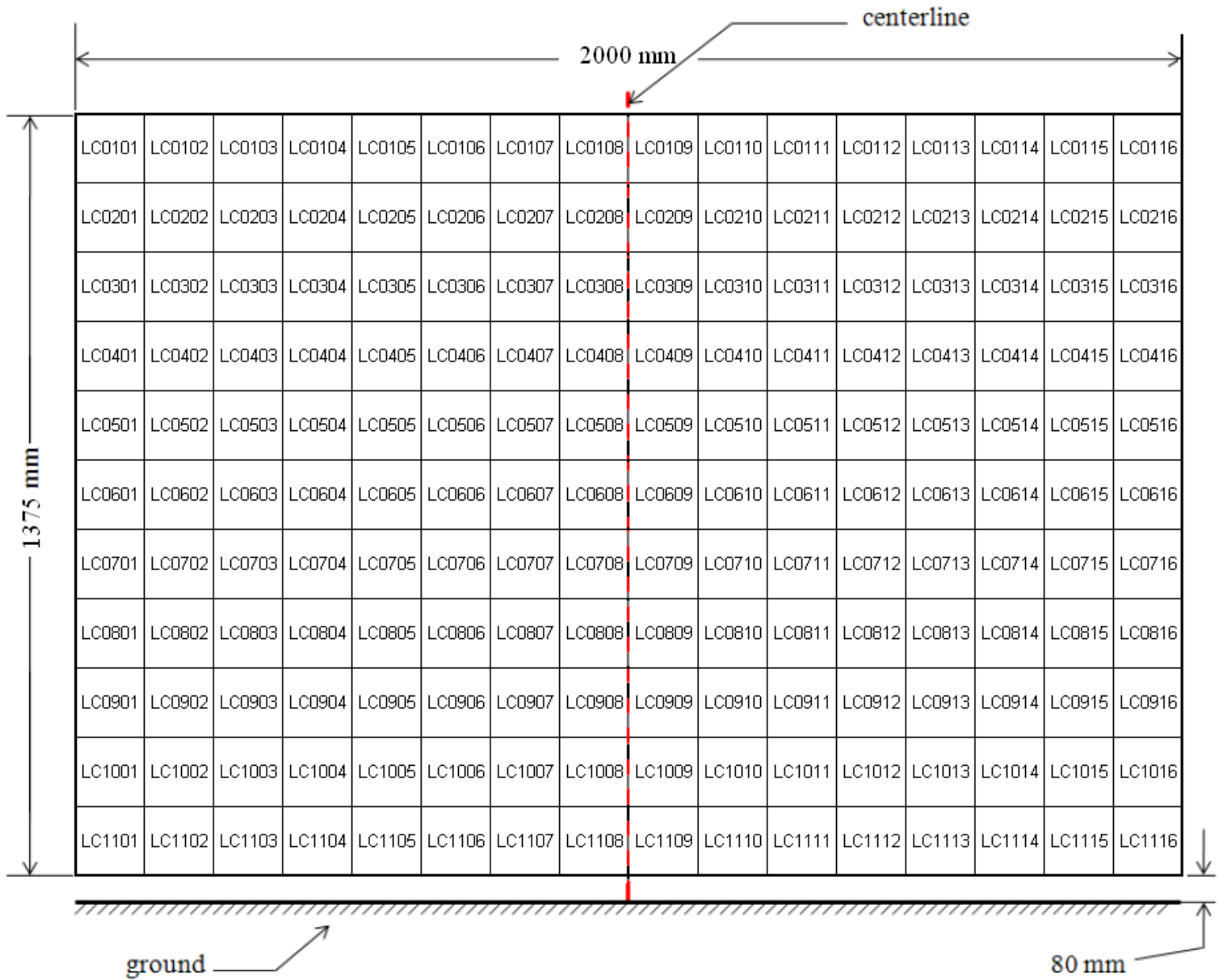
## LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 07/22/13



## DATA SHEET NO. 10

### TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

#### INSTRUMENTATION

|                                  |     |
|----------------------------------|-----|
| Driver Dummy Accelerometers      | 50  |
| Passenger Dummy Accelerometers   | 50  |
| Vehicle Structure Accelerometers | 8   |
| Seat Belt Load Cells             | 4   |
| Load Cell Barrier                | 528 |
| Total                            | 640 |

#### CAMERA COVERAGE

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

## DATA SHEET NO. 11

### POST-TEST OBSERVATIONS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

#### TEST DUMMY INFORMATION AND CONTACT

| Description           | Driver                               | Passenger                             |
|-----------------------|--------------------------------------|---------------------------------------|
| Dummy Type/Serial No. | P572E 50th Percentile Male ATD / 034 | P572O 5th Percentile Female ATD / 141 |
| Head Contact          | Airbag, Headrest                     | Airbag, Headrest                      |
| Upper Torso Contact   | Airbag                               | Airbag                                |
| Lower Torso Contact   | None                                 | None                                  |
| Left Knee Contact     | Knee Airbag                          | Knee Airbag                           |
| Right Knee Contact    | Knee Airbag                          | Knee Airbag                           |

#### DOOR OPENING AND SEAT TRACK INFORMATION

| Description             | Driver                                   | Passenger                                |
|-------------------------|------------------------------------------|------------------------------------------|
| Locked / Unlocked Doors | Unlocked                                 | Unlocked                                 |
| Front Door Opening      | Remained closed and latched, operational | Remained closed and latched, operational |
| Rear Door Opening       | Remained closed and latched, operational | Remained closed and latched, operational |
| Seat Track Shift (mm)   | 7                                        | 2                                        |
| Seat Back Failure       | None                                     | None                                     |
| Glazing Damage          | None                                     | None                                     |

#### POST TEST STRUCTURAL OBSERVATIONS

| Critical Areas of Performance | Observations and Conclusions |
|-------------------------------|------------------------------|
| Windshield Damage             | Cracked                      |
| Window Damage                 | None                         |
| Other Notable Effects         | Hood Unlatched               |

#### VEHICLE REBOUND FROM BARRIER

| Measured Parameter | Units | Value |
|--------------------|-------|-------|
| Left Side          | mm    | 603   |
| Center             | mm    | 539   |
| Right Side         | mm    | 591   |
| Average            | mm    | 578   |

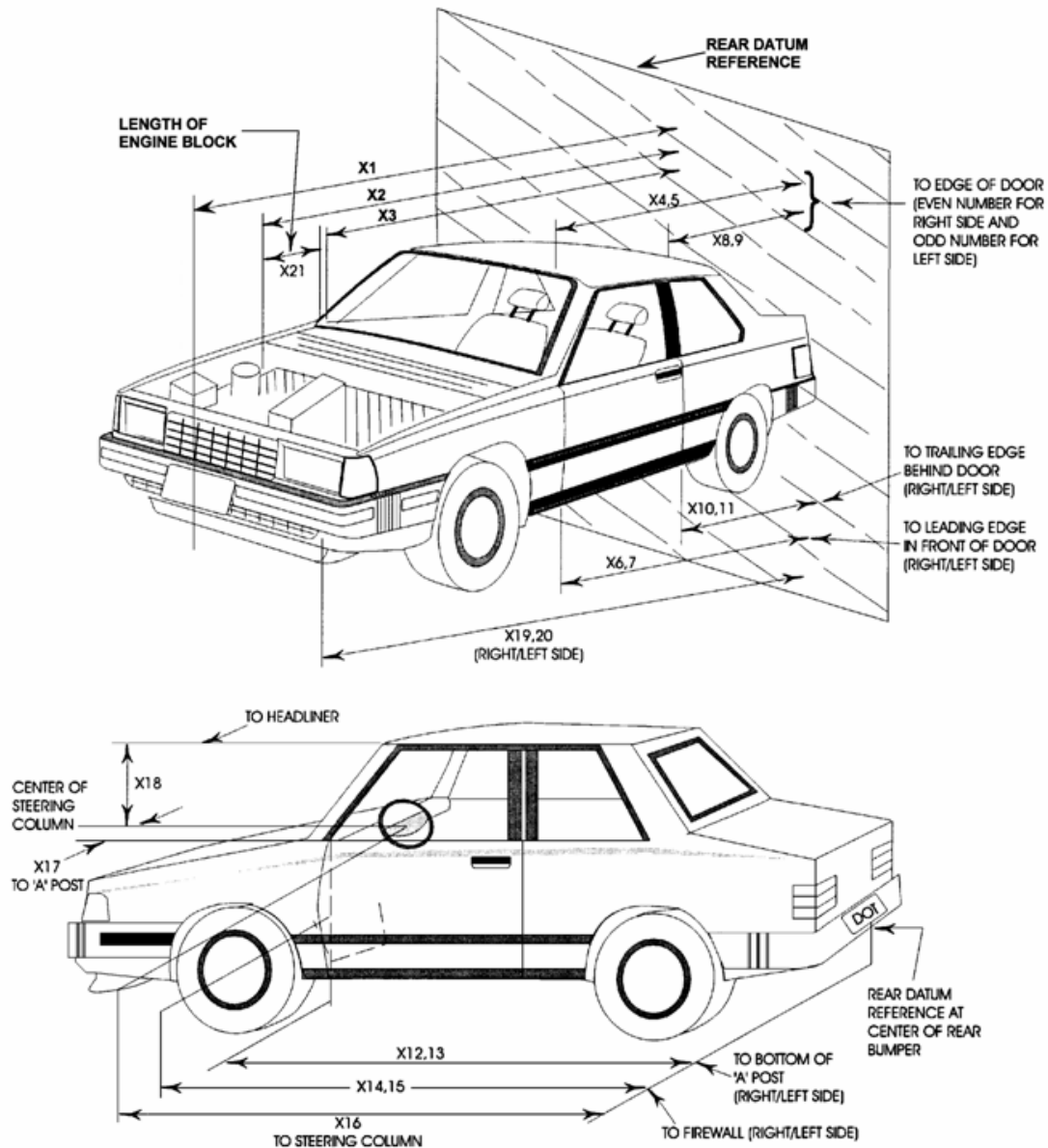
#### SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

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

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

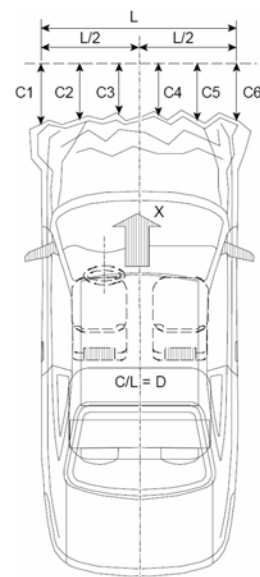


**DATA SHEET NO. 12 ... (CONTINUED)****VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

| No. | Description                                | Pre-Test | Post-Test | Difference |
|-----|--------------------------------------------|----------|-----------|------------|
| 1   | Total Length of Vehicle at Centerline      | 4995     | 4550      | -445       |
| 2   | Rear Surface of Vehicle to Front of Engine |          |           |            |
| 3   | RSOV to Firewall                           | 3593     | 3585      | -8         |
| 4   | RSOV to Upper Leading Edge of Right Door   | 3392     | 3390      | -2         |
| 5   | RSOV to Upper Leading Edge of Left Door    | 3389     | 3377      | -12        |
| 6   | RSOV to Lower Leading Edge of Right Door   | 3379     | 3370      | -9         |
| 7   | RSOV to Lower Leading Edge of Left Door    | 3380     | 3370      | -10        |
| 8   | RSOV to Upper Trailing Edge of Right Door  | 2265     | 2262      | -3         |
| 9   | RSOV to Upper Trailing Edge of Left Door   | 2260     | 2252      | -8         |
| 10  | RSOV to Lower Trailing Edge of Right Door  | 2294     | 2286      | -8         |
| 11  | RSOV to Lower Trailing Edge of Left Door   | 2292     | 2285      | -7         |
| 12  | RSOV to Bottom of A-Pillar, Right Side     | 3265     | 3266      | 1          |
| 13  | RSOV to Bottom of A-Pillar, Left Side      | 3250     | 3256      | 6          |
| 14  | RSOV to Firewall, Right Side               | 3610     | 3695      | 85         |
| 15  | RSOV to Firewall, Left Side                | 3595     | 3650      | 55         |
| 16  | RSOV to Steering Column                    | 2855     | 2890      | 35         |
| 17  | Center of Steering Column to A-Pillar      | 445      | 440       | -5         |
| 18  | Center of Steering Column to Headliner     | 385      | 390       | 5          |
| 19  | RSOV to Right Side of Front Bumper         | 4182     | 4170      | -12        |
| 20  | RSOV to Left Side of Front Bumper          | 4173     | 4215      | 42         |
| 21  | Length of Engine Block                     |          |           |            |
| RD  | RSOV to Right Side of Dash Panel           | 3055     | 3070      | 15         |
| CD  | RSOV to Center of Dash Panel               | 2955     | 2920      | -35        |
| LD  | RSOV to Left Side of Dash Panel            | 3045     | 3025      | -20        |

All measurements in millimeters.

**DATA SHEET NO. 13****ACCIDENT INVESTIGATION DATA**Test Vehicle: 2013 Tesla Model S 5-Door HatchbackNHTSA No.: MD5000Test Program: 56 km/h Frontal Impact NCAP TestTest Date: 07/22/13**VEHICLE INFORMATION**VIN: 5YJSA1AGXDFP11283Wheelbase (mm): 2790Vehicle Size Category: 5-Door HatchbackTest Weight (kg): 2272.5**ACCELEROMETER DATA**Accelerometer Locations: Left Rear CrossmemberCal. Procedure/Interval: Drop Test / 6 monthsIntegration Algorithm: NHTSA StandardImpact Velocity (km/h): 56.23Velocity Change (km/h): 63.5Time of Separation (msec): 67.8Linearity: Good**CRUSH PROFILE**Collision Deformation Classification: 12FDEW2Midpoint of Damage: Vehicle CenterlineDamage Region Length (mm): 1590Impact Mode: Full Frontal

| No. | Measurement Description    | Units | Pre-Test | Post-Test | Difference |
|-----|----------------------------|-------|----------|-----------|------------|
| C1  | Crush Zone 1 at Left Side  | mm    | 320      | 500       | 180        |
| C2  | Crush Zone 2 at Left Side  | mm    | 129      | 557       | 428        |
| C3  | Crush Zone 3 at Left Side  | mm    | 37       | 460       | 423        |
| C4  | Crush Zone 4 at Right Side | mm    | 37       | 460       | 423        |
| C5  | Crush Zone 5 at Right Side | mm    | 129      | 543       | 414        |
| C6  | Crush Zone 6 at Right Side | mm    | 320      | 502       | 182        |
| L   | C1 to C6                   | mm    | 1590     |           |            |

## DATA SHEET NO. 14

### VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test

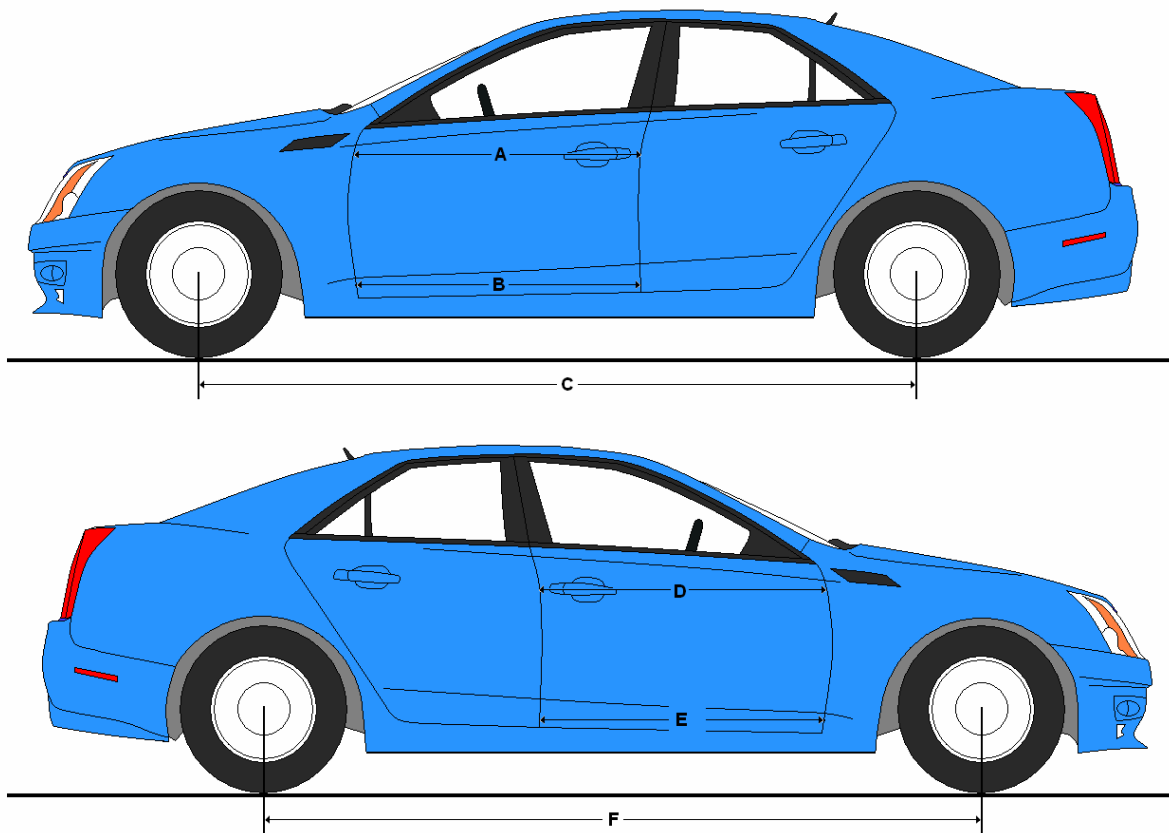
Test Date: 07/22/13

### DOOR OPENING WIDTH

| Item | Description      | Units | Pre-Test | Post-Test | Difference |
|------|------------------|-------|----------|-----------|------------|
| A    | Left Side Upper  | mm    | 928      | 931       | -3         |
| B    | Left Side Lower  | mm    | 923      | 921       | 2          |
| D    | Right Side Upper | mm    | 933      | 939       | -6         |
| E    | Right Side Lower | mm    | 906      | 901       | 5          |

### WHEELBASE MEASUREMENTS

| Item | Description          | Units | Pre-Test | Post-Test | Difference |
|------|----------------------|-------|----------|-----------|------------|
| C    | Left Side Wheelbase  | mm    | 2970     | 2875      | 95         |
| F    | Right Side Wheelbase | mm    | 2970     | 2900      | 70         |



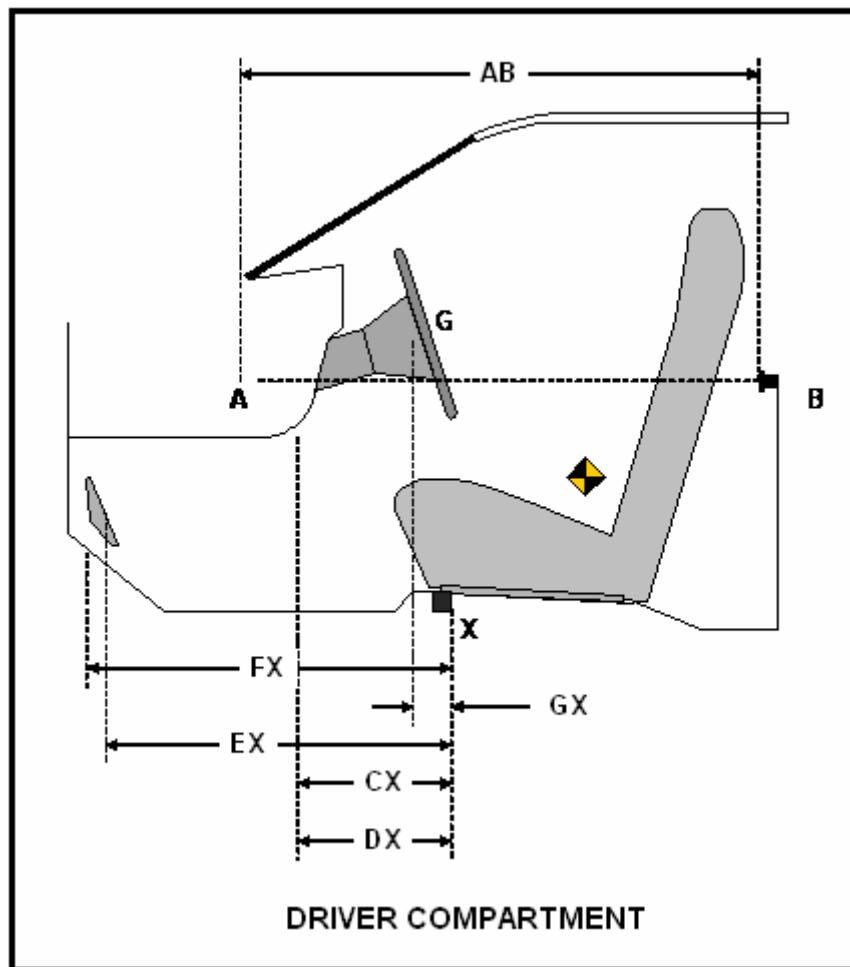
**DATA SHEET NO. 14 ... (CONTINUED)**  
**VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
 Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

**DRIVER COMPARTMENT INTRUSION**

| Item | Description                       | Units | Pre-Test | Post-Test | Difference |
|------|-----------------------------------|-------|----------|-----------|------------|
| AB   | Door Opening (Inside Window Jam)  | mm    | 823      | 831       | -8         |
| CX   | Left Knee Bolster to X            | mm    | 315      | 300       | 15         |
| DX   | Right Knee Bolster to X           | mm    | 340      | 290       | 50         |
| EX   | Brake Pedal to X                  | mm    | 550      | 565       | -15        |
| FX   | Foot Rest to X                    | mm    | 585      | 600       | -15        |
| GX   | Center of Steering Wheel Hub to X | mm    | 90       | 65        | 25         |

X = Front of Seat Track (Stationary)



## DATA SHEET NO. 15

### SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

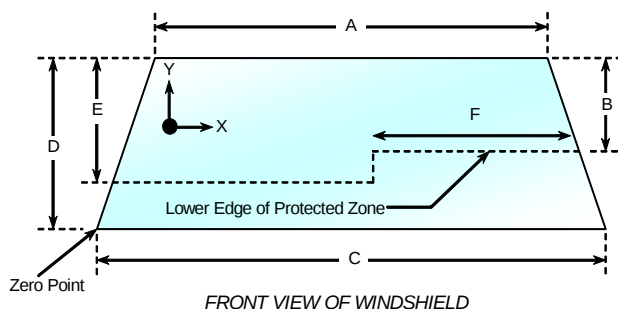
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with plastic molding and rubber cement.

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

Temperature of windshield molding during test: 21.2 ° C

#### WINDSHIELD PERIPHERY MEASUREMENTS

| Measurement | Pre-Test (mm) | Post-Test (mm) | % Retention |
|-------------|---------------|----------------|-------------|
| Left Side   | 2385          | 2385           | 100.0%      |
| Right Side  | 2385          | 2385           | 100.0%      |
| Total       | 4770          | 4770           | 100.0%      |



| Item | Units | Value |
|------|-------|-------|
| A    | mm    | 1360  |
| B    | mm    | 352   |
| C    | mm    | 1520  |
| D    | mm    | 945   |
| E    | mm    | 451   |
| F    | mm    | 538   |

#### AREAS OF PROTECTED ZONE FAILURES

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

| X | Y |
|---|---|
|   |   |
|   |   |
|   |   |
|   |   |

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

| X | Y |
|---|---|
|   |   |
|   |   |
|   |   |
|   |   |

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

**SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA**

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13

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

Temperature at Time of Impact: 36.5° C Test Time: 1:23 PM

**Stoddard Solvent Spillage Measurements**

- 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: N/A  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

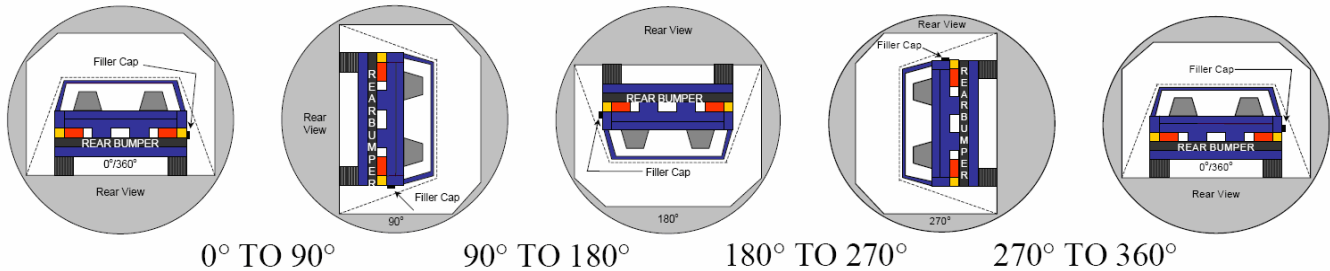
**DATA SHEET NO. 16**  
**FMVSS 301 STATIC ROLLOVER**

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback

NHTSA No.: MD5000

Test Program: 56 km/h Frontal Impact NCAP Test

Test Date: 07/22/13



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard solvent spillage: N/A

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase   | Rotation Time | Hold Time | Total Time |
|--------------|---------------|-----------|------------|
| 0° To 90°    |               |           |            |
| 90° To 180°  |               |           |            |
| 180° To 270° |               |           |            |
| 270° To 360° |               |           |            |

**FMVSS 301 SPILLAGE TABLE**

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

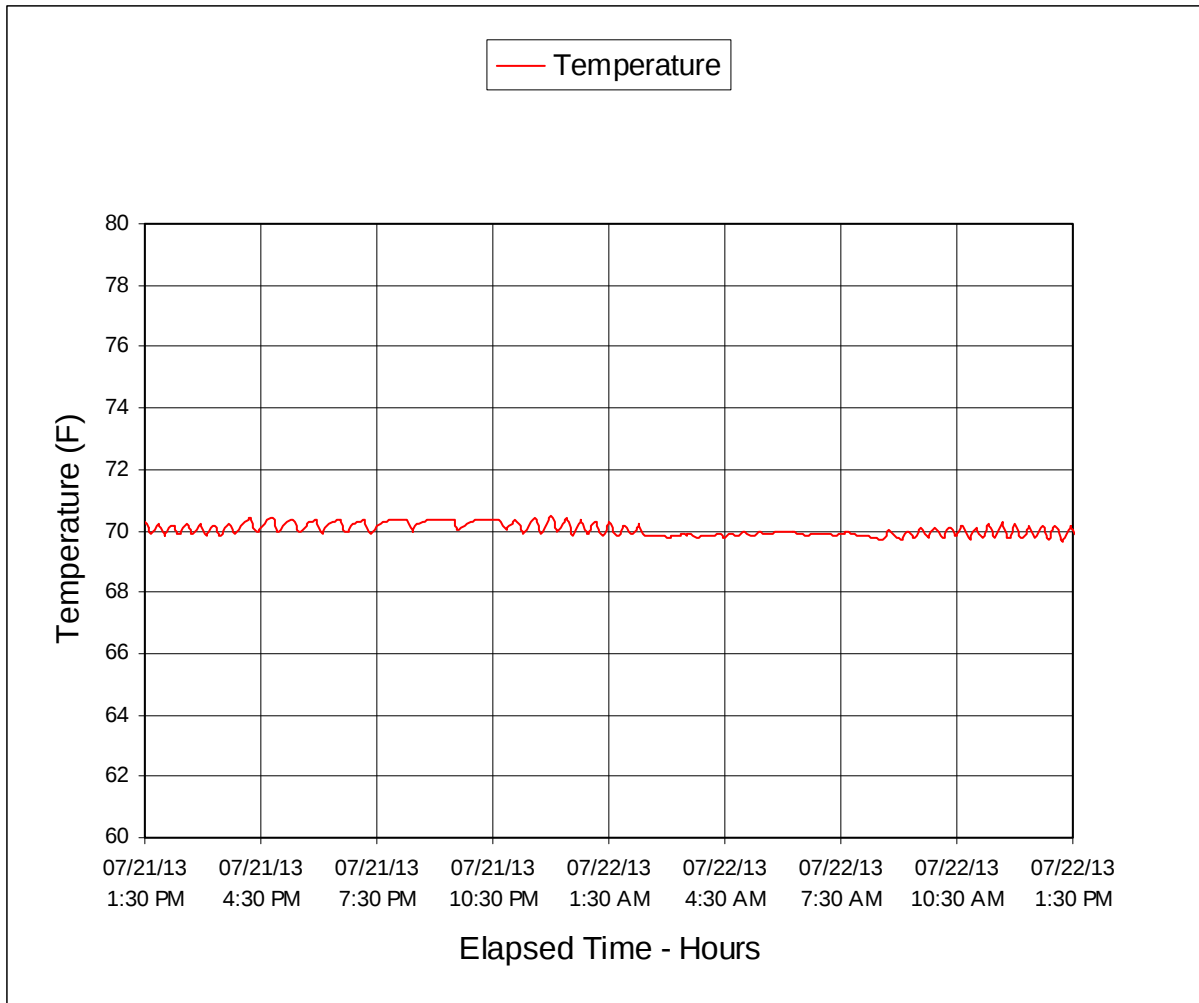
**SOLVENT SPILLAGE LOCATION TABLE**

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

## DATA SHEET NO. 17

### DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2013 Tesla Model S 5-Door Hatchback NHTSA No.: MD5000  
Test Program: 56 km/h Frontal Impact NCAP Test Test Date: 07/22/13



**APPENDIX A**  
**PHOTOGRAPHS**

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FIGURE 1. Load Cell Location

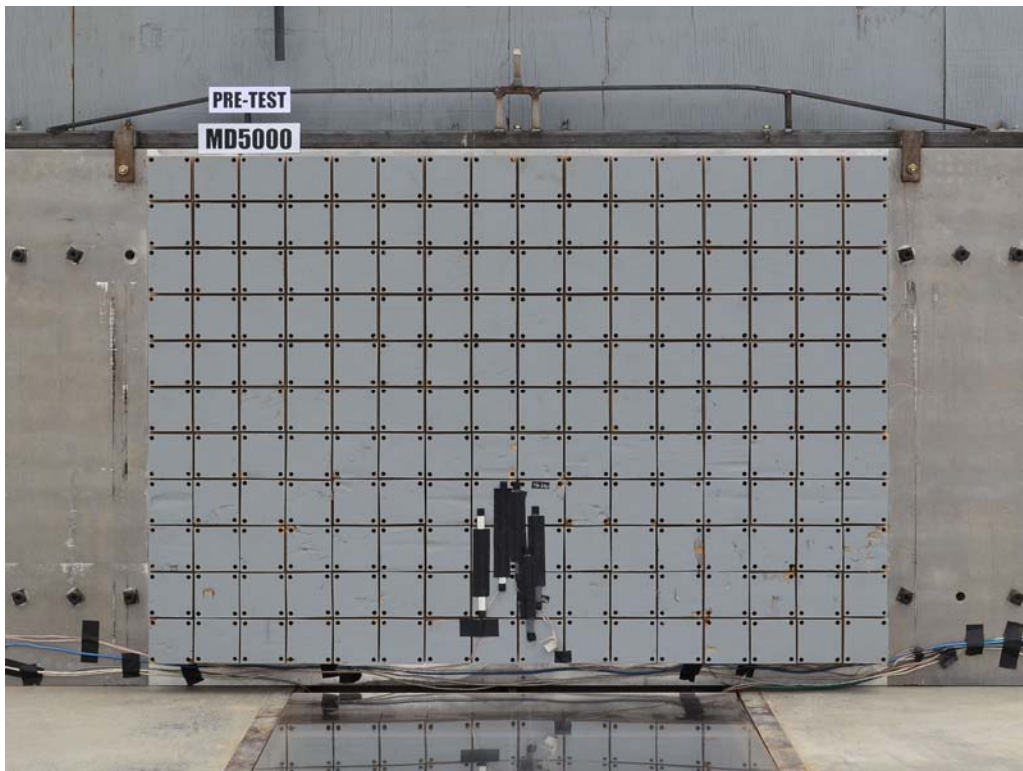


FIGURE 2. Load Cell Wall



FIGURE 3. Manufacturer's Label



FIGURE 4. Tire Placard



FIGURE 5. 2013 Tesla Model S 5-Door Hatchback Frontal As Delivered



FIGURE 6. Left Rear  $\frac{3}{4}$  View, As Received



FIGURE 7. Pre-Test Front View of Test Vehicle



FIGURE 8. Post-Test Front View of Test Vehicle



FIGURE 9. Pre-Test Left View of Test Vehicle



FIGURE 10. Post-Test Left View of Test Vehicle



FIGURE 11. Pre-Test Right View of Test Vehicle



FIGURE 12. Post-Test Right View of Test Vehicle



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



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



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



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

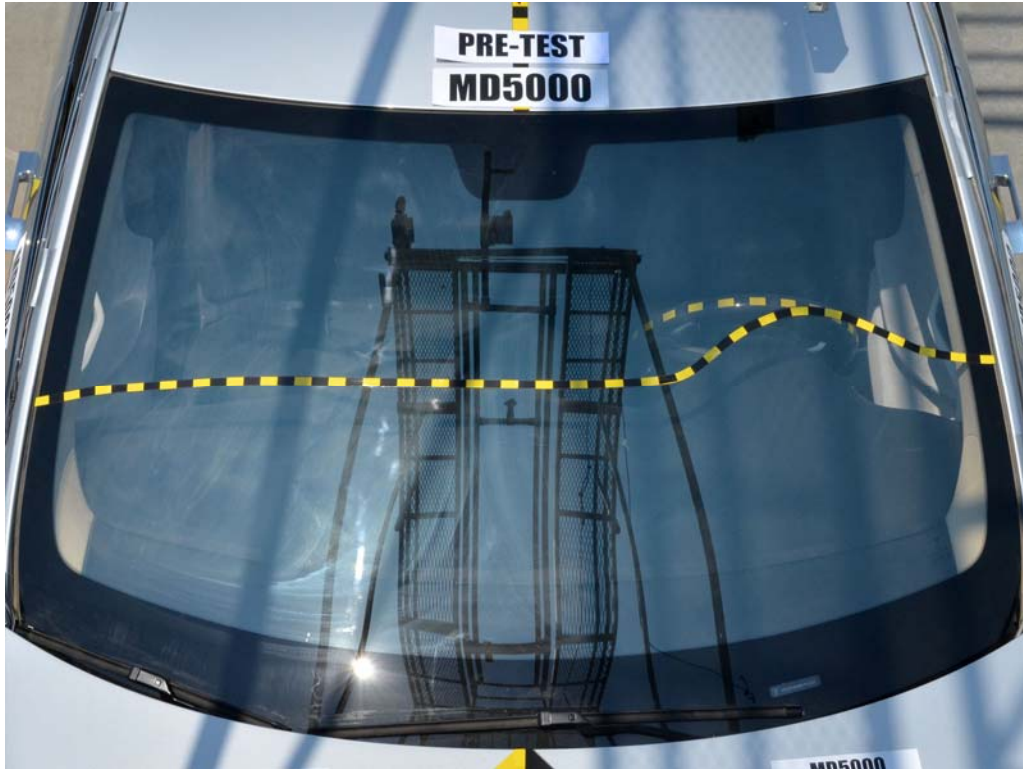


FIGURE 17. Pre-Test Windshield View

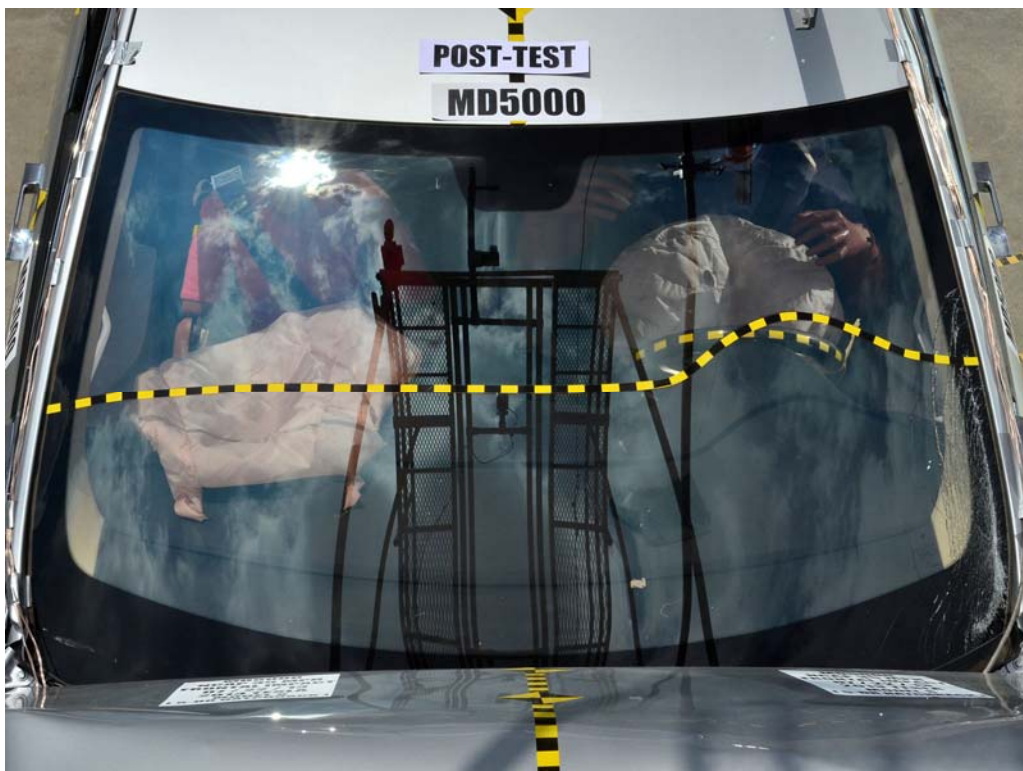


FIGURE 18. Post-Test Windshield View



FIGURE 19. Pre-Test Engine Compartment View



FIGURE 20. Post-Test Engine Compartment View

Photograph Not Applicable

Vehicle Not Equipped  
with Liquid Fuel System

FIGURE 21. Pre-Test Fuel Filler Cap View

Photograph Not Applicable

Vehicle Not Equipped  
with Liquid Fuel System

FIGURE 22. Post-Test Fuel Filler Cap View



FIGURE 23. Pre-Test Front Underbody View

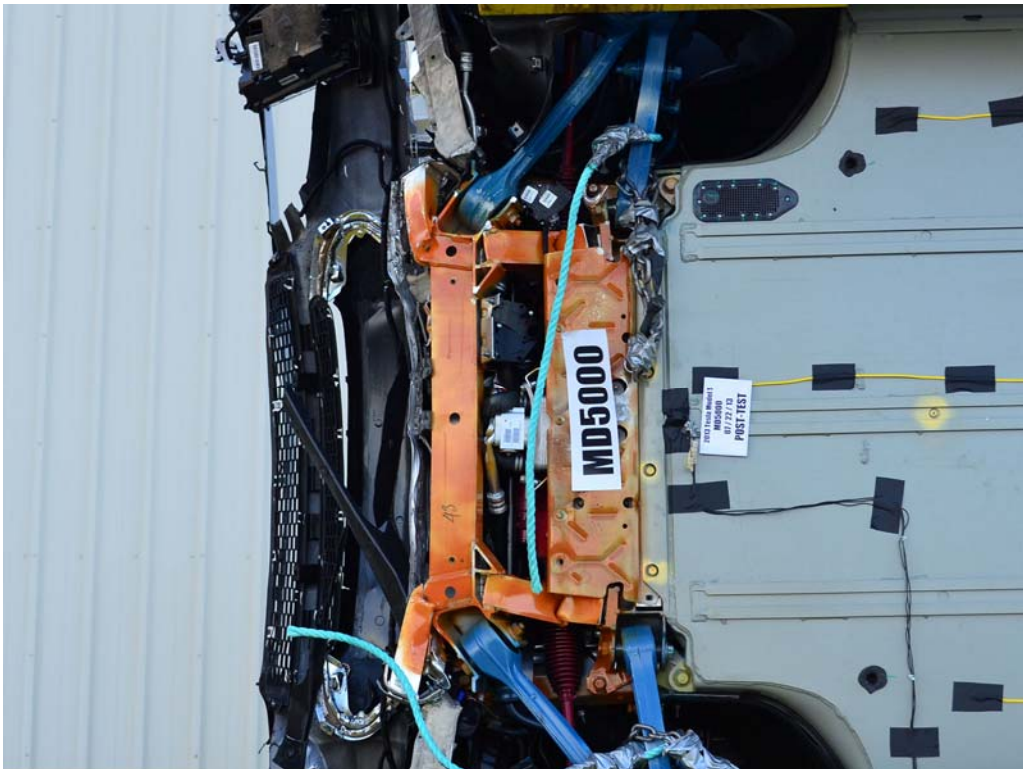


FIGURE 24. Post-Test Front Underbody View

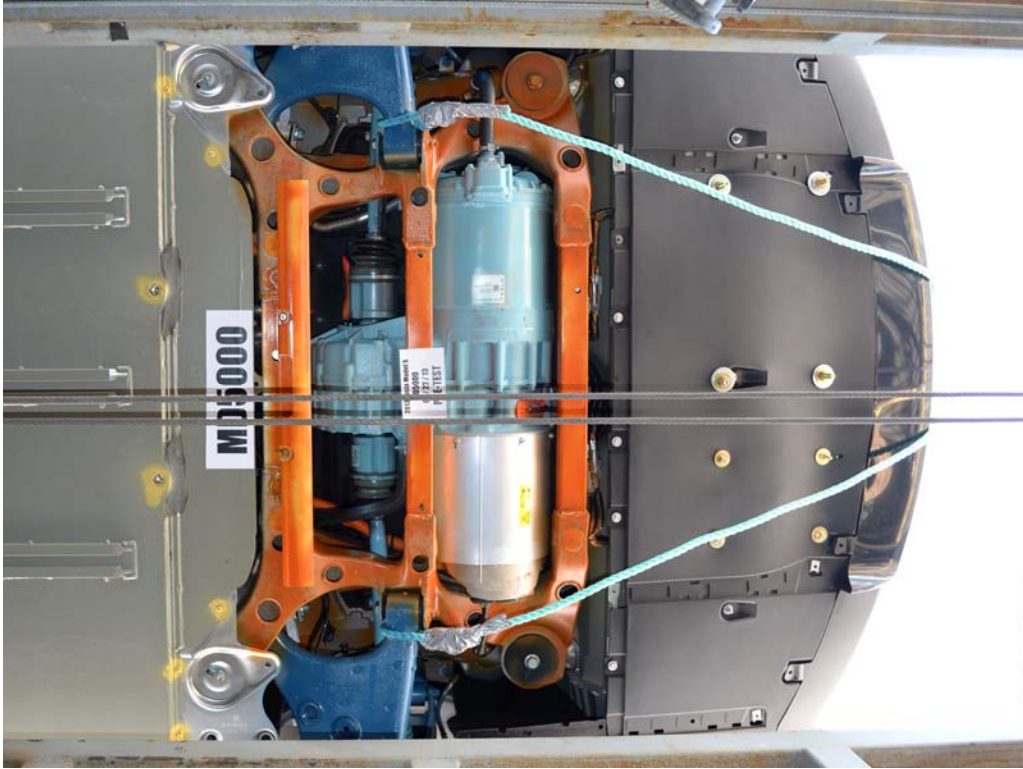


FIGURE 25. Pre-Test Rear Underbody View

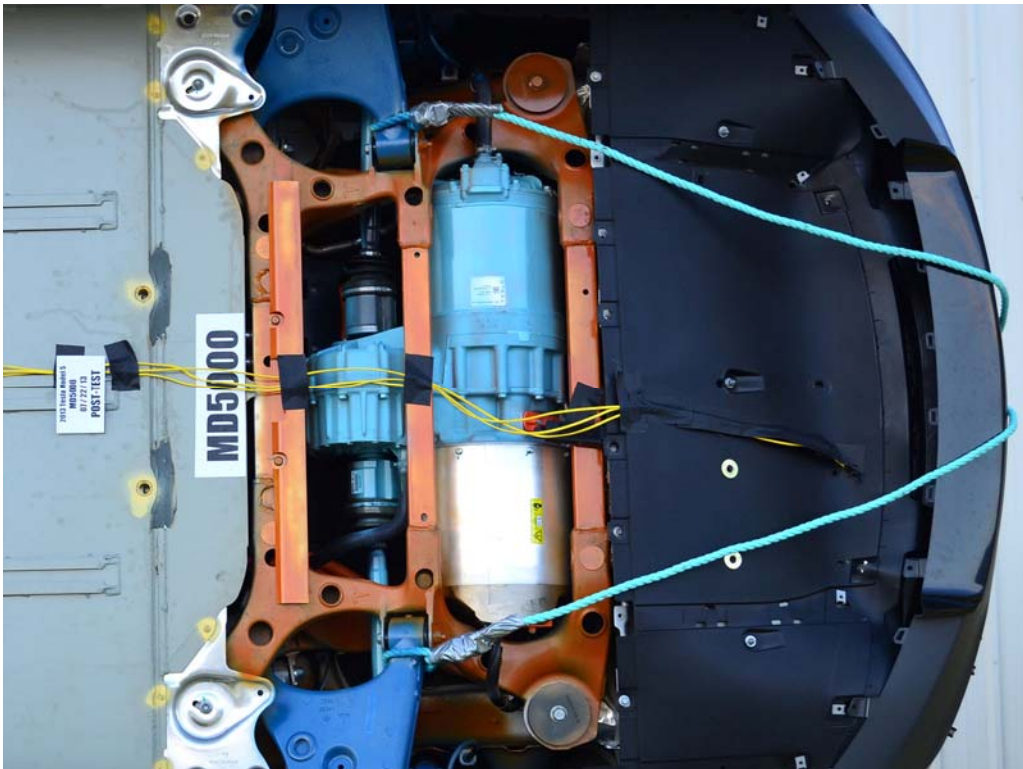


FIGURE 26. Post-Test Rear Underbody View



FIGURE 27. Pre-Test Dummy Cable Routing



FIGURE 28. Post-Test Dummy Cable Routing



FIGURE 29. Pre-Test Driver Dummy Front View



FIGURE 30. Post-Test Driver Dummy Front View



FIGURE 31. Pre-Test Driver Dummy Window View



FIGURE 32. Post-Test Driver Dummy Window View



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



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



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



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



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



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



FIGURE 39. Pre-Test Driver Dummy Feet



FIGURE 40. Post-Test Driver Dummy Feet



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



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



FIGURE 43. Pre-Test Driver's Side Floorpan

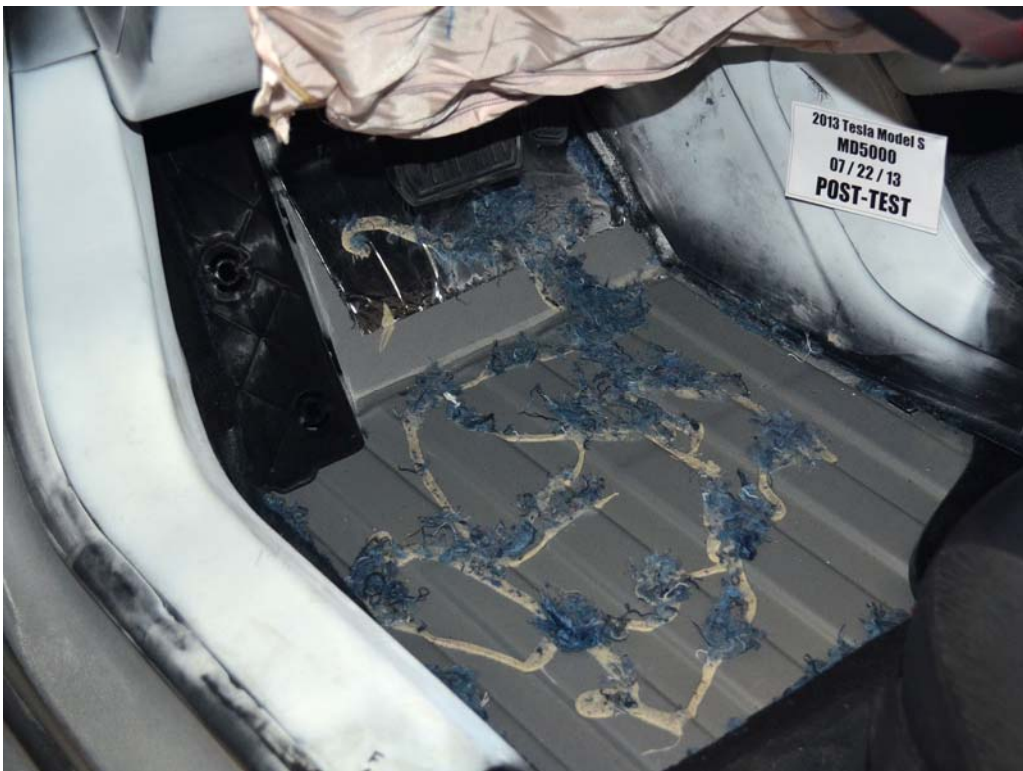


FIGURE 44. Post-Test Driver's Side Floorpan



FIGURE 45. Post-Test Driver Dummy Face

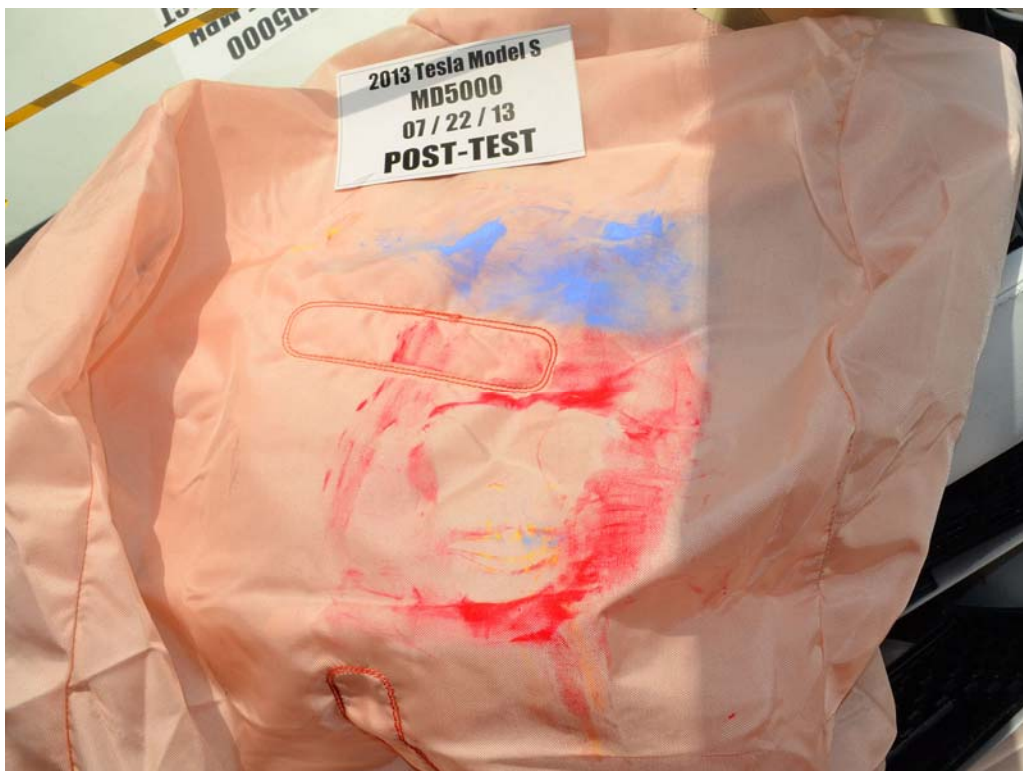


FIGURE 46. Post-Test Driver Dummy Contact With Airbag



FIGURE 47. Post-Test Driver Dummy Contact With Headrest



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



FIGURE 48. Pre-Test View of the Steering Wheel



FIGURE 49. Post-Test View of the Steering Wheel



FIGURE 50. Pre-Test Passenger Dummy Front View



FIGURE 51. Post-Test Passenger Dummy Front View



FIGURE 52. Pre-Test Passenger Dummy Window View



FIGURE 53. Post-Test Passenger Dummy Window View



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



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



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

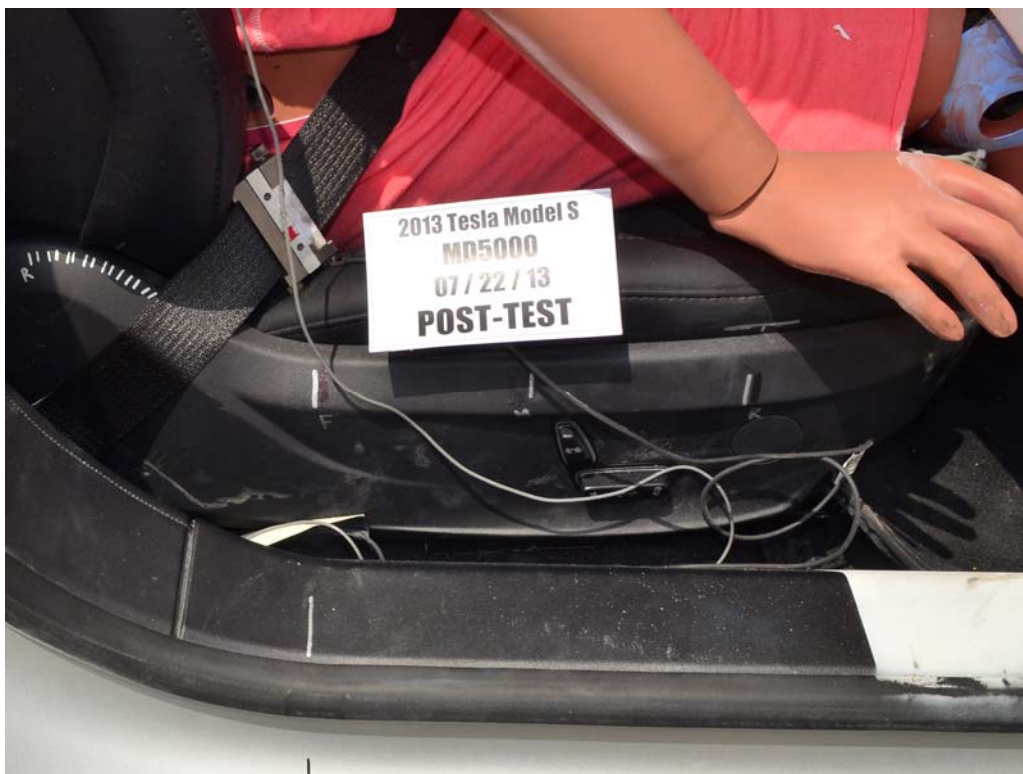


FIGURE 57. Post-Test Passenger's Seat Fore-Aft Markings



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



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



FIGURE 60. Pre-Test Passenger Dummy Feet



FIGURE 61. Post-Test Passenger Dummy Feet



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



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



FIGURE 64. Pre-Test Passenger's Side Floorpan



FIGURE 65. Post-Test Passenger's Side Floorpan



FIGURE 66. Post-Test Passenger Dummy Contact With Airbag



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



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

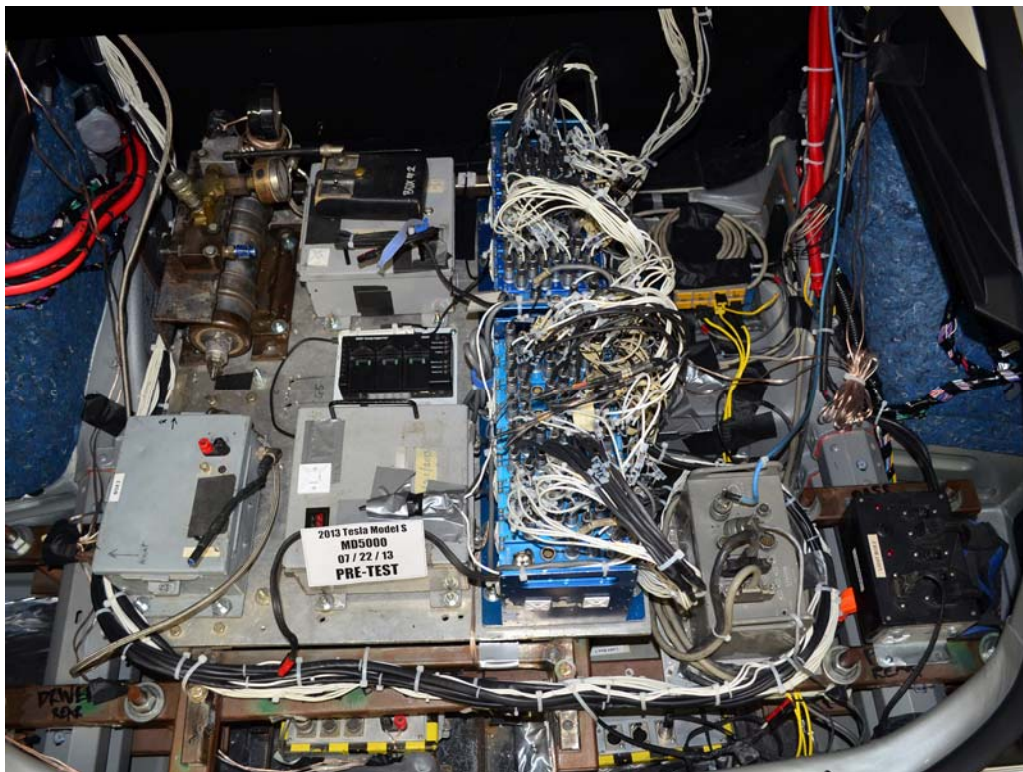


FIGURE 67. Photograph of Ballast Installed In vehicle

Photograph Not Applicable

Vehicle Not Equipped  
with Liquid Fuel System

FIGURE 68. Post-Test Stoddard Solvent Spillage Location View



FIGURE 69. Post-Test Speed Trap Read-Out



FIGURE 70. Vehicle at 0° on Static Rollover Device



FIGURE 71. Vehicle at 90° on Static Rollover Device



FIGURE 72. Vehicle at 180° on Static Rollover Device

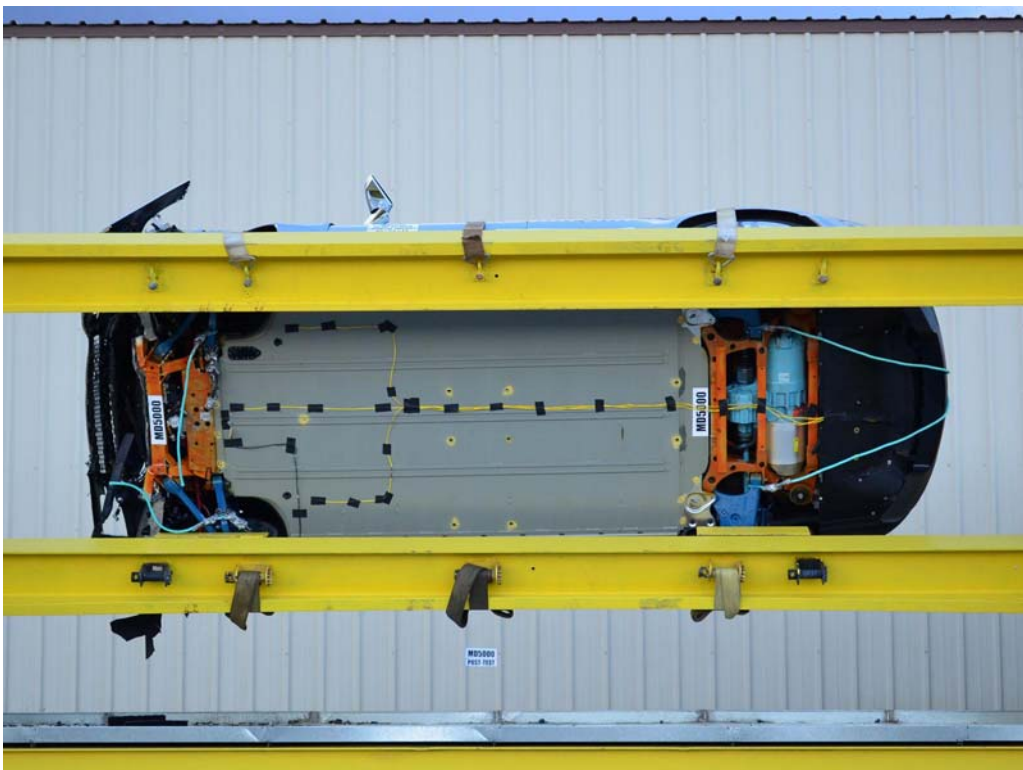


FIGURE 73. Vehicle at 270° on Static Rollover Device



FIGURE 74. Vehicle at 360° on Static Rollover Device



FIGURE 75. 2013 Tesla Model S 5-Door Hatchback Frontal Impact Event



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

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

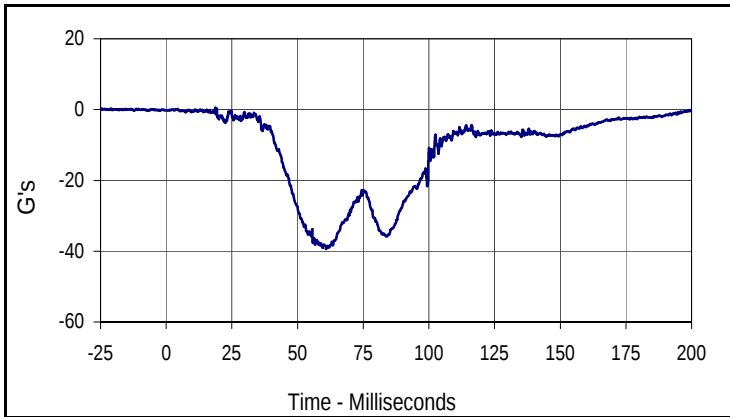
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Driver Head Y Acceleration Redundant  
Driver Head Z Acceleration Redundant  
Driver Head Front Y Acceleration  
Driver Head Front Z Acceleration  
Driver Head Top X Acceleration  
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Driver Head Left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

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

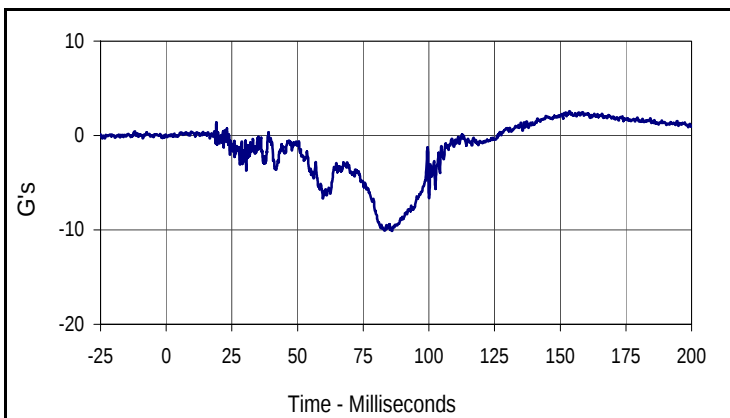
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Passenger Right Upper Tibia Force Z  
Passenger Right Lower Tibia Moment X  
Passenger Right Lower Tibia Moment Y  
Passenger Right Lower Tibia Force Z  
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Passenger Left Foot Aft X  
Passenger Left Foot Aft Z  
Passenger Right Foot Fore Z  
Passenger Right Foot Aft X  
Passenger Right Foot Aft Z  
Left Rear Seat Crossmember X  
Left Rear Seat Crossmember Z  
Right Rear Seat Crossmember X  
Right Rear Seat Crossmember Z  
Vehicle Engine Top X  
Vehicle Engine Bottom X  
Vehicle Left Rear Z  
Vehicle Right Rear Z  
Load Cell Barrier LC0101 – LC 1116

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

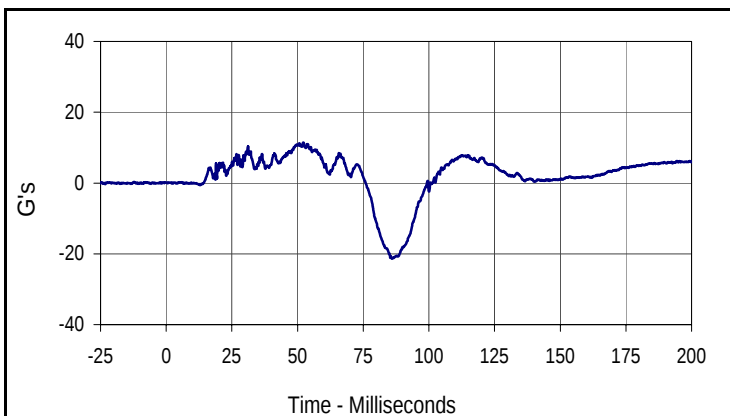
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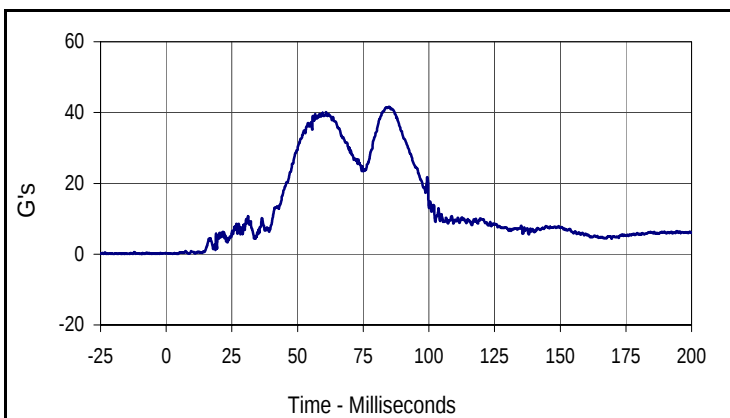
| Curve Description                  |      |           |       |
|------------------------------------|------|-----------|-------|
| Driver Head Acceleration X Primary |      |           |       |
| Plot No.                           | Type | SAE Class | Units |
| 001                                | FIL  | 1000      | G's   |
| Max                                | Time | Min       | Time  |
| 0.5                                | 18.7 | -39.4     | 60.9  |



| Curve Description                  |       |           |       |
|------------------------------------|-------|-----------|-------|
| Driver Head Acceleration Y Primary |       |           |       |
| Plot No.                           | Type  | SAE Class | Units |
| 002                                | FIL   | 1000      | G's   |
| Max                                | Time  | Min       | Time  |
| 2.6                                | 153.6 | -10.1     | 86.0  |



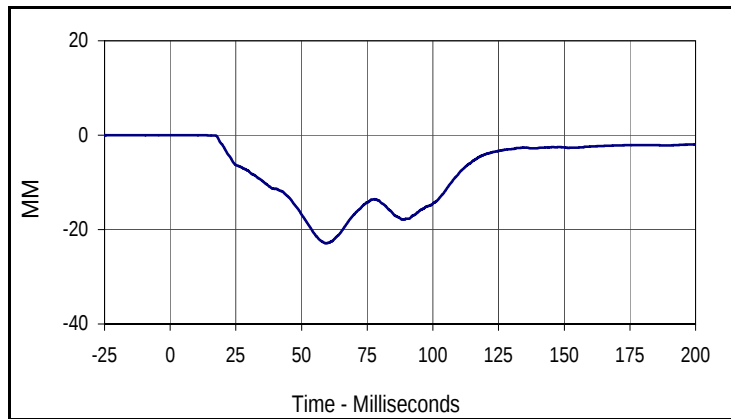
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|------------------------------------|------|-----------|-------|
| Driver Head Acceleration Z Primary |      |           |       |
| Plot No.                           | Type | SAE Class | Units |
| 003                                | FIL  | 1000      | G's   |
| Max                                | Time | Min       | Time  |
| 11.4                               | 52.2 | -21.4     | 85.9  |



| Curve Description                          |      |           |       |
|--------------------------------------------|------|-----------|-------|
| Driver Head Resultant Acceleration Primary |      |           |       |
| Plot No.                                   | Type | SAE Class | Units |
| 004                                        | RES  | 1000      | G's   |
| Max                                        | Time | Min       | Time  |
| 41.6                                       | 84.8 | 0.0       | 4.1   |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

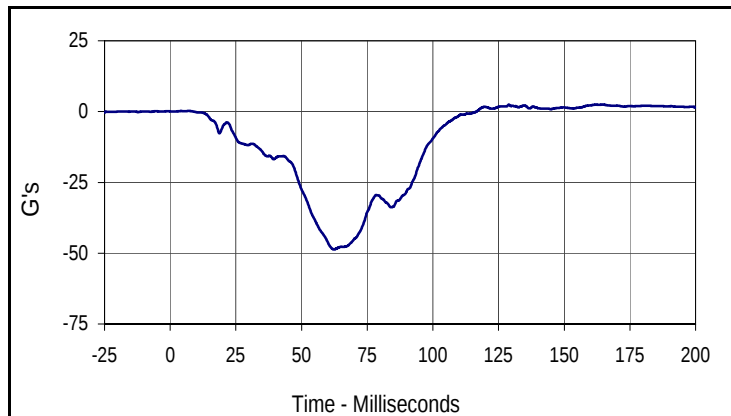
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 Test Date: 7/22/13



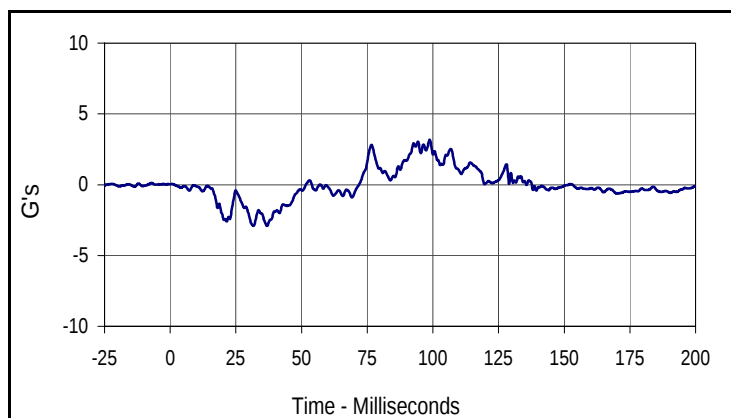
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|-------------------------|------|-----------|-------|
| Driver Chest Deflection |      |           |       |
| Plot No.                | Type | SAE Class | Units |
| 005                     | FIL  | 600       | MM    |
| Max                     | Time | Min       | Time  |
| 0.0                     | 7.7  | -22.9     | 59.3  |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

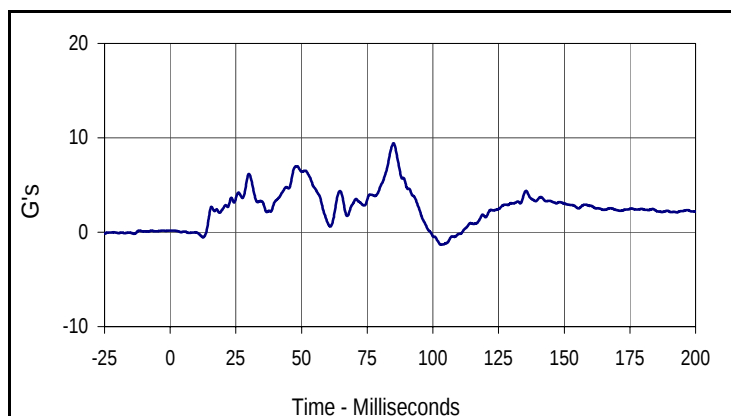
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 Test Date: 7/22/13



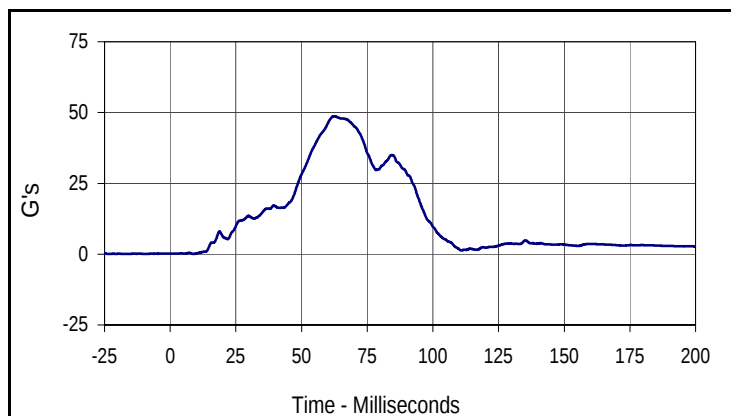
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|-------------------------------------|-------|-----------|-------|
| Driver Chest Acceleration X Primary |       |           |       |
| Plot No.                            | Type  | SAE Class | Units |
| 006                                 | FIL   | 180       | G's   |
| Max                                 | Time  | Min       | Time  |
| 2.5                                 | 164.7 | -48.7     | 62.2  |



| Curve Description                   |      |           |       |
|-------------------------------------|------|-----------|-------|
| Driver Chest Acceleration Y Primary |      |           |       |
| Plot No.                            | Type | SAE Class | Units |
| 007                                 | FIL  | 180       | G's   |
| Max                                 | Time | Min       | Time  |
| 3.2                                 | 98.8 | -2.9      | 31.7  |



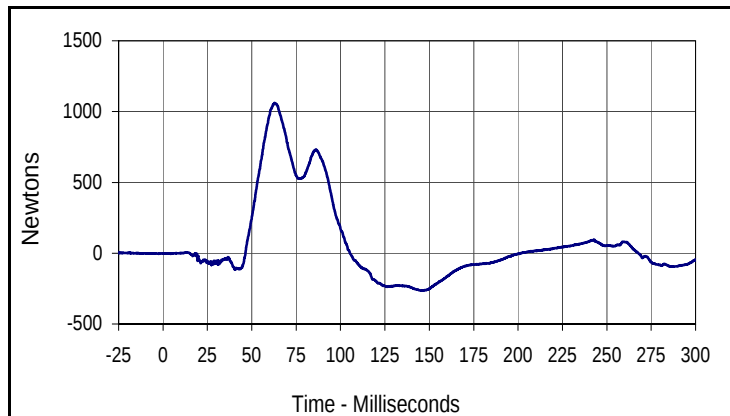
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|-------------------------------------|------|-----------|-------|
| Driver Chest Acceleration Z Primary |      |           |       |
| Plot No.                            | Type | SAE Class | Units |
| 008                                 | FIL  | 180       | G's   |
| Max                                 | Time | Min       | Time  |
| 9.4                                 | 85.0 | -1.3      | 102.9 |



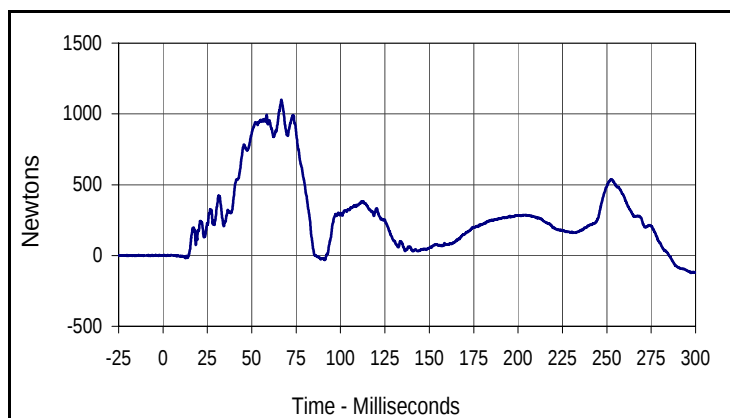
| Curve Description                           |      |           |       |
|---------------------------------------------|------|-----------|-------|
| Driver Chest Resultant Acceleration Primary |      |           |       |
| Plot No.                                    | Type | SAE Class | Units |
| 009                                         | RES  | 180       | G's   |
| Max                                         | Time | Min       | Time  |
| 48.7                                        | 62.3 | 0.1       | 8.9   |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

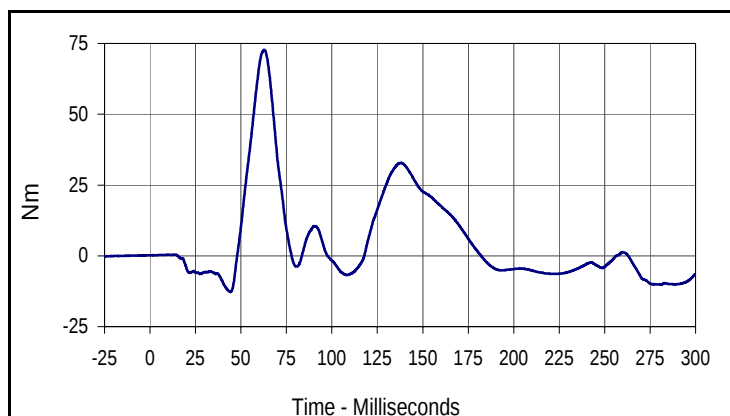
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 Test Date: 7/22/13



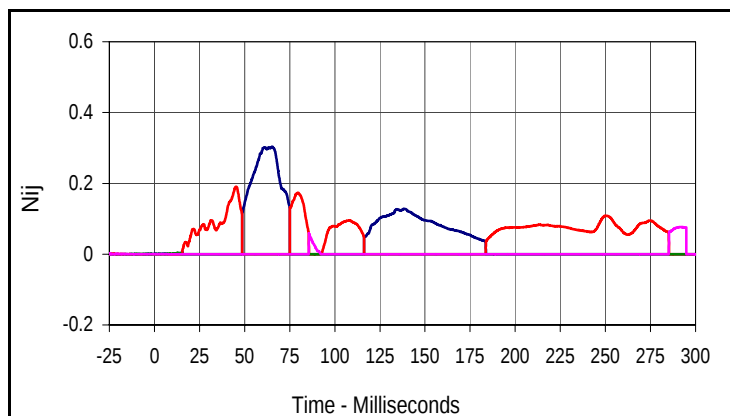
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|---------------------------|------|-----------|---------|
| Driver Upper Neck Force X |      |           |         |
| Plot No.                  | Type | SAE Class | Units   |
| 010                       | FIL  | 1000      | Newtons |
| Max                       | Time | Min       | Time    |
| 1060.7                    | 62.7 | -265.7    | 146.2   |



| Curve Description         |      |           |         |
|---------------------------|------|-----------|---------|
| Driver Upper Neck Force Z |      |           |         |
| Plot No.                  | Type | SAE Class | Units   |
| 011                       | FIL  | 1000      | Newtons |
| Max                       | Time | Min       | Time    |
| 1099.0                    | 66.7 | -122.5    | 297.2   |



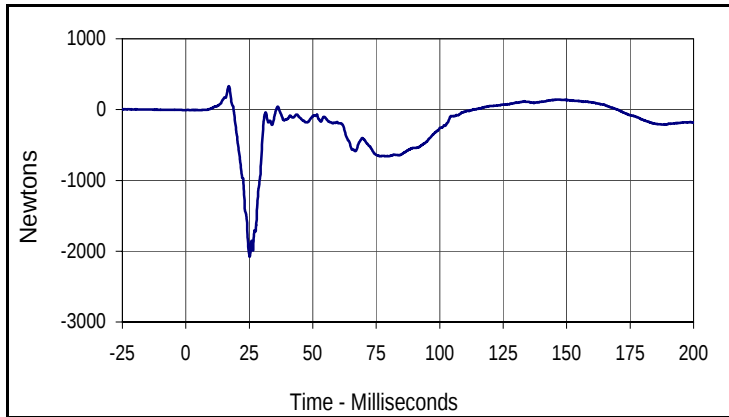
| Curve Description          |      |           |       |
|----------------------------|------|-----------|-------|
| Driver Upper Neck Moment Y |      |           |       |
| Plot No.                   | Type | SAE Class | Units |
| 012                        | FIL  | 600       | Nm    |
| Max                        | Time | Min       | Time  |
| 72.7                       | 62.8 | -12.8     | 44.3  |



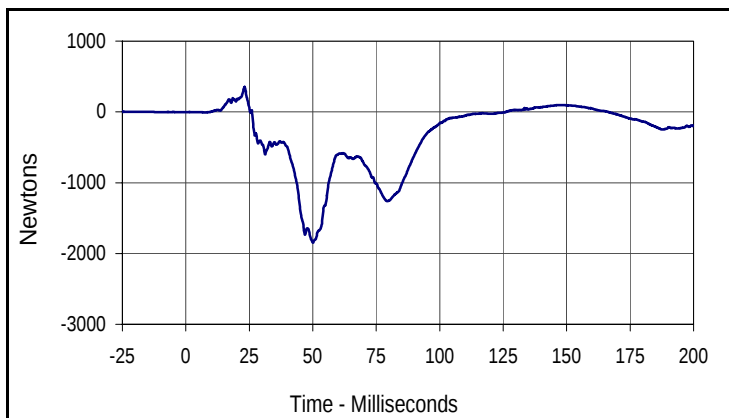
| Curve Description |      |      |       |
|-------------------|------|------|-------|
| Driver Nij        |      |      |       |
| Units             | Type | Max  | Time  |
| Ntf               | FIL  | 0.30 | 65.4  |
| Units             | Type | Max  | Time  |
| Nte               | FIL  | 0.19 | 45.3  |
| Units             | Type | Max  | Time  |
| Ncf               | FIL  | 0.00 | 12.8  |
| Units             | Type | Max  | Time  |
| Nce               | FIL  | 0.08 | 291.3 |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: MD5000  
 Test Date: 7/22/13



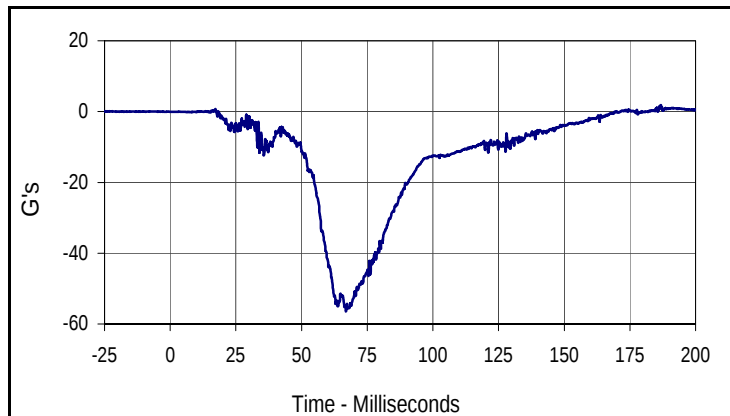
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|---------------------------|------|-----------|---------|
| Driver Left Femur Force Z |      |           |         |
| Plot No.                  | Type | SAE Class | Units   |
| 013                       | FIL  | 600       | Newtons |
| Max                       | Time | Min       | Time    |
| 331.3                     | 16.9 | -2078.3   | 25.2    |



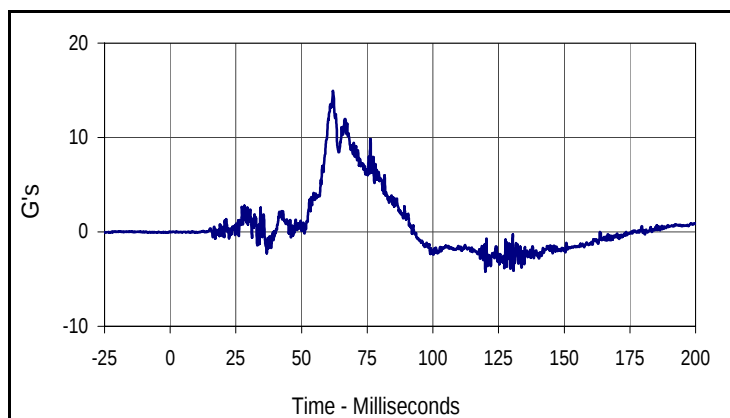
| Curve Description          |      |           |         |
|----------------------------|------|-----------|---------|
| Driver Right Femur Force Z |      |           |         |
| Plot No.                   | Type | SAE Class | Units   |
| 014                        | FIL  | 600       | Newtons |
| Max                        | Time | Min       | Time    |
| 351.9                      | 23.1 | -1846.1   | 50.1    |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

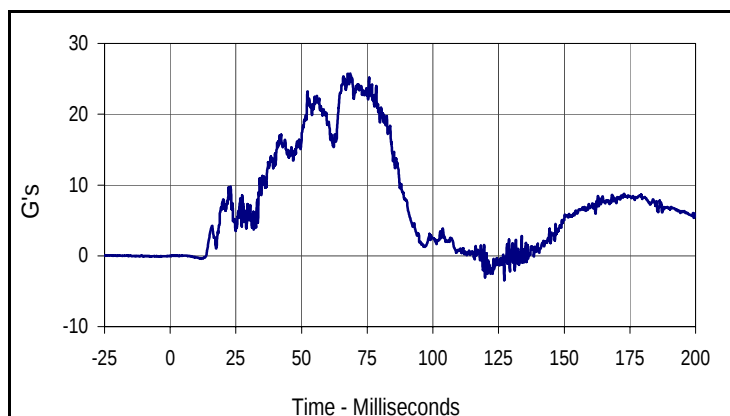
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 Test Date: 7/22/13



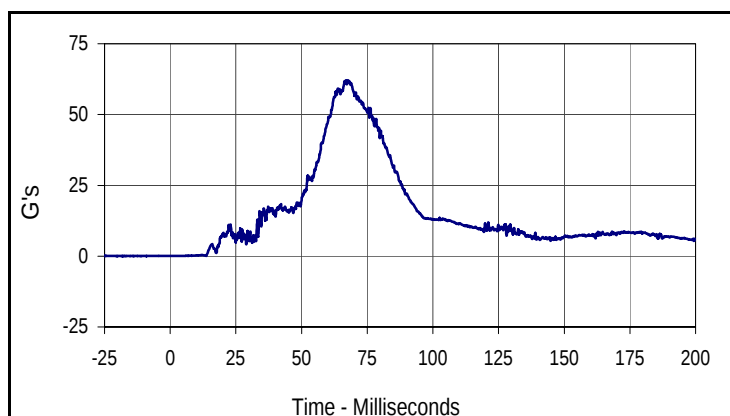
| Curve Description                     |       |           |       |
|---------------------------------------|-------|-----------|-------|
| Passenger Head Acceleration X Primary |       |           |       |
| Plot No.                              | Type  | SAE Class | Units |
| 015                                   | FIL   | 1000      | G's   |
| Max                                   | Time  | Min       | Time  |
| 1.8                                   | 186.7 | -56.5     | 66.9  |



| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration Y Primary |      |           |       |
| Plot No.                              | Type | SAE Class | Units |
| 016                                   | FIL  | 1000      | G's   |
| Max                                   | Time | Min       | Time  |
| 14.9                                  | 62.0 | -4.2      | 120.0 |



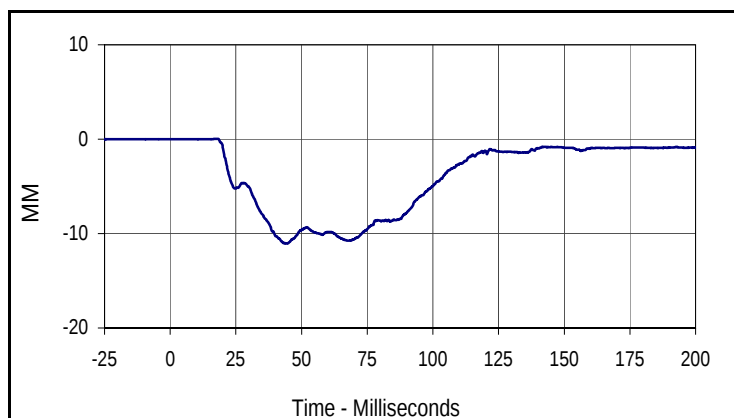
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|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration Z Primary |      |           |       |
| Plot No.                              | Type | SAE Class | Units |
| 017                                   | FIL  | 1000      | G's   |
| Max                                   | Time | Min       | Time  |
| 25.7                                  | 68.5 | -3.4      | 127.1 |



| Curve Description                             |      |           |       |
|-----------------------------------------------|------|-----------|-------|
| Passenger Head Resultant Acceleration Primary |      |           |       |
| Plot No.                                      | Type | SAE Class | Units |
| 018                                           | RES  | 1000      | G's   |
| Max                                           | Time | Min       | Time  |
| 62.1                                          | 66.9 | 0.0       | 6.7   |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

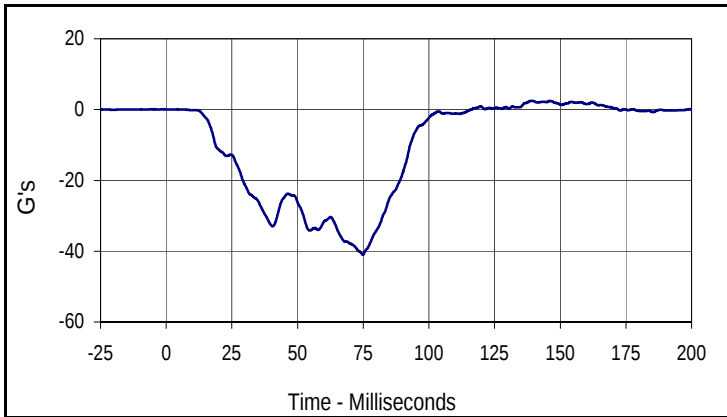
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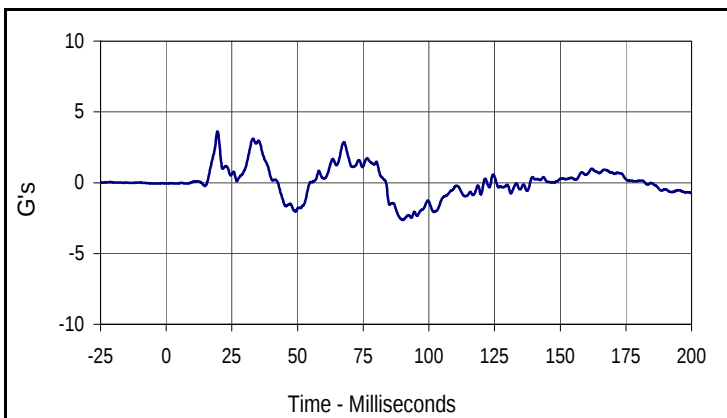
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|----------------------------|------|-----------|-------|
| Passenger Chest Deflection |      |           |       |
| Plot No.                   | Type | SAE Class | Units |
| 019                        | FIL  | 600       | MM    |
| Max                        | Time | Min       | Time  |
| 0.0                        | 18.2 | -11.1     | 44.2  |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

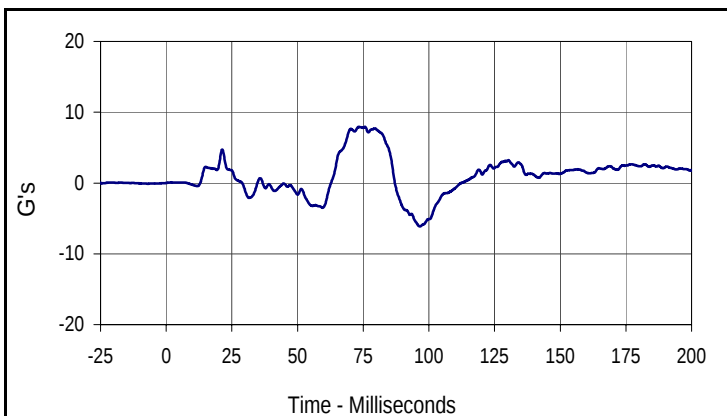
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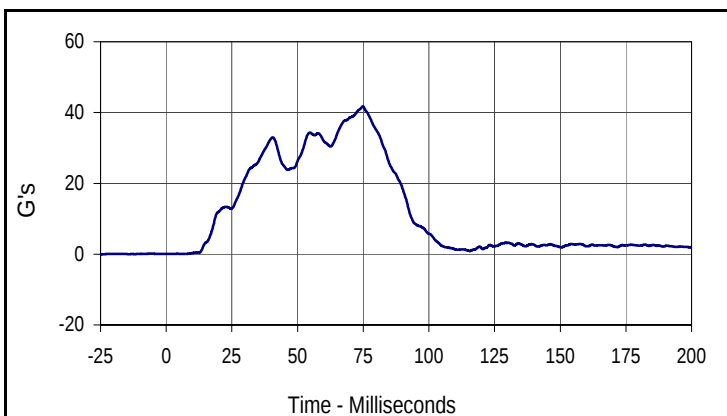
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|----------------------------------------|-------|-----------|-------|
| Passenger Chest Acceleration X Primary |       |           |       |
| Plot No.                               | Type  | SAE Class | Units |
| 020                                    | FIL   | 180       | G's   |
| Max                                    | Time  | Min       | Time  |
| 2.5                                    | 139.1 | -41.0     | 74.9  |



| Curve Description                      |      |           |       |
|----------------------------------------|------|-----------|-------|
| Passenger Chest Acceleration Y Primary |      |           |       |
| Plot No.                               | Type | SAE Class | Units |
| 021                                    | FIL  | 180       | G's   |
| Max                                    | Time | Min       | Time  |
| 3.6                                    | 19.5 | -2.6      | 90.1  |



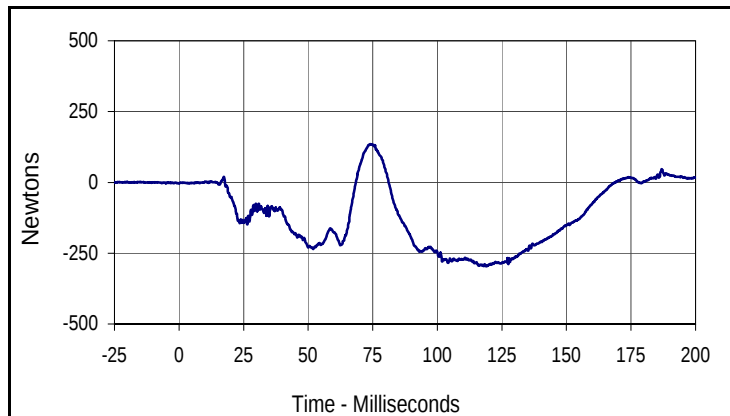
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|----------------------------------------|------|-----------|-------|
| Passenger Chest Acceleration Z Primary |      |           |       |
| Plot No.                               | Type | SAE Class | Units |
| 022                                    | FIL  | 180       | G's   |
| Max                                    | Time | Min       | Time  |
| 7.9                                    | 75.7 | -6.1      | 96.5  |



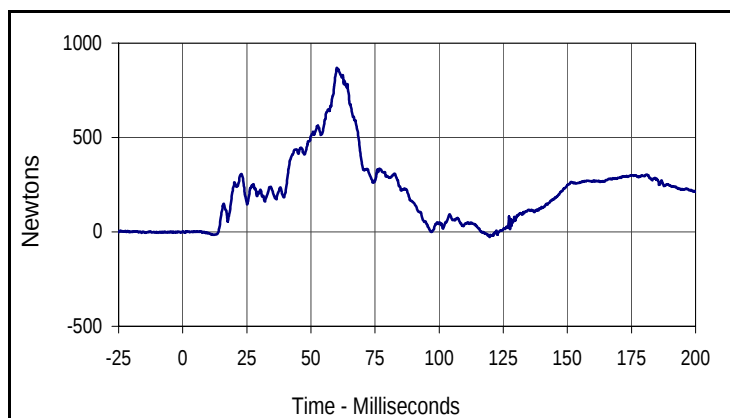
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|------------------------------------------------|------|-----------|-------|
| Passenger Chest Resultant Acceleration Primary |      |           |       |
| Plot No.                                       | Type | SAE Class | Units |
| 023                                            | RES  | 180       | G's   |
| Max                                            | Time | Min       | Time  |
| 41.7                                           | 74.9 | 0.1       | 7.8   |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

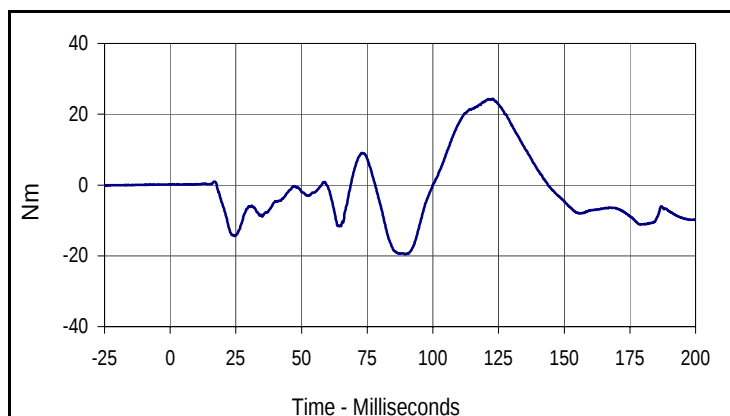
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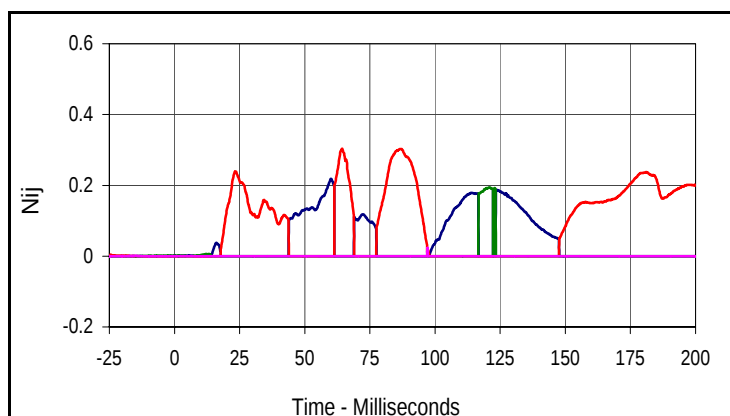
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|------------------------------|------|-----------|---------|
| Passenger Upper Neck Force X |      |           |         |
| Plot No.                     | Type | SAE Class | Units   |
| 024                          | FIL  | 1000      | Newtons |
| Max                          | Time | Min       | Time    |
| 135.1                        | 74.2 | -296.3    | 119.1   |



| Curve Description            |      |           |         |
|------------------------------|------|-----------|---------|
| Passenger Upper Neck Force Z |      |           |         |
| Plot No.                     | Type | SAE Class | Units   |
| 025                          | FIL  | 1000      | Newtons |
| Max                          | Time | Min       | Time    |
| 869.7                        | 60.1 | -27.0     | 119.6   |



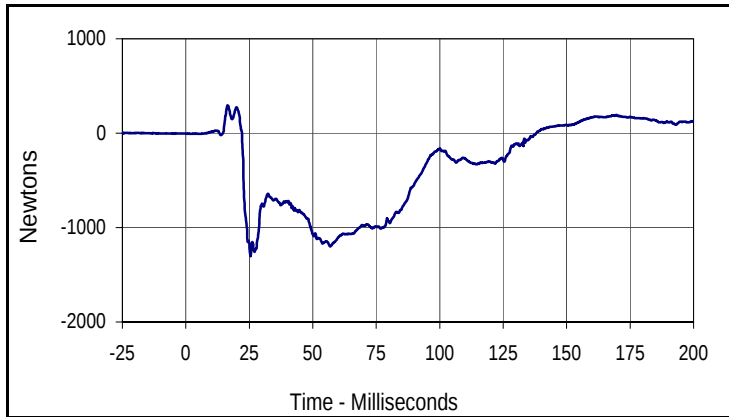
| Curve Description             |       |           |       |
|-------------------------------|-------|-----------|-------|
| Passenger Upper Neck Moment Y |       |           |       |
| Plot No.                      | Type  | SAE Class | Units |
| 026                           | FIL   | 600       | Nm    |
| Max                           | Time  | Min       | Time  |
| 24.3                          | 122.8 | -19.5     | 89.4  |



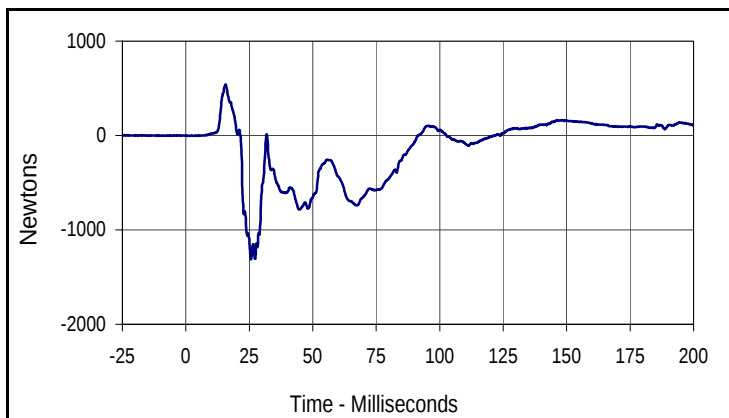
| Curve Description |      |      |       |
|-------------------|------|------|-------|
| Passenger Nij     |      |      |       |
| Units             | Type | Max  | Time  |
| Ntf               | FIL  | 0.22 | 60.1  |
| Units             | Type | Max  | Time  |
| Nte               | FIL  | 0.30 | 64.3  |
| Units             | Type | Max  | Time  |
| Ncf               | FIL  | 0.19 | 121.2 |
| Units             | Type | Max  | Time  |
| Nce               | FIL  | 0.27 | 238.9 |

Test Vehicle: 2013 Telsa Model S 5-Door Hatchback  
 Test Program: 56 km/h Frontal Impact NCAP Test

NHTSA No.: MD5000  
 Test Date: 7/22/13



| Curve Description            |      |           |         |
|------------------------------|------|-----------|---------|
| Passenger Left Femur Force Z |      |           |         |
| Plot No.                     | Type | SAE Class | Units   |
| 027                          | FIL  | 600       | Newtons |
| Max                          | Time | Min       | Time    |
| 295.6                        | 16.4 | -1300.9   | 25.5    |



| Curve Description             |      |           |         |
|-------------------------------|------|-----------|---------|
| Passenger Right Femur Force Z |      |           |         |
| Plot No.                      | Type | SAE Class | Units   |
| 028                           | FIL  | 600       | Newtons |
| Max                           | Time | Min       | Time    |
| 540.0                         | 15.6 | -1312.5   | 25.7    |

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

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

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

Test Date: 7/10/13



ATD Serial No.: 034

Test I.D.: N/A

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

Describe the repair on repair or replacement of parts:

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Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 7/10/13

ATD Serial No.: 034

Test I.D.: N/A



| Tested Parameter                               | Units | Specification | Result | Pass/Fail |
|------------------------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature                         | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity                   | %     | 10 to 70      | 29.5   | Pass      |
| A - Total sitting height                       | mm    | 879 to 889    | 884    | Pass      |
| B - Shoulder pivot height                      | mm    | 505 to 521    | 512    | Pass      |
| C - H point height                             | mm    | 84 to 89      | 85     | Pass      |
| D - H point location from backline             | mm    | 135 to 140    | 137    | Pass      |
| E - Shoulder pivot from backline               | mm    | 84 to 94      | 89     | Pass      |
| F - Thigh clearance                            | mm    | 140 to 155    | 146    | Pass      |
| G - Back of elbow to wrist pivot               | mm    | 290 to 305    | 297    | Pass      |
| H - Head back to backline                      | mm    | 41 to 46      | 43     | Pass      |
| I - Shoulder to elbow length                   | mm    | 330 to 345    | 336    | Pass      |
| J - Elbow rest height                          | mm    | 190 to 211    | 201    | Pass      |
| K - Buttock to knee length                     | mm    | 579 to 604    | 586    | Pass      |
| L - Popliteal length                           | mm    | 429 to 455    | 438    | Pass      |
| M - Knee pivot height                          | mm    | 485 to 500    | 493    | Pass      |
| N - Buttock popliteal length                   | mm    | 452 to 477    | 472    | Pass      |
| O - Chest depth without jacket                 | mm    | 213 to 229    | 225    | Pass      |
| P - Foot length                                | mm    | 251 to 267    | 260    | Pass      |
| V - Shoulder breadth                           | mm    | 422 to 437    | 433    | Pass      |
| W - Foot breadth                               | mm    | 91 to 107     | 99     | Pass      |
| Y - Chest circumference<br>(with chest jacket) | mm    | 970 to 1001   | 981    | Pass      |
| Z - Waist circumference                        | mm    | 836 to 866    | 864    | Pass      |
| AA - Location for chest circumference          | mm    | 429 to 434    | 429    | Pass      |
| BB - Location for waist circumference          | mm    | 226 to 231    | 230    | Pass      |
| Overall Test Results                           |       |               | Pass   |           |

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

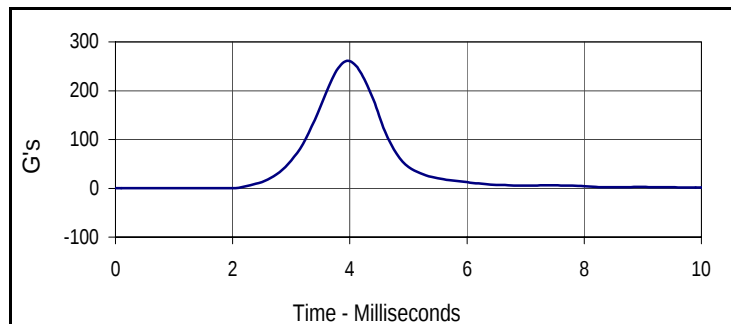
Test Date: 7/10/13



ATD Serial No.: 034

Test I.D.: M034HD042

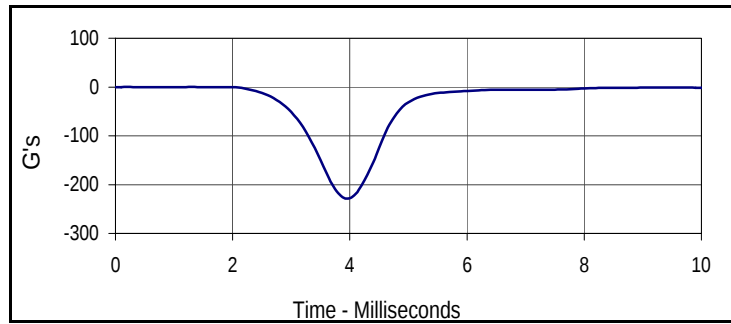
| Tested Parameter                   |     | Units   | Specification                  | Result | Pass/Fail |
|------------------------------------|-----|---------|--------------------------------|--------|-----------|
| Head Assembly Soak Time            |     | Minutes | ≥240                           | 325    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6                   | 22.0   | Pass      |
|                                    | Min | °C      |                                | 20.6   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0                   | 31.5   | Pass      |
|                                    | Min | %       |                                | 26.2   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6                   | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0                   | 29.4   | Pass      |
| Peak Resultant Acceleration        |     | G's     | 225.0 to 275.0                 | 260.7  | Pass      |
| Peak Lateral Acceleration          |     | G's     | ≤15.0                          | 3.9    | Pass      |
| Oscillations After Main Pulse      |     | %       | <10% of peak Res. Acceleration | 4.8    | Pass      |
| Is Acceleration Unimodal?          |     | Yes/No  | Yes                            | Yes    | Pass      |
| Overall Test Results               |     |         |                                | Pass   |           |



## Curve Description

## Head Resultant

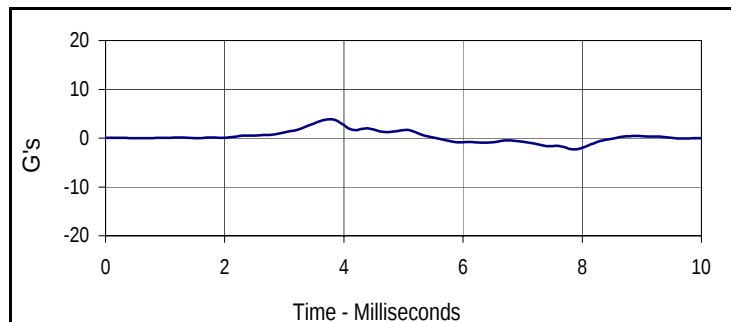
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 001      | RES  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 260.7    | 4.0  | 0.2       | 1.9   |



## Curve Description

## Head X

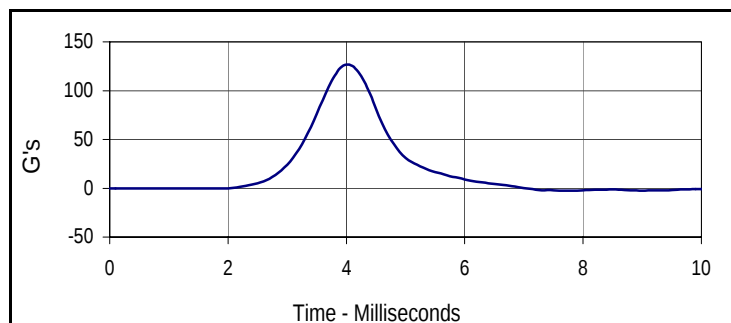
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 0.0      | 1.3  | -227.7    | 4.0   |



## Curve Description

## Head Y

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 3.9      | 3.8  | -2.3      | 7.9   |



## Curve Description

## Head Z

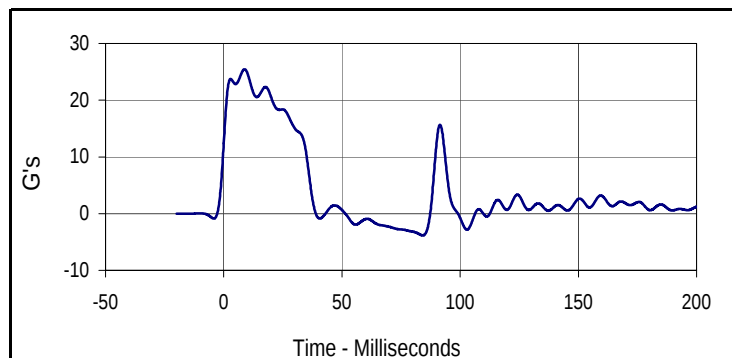
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 126.8    | 4.0  | -2.5      | 7.7   |

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 ATD Serial No.: 034

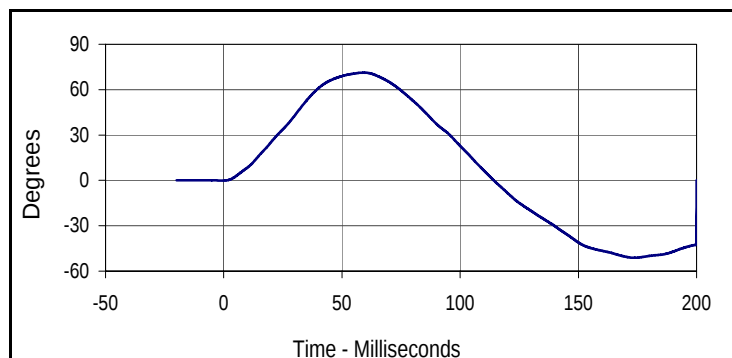
Test Date: 7/10/13  
 Test I.D.: M034NF042



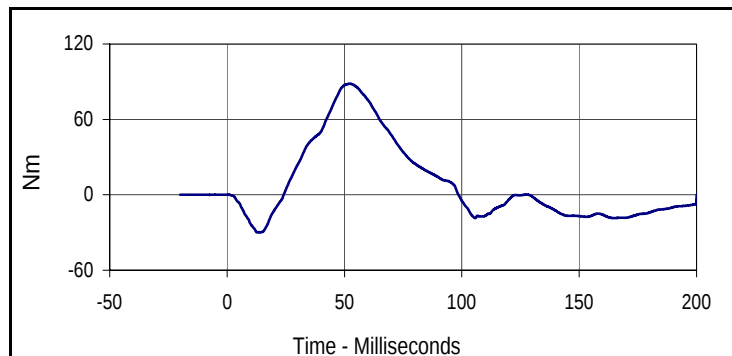
| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Neck Assembly Soak Time                         |          | Minutes | ≥240           | 375    | Pass      |
| Temperature During Soak                         | Max      | °C      | 20.6 to 22.2   | 22.0   | Pass      |
|                                                 | Min      | °C      |                | 20.6   | Pass      |
| Humidity During Soak                            | Max      | %       | 10.0 to 70.0   | 31.5   | Pass      |
|                                                 | Min      | %       |                | 26.2   | Pass      |
| Laboratory Temperature During Test              |          | °C      | 20.6 to 22.2   | 21.2   | Pass      |
| Laboratory Humidity During Test                 |          | %       | 10.0 to 70.0   | 29.4   | Pass      |
| Pendulum Velocity                               |          | m/s     | 6.89 to 7.13   | 6.93   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 22.5 to 27.5   | 24.8   | Pass      |
|                                                 | 20 Msec. | G's     | 17.6 to 22.6   | 20.6   | Pass      |
|                                                 | 30 Msec. | G's     | 12.5 to 18.5   | 15.1   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 29.0         | 15.7   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 34.0 to 42.0   | 36.7   | Pass      |
| Maximum "D" Plane Rotation                      | Max      | Degrees | 64.0 to 78.0   | 71.3   | Pass      |
|                                                 | Time     | Msec.   | 57.0 to 64.0   | 59.2   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 113.0 to 128.0 | 114.3  | Pass      |
| Moment About Occ. Condyle                       | Max      | Nm      | 88.1 to 108.5  | 88.4   | Pass      |
|                                                 | Time     | Msec.   | 47.0 to 58.0   | 52.3   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 97.0 to 107.0  | 98.6   | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Pendulum Deceleration |      |           |       |
| Plot No.              | Type | SAE Class | Units |
| 001                   | FIL  | 60        | G's   |
| Max                   | Time | Min       | Time  |
| 25.5                  | 8.8  | -3.8      | 84.2  |



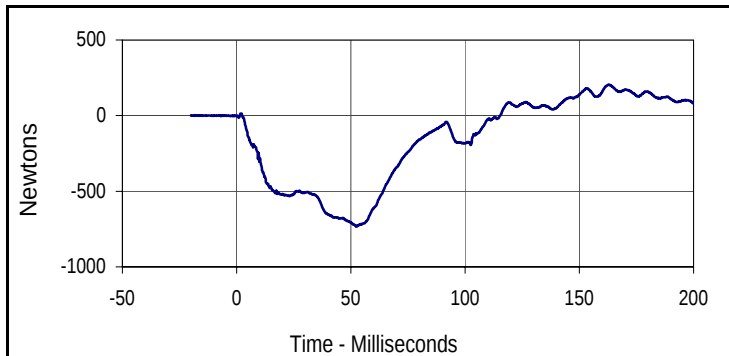
| Curve Description  |      |           |         |
|--------------------|------|-----------|---------|
| "D" Plane Rotation |      |           |         |
| Plot No.           | Type | SAE Class | Units   |
| 002                | FIL  | 60        | Degrees |
| Max                | Time | Min       | Time    |
| 71.3               | 59.2 | -51.1     | 173.6   |



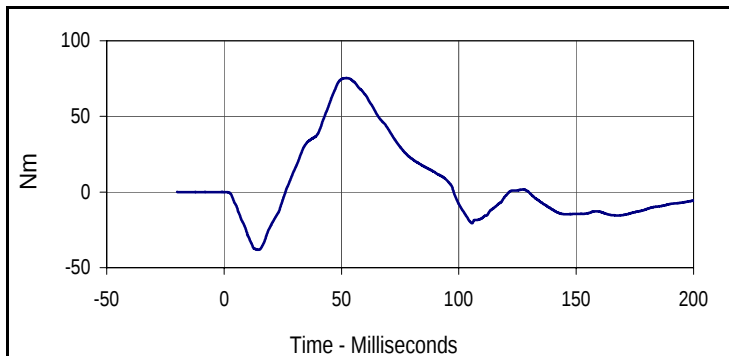
| Curve Description              |      |           |       |
|--------------------------------|------|-----------|-------|
| Moment About Occipital Condyle |      |           |       |
| Plot No.                       | Type | SAE Class | Units |
| 003                            | FIL  | 600       | Nm    |
| Max                            | Time | Min       | Time  |
| 88.4                           | 52.3 | -30.0     | 13.7  |

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 ATD Serial No.: 034

Test Date: 7/10/13  
 Test I.D.: M034NF042



| Curve Description |       |           |         |
|-------------------|-------|-----------|---------|
| Neck Force X      |       |           |         |
| Plot No.          | Type  | SAE Class | Units   |
| 004               | FIL   | 1000      | Newtons |
| Max               | Time  | Min       | Time    |
| 205.5             | 162.8 | -732.5    | 52.5    |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Neck Moment Y     |      |           |       |
| Plot No.          | Type | SAE Class | Units |
| 005               | FIL  | 600       | Nm    |
| Max               | Time | Min       | Time  |
| 75.4              | 52.2 | -38.2     | 14.6  |

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

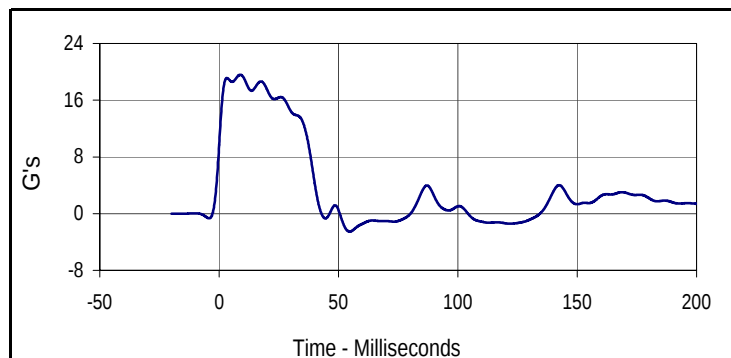
Test Date: 7/10/13



ATD Serial No.: 034

Test I.D.: M034NE042

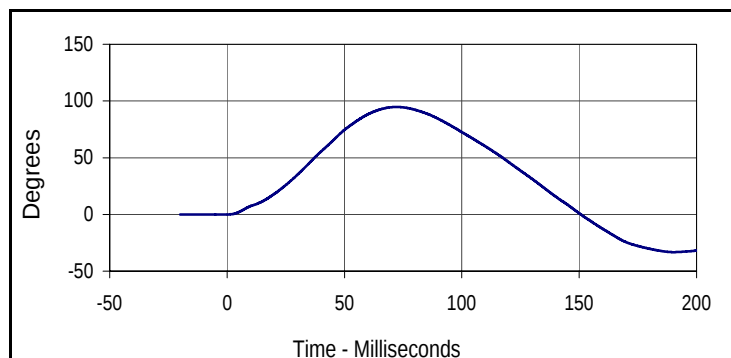
| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Neck Assembly Soak Time                         |          | Minutes | ≥240           | 410    | Pass      |
| Temperature During Soak                         | Max      | °C      | 20.6 to 22.2   | 22.0   | Pass      |
|                                                 | Min      | °C      |                | 20.6   | Pass      |
| Humidity During Soak                            | Max      | %       | 10.0 to 70.0   | 31.5   | Pass      |
|                                                 | Min      | %       |                | 26.2   | Pass      |
| Laboratory Temperature During Test              |          | °C      | 20.6 to 22.2   | 21.2   | Pass      |
| Laboratory Humidity During Test                 |          | %       | 10.0 to 70.0   | 29.4   | Pass      |
| Pendulum Velocity                               |          | m/s     | 5.94 to 6.19   | 6.04   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 17.2 to 21.2   | 19.3   | Pass      |
|                                                 | 20 Msec. | G's     | 14.0 to 19.0   | 17.6   | Pass      |
|                                                 | 30 Msec. | G's     | 11.0 to 16.0   | 14.5   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 22.0         | 14.5   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 38.0 to 46.0   | 39.7   | Pass      |
| Maximum "D" Plane Rotation                      | Max      | Degrees | 81.0 to 106.0  | 94.7   | Pass      |
|                                                 | Time     | Msec.   | 72.0 to 82.0   | 72.2   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 147.0 to 174.0 | 150.7  | Pass      |
| Moment About Occ. Condyle                       | Max      | Nm      | -52.9 to -79.9 | -61.3  | Pass      |
|                                                 | Time     | Msec.   | 65.0 to 79.0   | 67.2   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 120.0 to 148.0 | 137.8  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |



## Curve Description

## Pendulum Deceleration

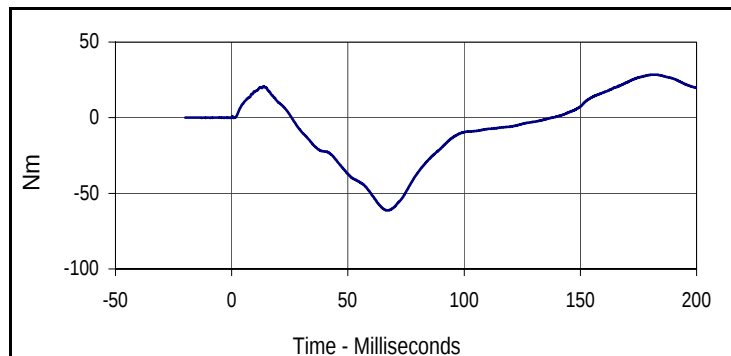
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 001      | FIL  | 60        | G's   |
| Max      | Time | Min       | Time  |
| 19.6     | 8.8  | -2.5      | 54.7  |



## Curve Description

## "D" Plane Rotation

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 002      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 94.7     | 72.2 | -33.2     | 190.1   |



## Curve Description

## Moment About Occipital Condyle

| Plot No. | Type  | SAE Class | Units |
|----------|-------|-----------|-------|
| 003      | FIL   | 600       | Nm    |
| Max      | Time  | Min       | Time  |
| 28.5     | 181.7 | -61.3     | 67.2  |

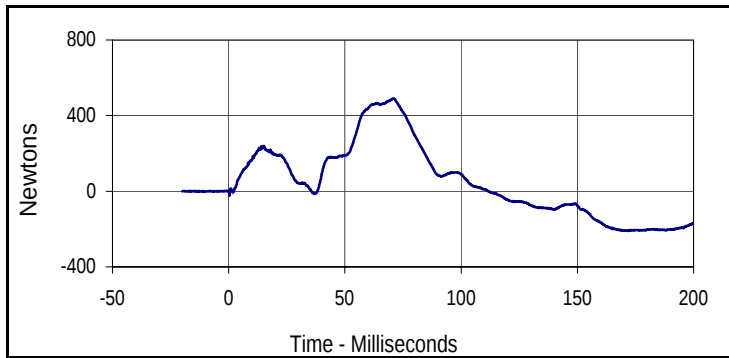
Test Program: Hybrid III 50th Percentile Male Neck Extension Test

Test Date: 7/10/13

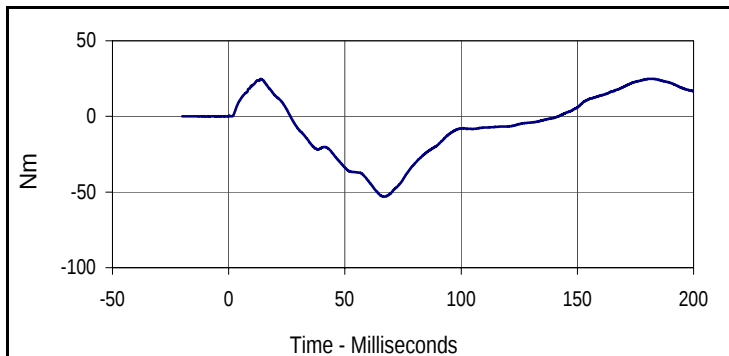


ATD Serial No.: 034

Test I.D.: M034NE042



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Neck Force X      |      |           |         |
| Plot No.          | Type | SAE Class | Units   |
| 004               | FIL  | 1000      | Newtons |
| Max               | Time | Min       | Time    |
| 490.5             | 70.7 | -210.1    | 171.9   |



| Curve Description |       |           |       |
|-------------------|-------|-----------|-------|
| Neck Moment Y     |       |           |       |
| Plot No.          | Type  | SAE Class | Units |
| 005               | FIL   | 600       | Nm    |
| Max               | Time  | Min       | Time  |
| 24.9              | 182.0 | -53.0     | 67.1  |

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

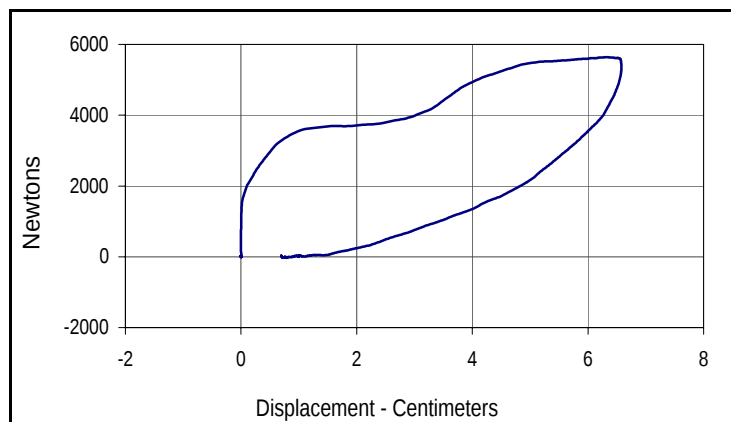
Test Date: 7/10/13



ATD Serial No.: 034

Test I.D.: M034CH042

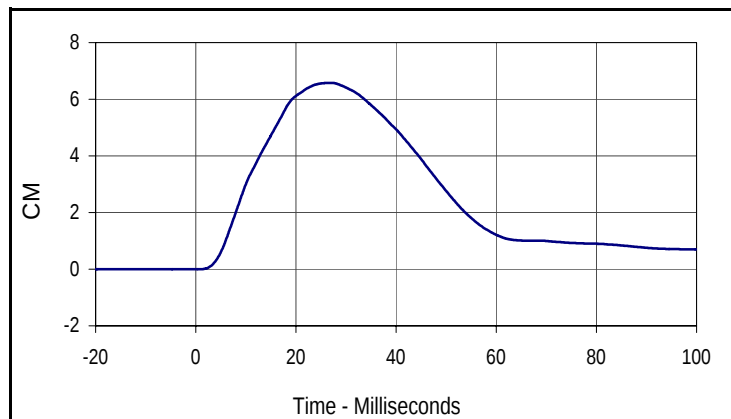
| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Dummy Soak Time                    |     | Minutes | ≥240          | 460    | Pass      |
| Temperature During Soak            | Max | °C      | 20.6 to 22.2  | 22.0   | Pass      |
|                                    | Min | °C      |               | 20.6   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 31.5   | Pass      |
|                                    | Min | %       |               | 26.2   | Pass      |
| Laboratory Temperature During Test |     | °C      | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 29.5   | Pass      |
| Probe Velocity                     |     | m/s     | 6.58 to 6.82  | 6.62   | Pass      |
| Peak Probe Force                   |     | Newtons | 5159 to 5893  | 5640   | Pass      |
| Peak Sternum Deflection            |     | CM      | 6.35 to 7.26  | 6.58   | Pass      |
| Internal Hysteresis                |     | %       | 69 to 85      | 70.1   | Pass      |
| Overall Test Results               |     |         |               | Pass   |           |



## Curve Description

## Probe Force vs. Chest Deflection

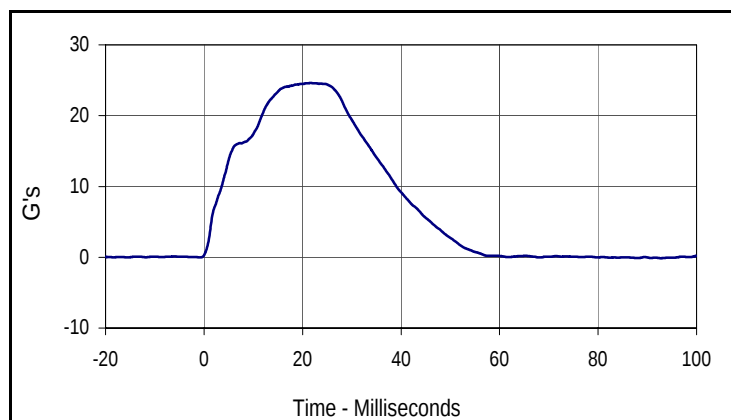
| Plot No.         | Type | SAE Class             | Hysteresis |
|------------------|------|-----------------------|------------|
| 001              | FIL  | 180                   | 70.1       |
| Peak Probe Force |      | Peak Chest Deflection |            |
| 5640             |      | 6.58                  |            |



## Curve Description

## Chest Deflection

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 180       | CM    |
| Max      | Time | Min       | Time  |
| 6.6      | 26.9 | 0.0       | -14.2 |



## Curve Description

## Impactor Acceleration

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 180       | G's   |
| Max      | Time | Min       | Time  |
| 24.6     | 21.7 | -0.1      | 92.8  |

Test Program: Hybrid III 50th Percentile Male Knee Impact Test  
 ATD Serial No.: 034

Test Date: 7/10/13  
 Test I.D.: M034LK042, M034RK042

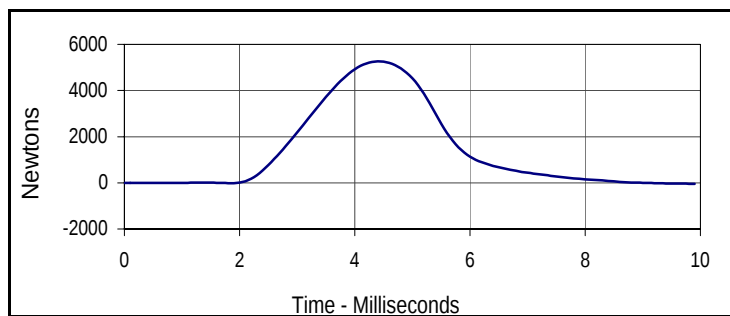


### Left Knee

| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Knee Assembly Soak Time            |     | Minutes | ≥240          | 495    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6  | 22.0   | Pass      |
|                                    | Min | °C      |               | 20.6   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 31.5   | Pass      |
|                                    | Min | %       |               | 26.2   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6  | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 29.5   | Pass      |
| Pendulum Velocity at T=0           |     | m/sec   | 2.07 to 2.13  | 2.08   | Pass      |
| Peak Probe Force                   |     | Newtons | 4715 to 5782  | 5264   | Pass      |
| Overall Test Results               |     |         |               | Pass   |           |

### Right Knee

|                          |  |         |              |      |      |
|--------------------------|--|---------|--------------|------|------|
| Pendulum Velocity at T=0 |  | m/sec   | 2.07 to 2.13 | 2.09 | Pass |
| Peak Probe Force         |  | Newtons | 4715 to 5782 | 5314 | Pass |
| Overall Test Results     |  |         |              | Pass |      |



#### Curve Description

##### Left Knee Probe Force

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 001      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 5264.2   | 4.4  | -41.5     | 9.9     |



#### Curve Description

##### Left Knee Acceleration

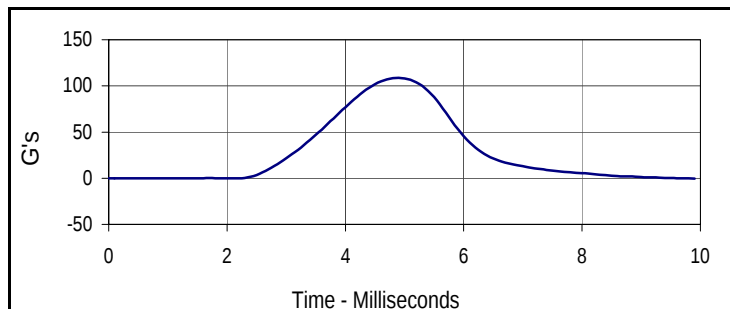
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 107.6    | 4.4  | -1.0      | 0.0   |



#### Curve Description

##### Right Knee Probe Force

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 003      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 5314.3   | 4.9  | -16.5     | 9.9     |



#### Curve Description

##### Right Knee Acceleration

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 108.6    | 4.9  | -1.2      | 0.0   |

Test Program: Hybrid III 50th Percentile Male Hip Joint-Femur Flexion Test

Test Date: 7/10/13

ATD Serial No.: 034

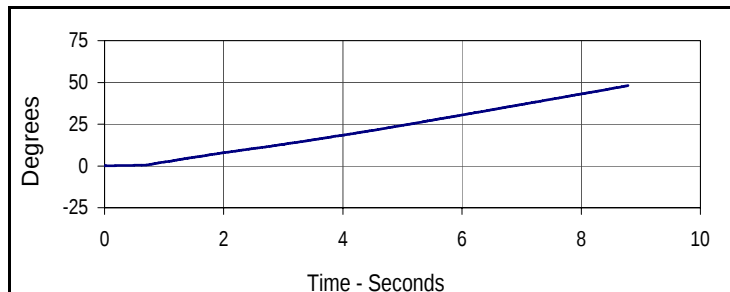
Test I.D.: M034LF042, M034RF042

**Left Hip Joint-Femur Results**

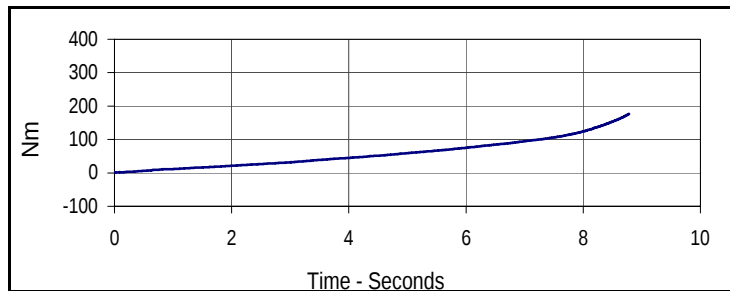
| Tested Parameter                   | Units   | Specification | Result | Pass/Fail |
|------------------------------------|---------|---------------|--------|-----------|
| Hip Joint-Femur Assembly Soak Time | Minutes | ≥240          | 545    | Pass      |
| Temperature During Soak            | Max     | 18.9 to 25.6  | 22.0   | Pass      |
|                                    | Min     |               | 20.6   | Pass      |
| Humidity During Soak               | Max     | 10.0 to 70.0  | 31.5   | Pass      |
|                                    | Min     |               | 26.2   | Pass      |
| Laboratory Temperature During Test | °C      | 18.9 to 25.6  | 21.2   | Pass      |
| Laboratory Humidity During Test    | %       | 10.0 to 70.0  | 29.5   | Pass      |
| Rotation Rate                      | deg/sec | 5 to 10       | 5.5    | Pass      |
| Femur Torque at 30°                | Nm      | ≤ 95          | 72.4   | Pass      |
| Rotation at 203 Nm                 | Degrees | 40.0 to 50.0  | 47.6   | Pass      |
| Overall Test Results               |         |               |        | Pass      |

**Right Hip Joint-Femur Results**

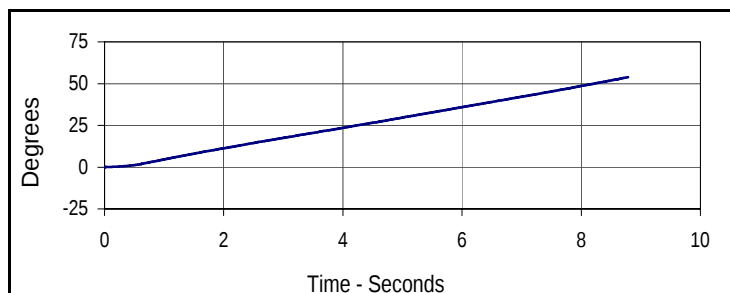
|                      |         |              |      |      |
|----------------------|---------|--------------|------|------|
| Rotation Rate        | deg/sec | 5 to 10      | 6.1  | Pass |
| Femur Torque at 30°  | Nm      | ≤ 95         | 84.7 | Pass |
| Rotation at 203 Nm   | Degrees | 40.0 to 50.0 | 49.4 | Pass |
| Overall Test Results |         |              |      | Pass |

**Curve Description****Left Hip-Femur Rotation**

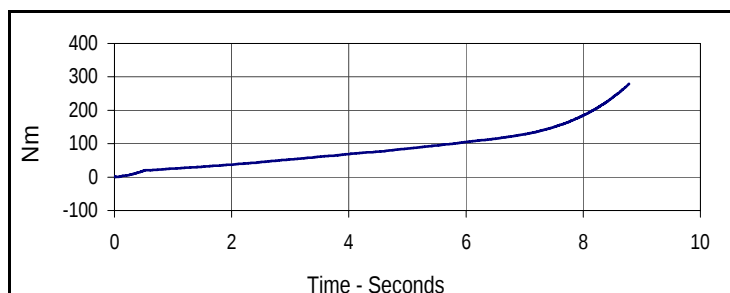
| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 001      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 48.1     | 8.8  | 0.0       | 0.0     |

**Curve Description****Left Femur Torque**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 176.5    | 8.8  | 1.2       | 0.0   |

**Curve Description****Right Hip-Femur Rotation**

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 003      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 53.8     | 8.8  | 0.0       | 0.0     |

**Curve Description****Right Femur Torque**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 279.3    | 8.8  | 0.2       | 0.0   |

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

Test Date: 7/12/13



ATD Serial No.: 141

Test I.D.: N/A

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

Describe the repair on repair or replacement of parts:

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Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 7/12/13

ATD Serial No.: 141

Test I.D.: N/A



| Tested Parameter                               | Units | Specification  | Result | Pass/Fail |
|------------------------------------------------|-------|----------------|--------|-----------|
| Laboratory Temperature                         | °C    | 20.6 to 22.2   | 21.2   | Pass      |
| Laboratory Relative Humidity                   | %     | 10 to 70       | 29.4   | Pass      |
| A - Total sitting height                       | mm    | 774.7 to 800.1 | 784    | Pass      |
| B - Shoulder pivot height                      | mm    | 431.8 to 457.2 | 450    | Pass      |
| C - H point height                             | mm    | 81.3 to 86.3   | 85     | Pass      |
| D - H point location from backline             | mm    | 144.8 to 149.8 | 146    | Pass      |
| E - Shoulder pivot from backline               | mm    | 68.6 to 83.8   | 77     | Pass      |
| F - Thigh clearance                            | mm    | 119.4 to 134.6 | 126    | Pass      |
| G - Back of elbow to wrist pivot               | mm    | 243.9 to 259.1 | 250    | Pass      |
| H - Head back to backline                      | mm    | 40.7 to 45.7   | 44     | Pass      |
| I - Shoulder to elbow length                   | mm    | 276.8 to 297.2 | 285    | Pass      |
| J - Elbow rest height                          | mm    | 182.8 to 203.2 | 197    | Pass      |
| K - Buttock to knee length                     | mm    | 520.7 to 546.1 | 531    | Pass      |
| L - Popliteal length                           | mm    | 355.6 to 376.0 | 371    | Pass      |
| M - Knee pivot height                          | mm    | 393.7 to 419.1 | 401    | Pass      |
| N - Buttock popliteal length                   | mm    | 414.0 to 439.4 | 420    | Pass      |
| O - Chest depth without jacket                 | mm    | 175.3 to 190.5 | 185    | Pass      |
| P - Foot length                                | mm    | 218.5 to 233.7 | 221    | Pass      |
| R - Buttock to Knee Pivot Length               | mm    | 457.2 to 482.6 | 473    | Pass      |
| S - Head Breadth                               | mm    | 137.1 to 147.3 | 144    | Pass      |
| T - Head Depth                                 | mm    | 177.8 to 188.0 | 180    | Pass      |
| U - Hip Breadth                                | mm    | 299.7 to 314.9 | 302    | Pass      |
| V - Shoulder breadth                           | mm    | 350.5 to 365.7 | 359    | Pass      |
| W - Foot breadth                               | mm    | 78.8 to 94.0   | 90     | Pass      |
| X - Head circumference                         | mm    | 528.3 to 548.7 | 541    | Pass      |
| Y - Chest circumference<br>(with chest jacket) | mm    | 850.8 to 881.3 | 864    | Pass      |
| Z - Waist circumference                        | mm    | 759.5 to 789.9 | 768    | Pass      |
| AA - Location for chest circumference          | mm    | 299.7 to 309.9 | 300    | Pass      |
| BB - Location for waist circumference          | mm    | 160.1 to 170.2 | 165    | Pass      |
| Overall Test Results                           |       |                |        | Pass      |

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

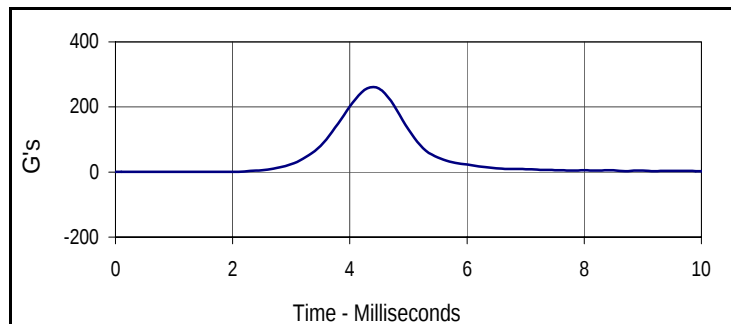
Test Date: 7/12/13



ATD Serial No.: 141

Test I.D.: F141HD055

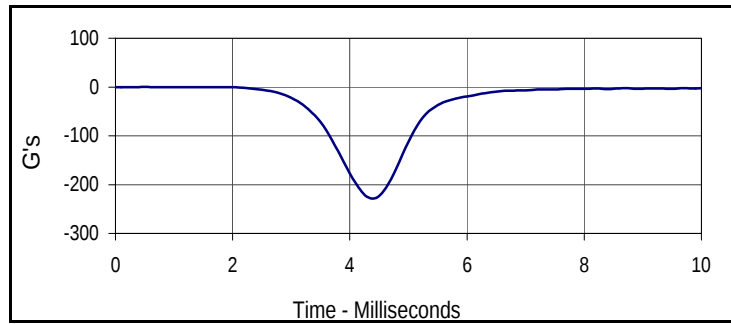
| Tested Parameter                   |     | Units   | Specification                  | Result | Pass/Fail |
|------------------------------------|-----|---------|--------------------------------|--------|-----------|
| Head Assembly Soak Time            |     | Minutes | ≥240                           | 365    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6                   | 21.9   | Pass      |
|                                    | Min | °C      |                                | 20.7   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0                   | 32.7   | Pass      |
|                                    | Min | %       |                                | 25.9   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6                   | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0                   | 29.5   | Pass      |
| Peak Resultant Acceleration        |     | G's     | 250.0 to 300.0                 | 261.4  | Pass      |
| Peak Lateral Acceleration          |     | G's     | ≤15.0                          | 2.8    | Pass      |
| Oscillations After Main Pulse      |     | %       | <10% of peak Res. Acceleration | 2.1    | Pass      |
| Is Acceleration Unimodal?          |     | Yes/No  | Yes                            | Yes    | Pass      |
| Overall Test Results               |     |         |                                | Pass   |           |



## Curve Description

## Head Resultant

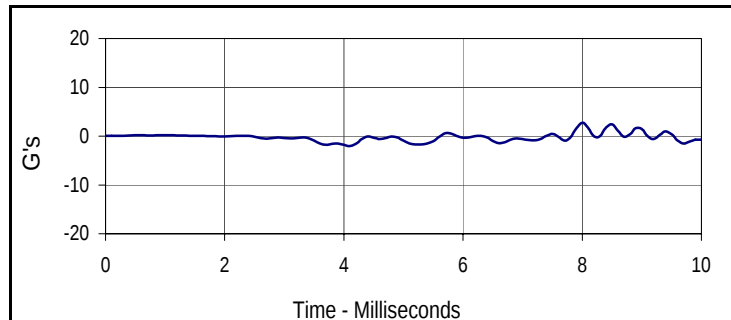
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 001      | RES  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 261.4    | 4.4  | 0.5       | 0.0   |



## Curve Description

## Head X

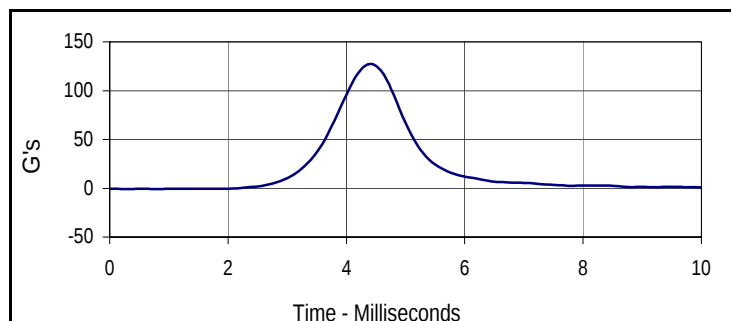
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 0.0      | 0.5  | -228.3    | 4.4   |



## Curve Description

## Head Y

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 2.8      | 8.0  | -2.0      | 4.1   |



## Curve Description

## Head Z

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 127.3    | 4.4  | -0.7      | 0.3   |

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

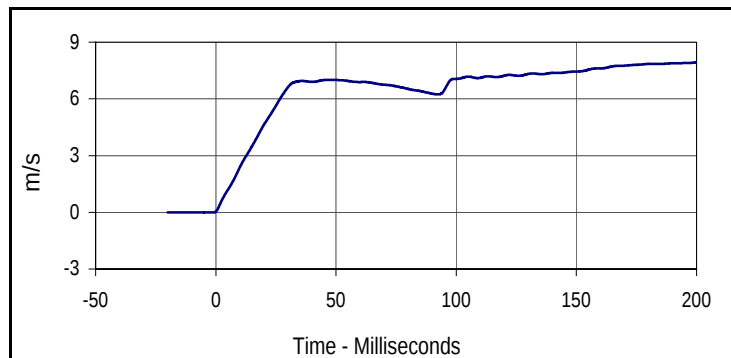
Test Date: 7/12/13



ATD Serial No.: 141

Test I.D.: F141NF055

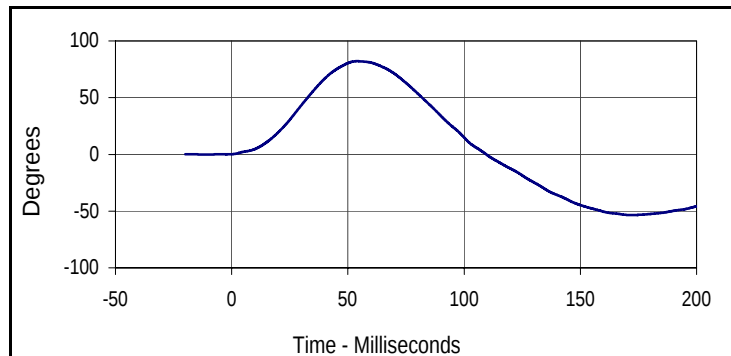
| Tested Parameter                     |          | Units   | Specification | Result | Pass/Fail |
|--------------------------------------|----------|---------|---------------|--------|-----------|
| Neck Assembly Soak Time              |          | Minutes | ≥240          | 420    | Pass      |
| Temperature During Soak              | Max      | °C      | 20.6 to 22.2  | 21.9   | Pass      |
|                                      | Min      | °C      |               | 20.7   | Pass      |
| Humidity During Soak                 | Max      | %       | 10.0 to 70.0  | 32.7   | Pass      |
|                                      | Min      | %       |               | 25.9   | Pass      |
| Laboratory Temperature During Test   |          | °C      | 20.6 to 22.2  | 21.2   | Pass      |
| Laboratory Humidity During Test      |          | %       | 10.0 to 70.0  | 29.5   | Pass      |
| Pendulum Velocity                    |          | m/s     | 6.89 to 7.13  | 6.98   | Pass      |
| Pendulum Deceleration                | 10 Msec. | m/s     | 2.1 to 2.5    | 2.4    | Pass      |
|                                      | 20 Msec. | m/s     | 4.0 to 5.0    | 4.6    | Pass      |
|                                      | 30 Msec. | m/s     | 5.8 to 7.0    | 6.6    | Pass      |
| "D" Plane Rotation                   | Max      | Degrees | 77.0 to 91.0  | 82.1   | Pass      |
| Peak Moment in Rotation              | Max      | Nm      | 69.0 to 83.0  | 77.3   | Pass      |
| Positive Moment Decay, Time To 10 Nm |          | Msec.   | 80.0 to 100.0 | 81.9   | Pass      |
| Overall Test Results                 |          |         |               | Pass   |           |



## Curve Description

## Pendulum Velocity

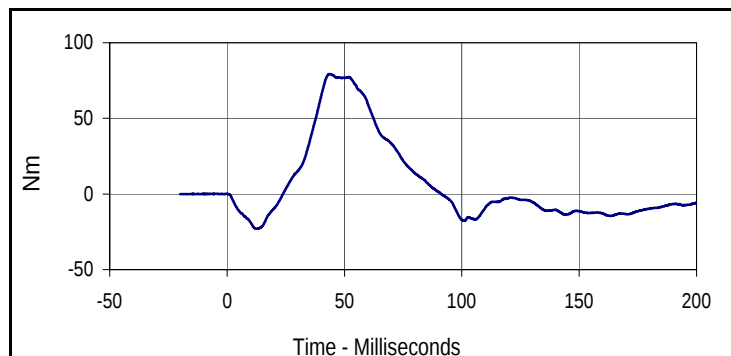
| Plot No. | Type  | SAE Class | Units |
|----------|-------|-----------|-------|
| 001      | FIL   | 180       | m/s   |
| Max      | Time  | Min       | Time  |
| 7.9      | 200.0 | 0.0       | -1.0  |



## Curve Description

## "D" Plane Rotation

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 002      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 82.1     | 53.9 | -53.5     | 171.9   |



## Curve Description

## Moment About Occipital Condyle

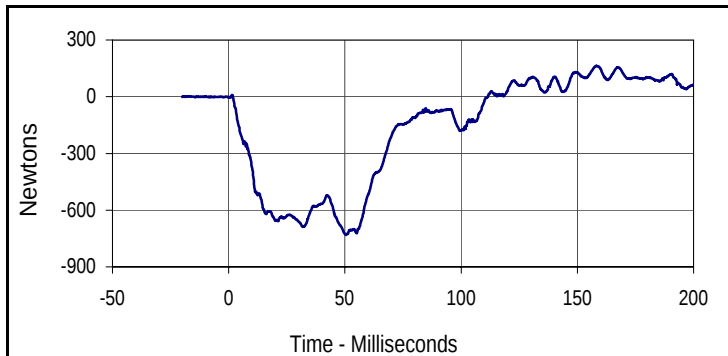
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 79.3     | 43.9 | -23.0     | 12.2  |

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

ATD Serial No.: 141

Test Date: 7/12/13

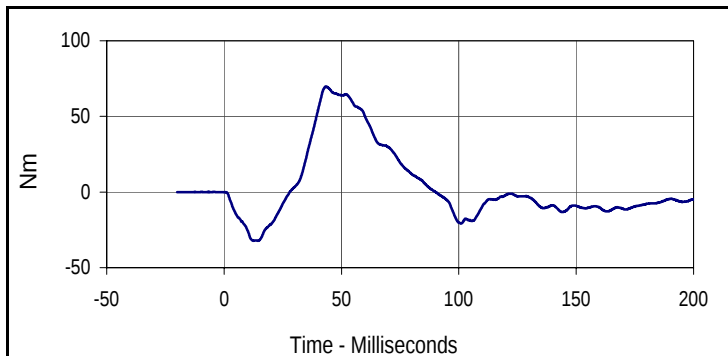
Test I.D.: F141NF055



Curve Description

Upper Neck Force X

| Plot No. | Type  | SAE Class | Units   |
|----------|-------|-----------|---------|
| 004      | FIL   | 1000      | Newtons |
| Max      | Time  | Min       | Time    |
| 163.8    | 158.1 | -730.7    | 50.4    |



Curve Description

Neck Moment Y

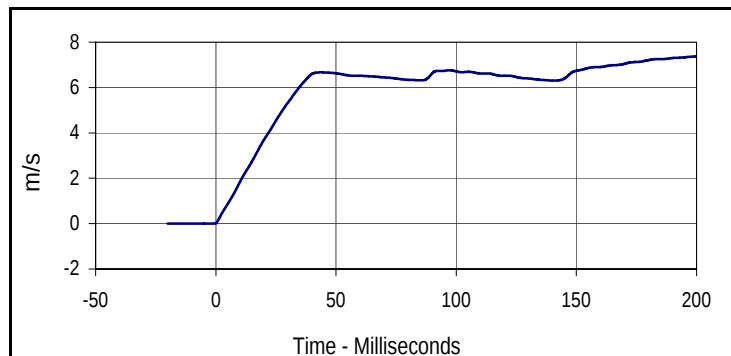
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 005      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 69.7     | 43.4 | -32.2     | 14.4  |

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

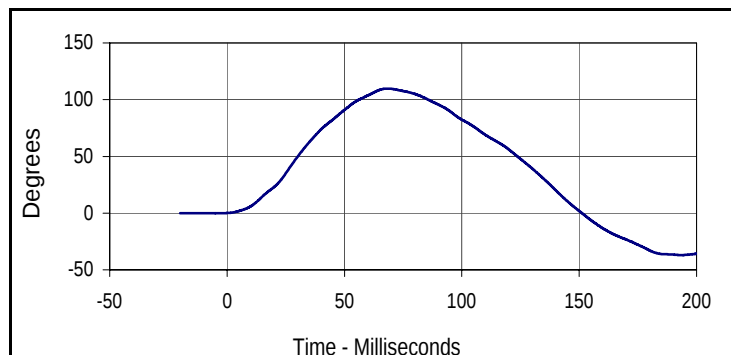
Test Date: 7/12/13  
 Test I.D.: F141NE055



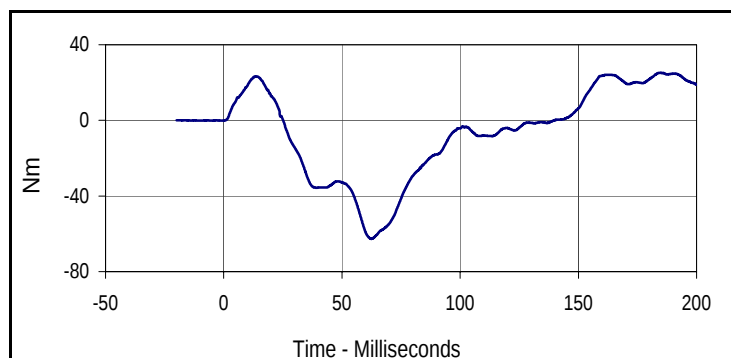
| Tested Parameter                      |          | Units   | Specification  | Result | Pass/Fail |
|---------------------------------------|----------|---------|----------------|--------|-----------|
| Neck Assembly Soak Time               |          | Minutes | ≥240           | 455    | Pass      |
| Temperature During Soak               | Max      | °C      | 20.6 to 22.2   | 21.9   | Pass      |
|                                       | Min      | °C      |                | 20.7   | Pass      |
| Humidity During Soak                  | Max      | %       | 10.0 to 70.0   | 32.7   | Pass      |
|                                       | Min      | %       |                | 25.9   | Pass      |
| Laboratory Temperature During Test    |          | °C      | 20.6 to 22.2   | 21.2   | Pass      |
| Laboratory Humidity During Test       |          | %       | 10.0 to 70.0   | 29.5   | Pass      |
| Pendulum Velocity                     |          | m/s     | 5.95 to 6.19   | 6.09   | Pass      |
| Pendulum Deceleration                 | 10 Msec. | m/s     | 1.5 to 1.9     | 1.8    | Pass      |
|                                       | 20 Msec. | m/s     | 3.1 to 3.9     | 3.7    | Pass      |
|                                       | 30 Msec. | m/s     | 4.6 to 5.6     | 5.3    | Pass      |
| "D" Plane Rotation                    | Max      | Degrees | 99.0 to 114.0  | 109.8  | Pass      |
| Peak Moment in Rotation               | Max      | Nm      | -53.0 to -65.0 | -62.7  | Pass      |
| Positive Moment Decay, Time To -10 Nm |          | Msec.   | 94.0 to 114.0  | 94.9   | Pass      |
| Overall Test Results                  |          |         |                | Pass   |           |



| Curve Description |       |           |       |
|-------------------|-------|-----------|-------|
| Pendulum Velocity |       |           |       |
| Plot No.          | Type  | SAE Class | Units |
| 001               | FIL   | 180       | m/s   |
| Max               | Time  | Min       | Time  |
| 7.4               | 200.0 | 0.0       | -0.9  |



| Curve Description  |      |           |         |
|--------------------|------|-----------|---------|
| "D" Plane Rotation |      |           |         |
| Plot No.           | Type | SAE Class | Units   |
| 002                | FIL  | 60        | Degrees |
| Max                | Time | Min       | Time    |
| 109.8              | 68.3 | -37.0     | 193.4   |



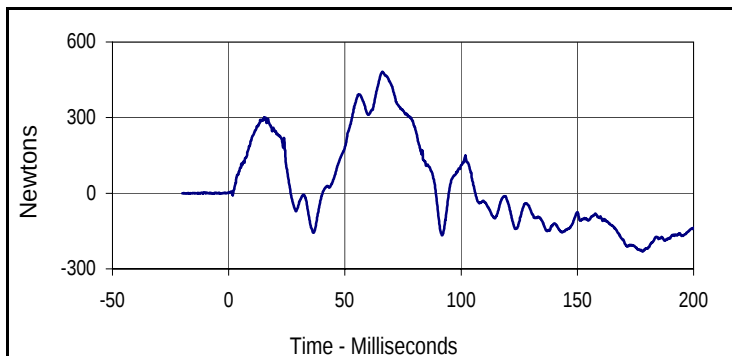
| Curve Description              |       |           |       |
|--------------------------------|-------|-----------|-------|
| Moment About Occipital Condyle |       |           |       |
| Plot No.                       | Type  | SAE Class | Units |
| 003                            | FIL   | 600       | Nm    |
| Max                            | Time  | Min       | Time  |
| 25.3                           | 184.9 | -62.7     | 62.4  |

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

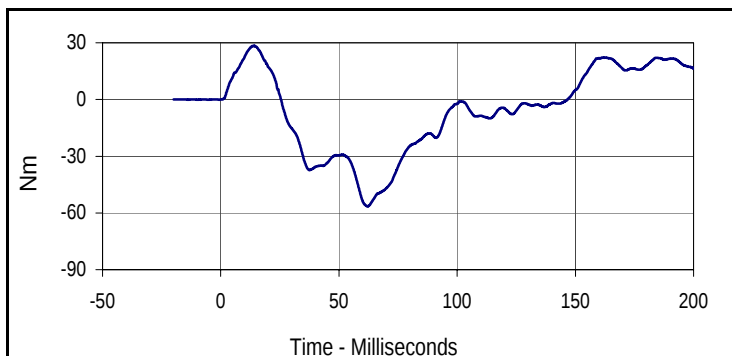
ATD Serial No.: 141

Test Date: 7/12/13

Test I.D.: F141NE055



| Curve Description  |      |           |         |
|--------------------|------|-----------|---------|
| Upper Neck Force X |      |           |         |
| Plot No.           | Type | SAE Class | Units   |
| 004                | FIL  | 1000      | Newtons |
| Max                | Time | Min       | Time    |
| 482.4              | 66.1 | -230.8    | 178.1   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Neck Moment Y     |      |           |       |
| Plot No.          | Type | SAE Class | Units |
| 005               | FIL  | 600       | Nm    |
| Max               | Time | Min       | Time  |
| 28.4              | 14.0 | -56.6     | 62.2  |

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

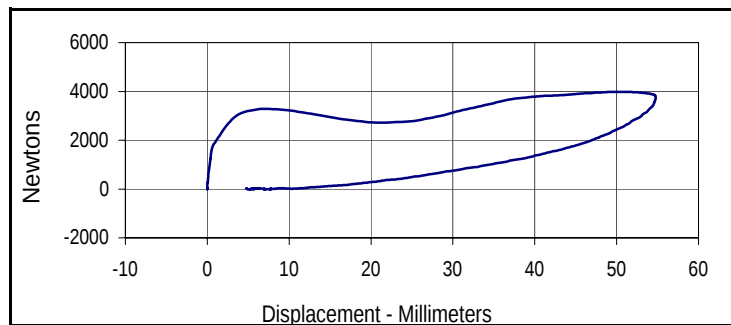
Test Date: 7/12/13



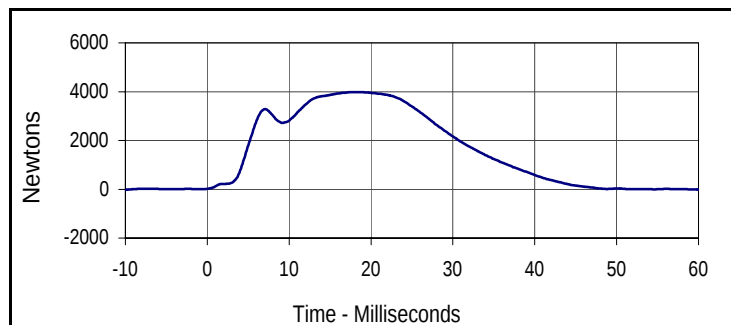
ATD Serial No.: 141

Test I.D.: F141CH055

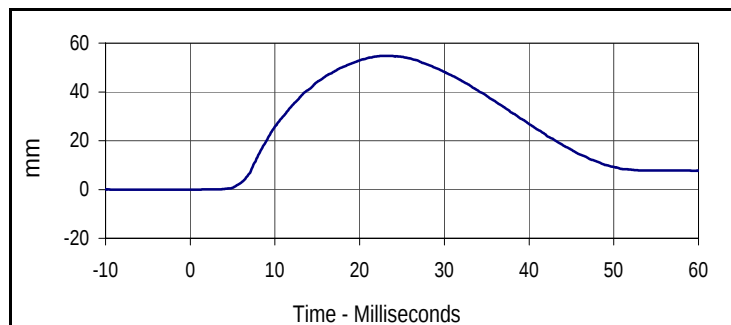
| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Dummy Soak Time                    |     | Minutes | ≥240          | 505    | Pass      |
| Temperature During Soak            | Max | °C      | 20.6 to 22.2  | 21.9   | Pass      |
|                                    | Min | °C      |               | 20.7   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 32.7   | Pass      |
|                                    | Min | %       |               | 25.9   | Pass      |
| Laboratory Temperature During Test |     | °C      | 20.6 to 22.2  | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 29.4   | Pass      |
| Probe Velocity                     |     | m/s     | 6.59 to 6.83  | 6.62   | Pass      |
| Peak Chest Deflection              |     | mm      | 50.0 to 58.0  | 54.8   | Pass      |
| Peak Force Between 50 and 58 MM    |     | Newtons | 3900 to 4400  | 3982   | Pass      |
| Peak Force Between 18 and 50 MM    |     | Newtons | ≤4600         | 3985   | Pass      |
| Internal Hysteresis                |     | %       | 69 to 85      | 72.7   | Pass      |
| Overall Test Results               |     |         |               |        | Pass      |



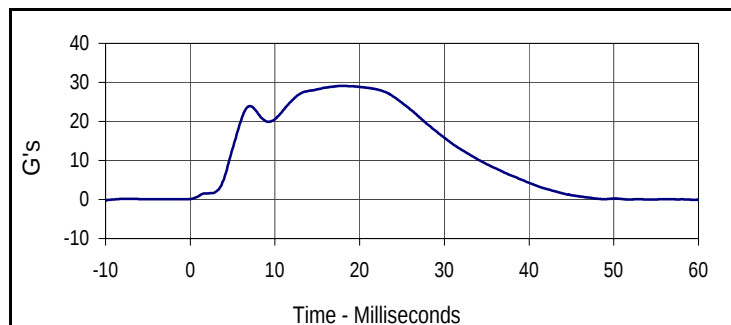
| Curve Description                |      |                       |            |
|----------------------------------|------|-----------------------|------------|
| Probe Force vs. Chest Deflection |      |                       |            |
| Plot No.                         | Type | SAE Class             | Hysteresis |
| 001                              | FIL  | 180                   | 72.7       |
| Peak Probe Force                 |      | Peak Chest Deflection |            |
| 3984.9                           |      | 54.8                  |            |



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Probe Force       |      |           |         |
| Plot No.          | Type | SAE Class | Units   |
| 002               | FIL  | 180       | Newtons |
| Max               | Time | Min       | Time    |
| 3984.9            | 18.2 | -21.0     | -10.0   |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Chest Deflection  |      |           |       |
| Plot No.          | Type | SAE Class | Units |
| 003               | FIL  | 600       | mm    |
| Max               | Time | Min       | Time  |
| 54.8              | 23.1 | 0.0       | -7.7  |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Impactor Acceleration |      |           |       |
| Plot No.              | Type | SAE Class | Units |
| 004                   | FIL  | 180       | G's   |
| Max                   | Time | Min       | Time  |
| 29.1                  | 18.2 | -0.2      | -10.0 |

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

Test Date: 7/12/13

ATD Serial No.: 141

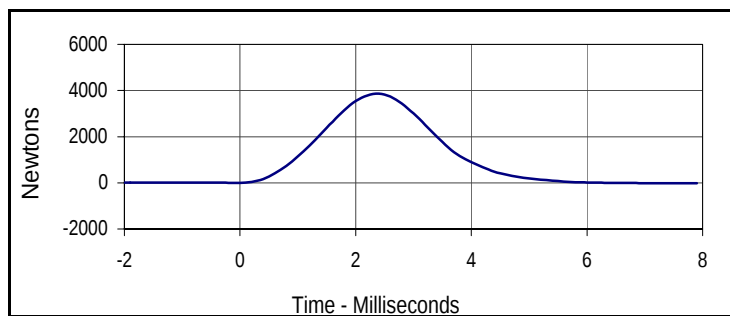
Test I.D.: F141LK055, F141RK055

**Left Knee**

| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Knee Assembly Soak Time            |     | Minutes | ≥240          | 535    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6  | 21.9   | Pass      |
|                                    | Min | °C      |               | 20.7   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 32.7   | Pass      |
|                                    | Min | %       |               | 25.9   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6  | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 29.5   | Pass      |
| Pendulum Velocity at T=0           |     | m/sec   | 2.07 to 2.13  | 2.09   | Pass      |
| Peak Probe Force                   |     | Newtons | 3450 to 4060  | 3859   | Pass      |
| Overall Test Results               |     |         |               |        | Pass      |

**Right Knee**

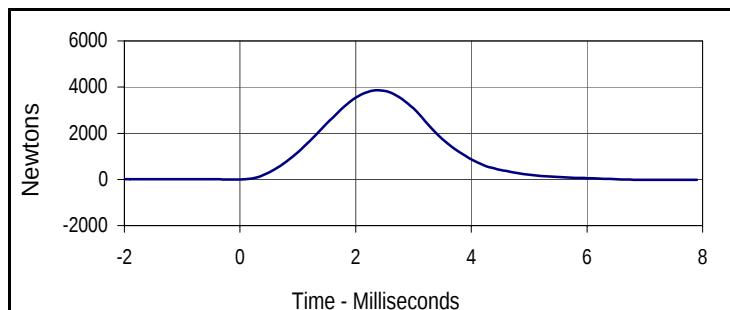
|                          |  |         |              |      |      |
|--------------------------|--|---------|--------------|------|------|
| Pendulum Velocity at T=0 |  | m/sec   | 2.07 to 2.13 | 2.11 | Pass |
| Peak Probe Force         |  | Newtons | 3450 to 4060 | 3864 | Pass |
| Overall Test Results     |  |         |              |      | Pass |

**Curve Description****Left Knee Probe Force**

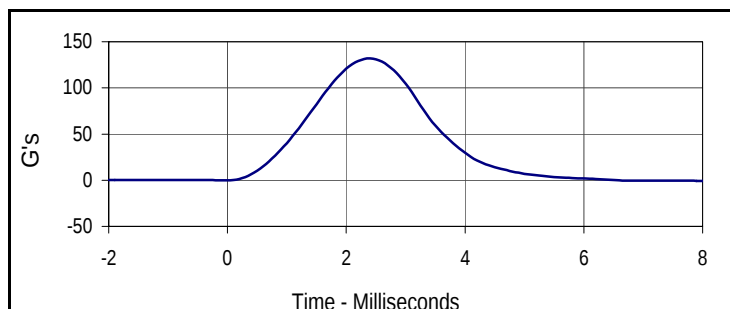
| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 001      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 3858.7   | 2.4  | -17.4     | 7.9     |

**Curve Description****Left Knee Acceleration**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 131.6    | 2.4  | -0.9      | 9.3   |

**Curve Description****Right Knee Probe Force**

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 003      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 3864.3   | 2.4  | -18.6     | 7.9     |

**Curve Description****Right Knee Acceleration**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 131.8    | 2.4  | -1.1      | 9.4   |

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

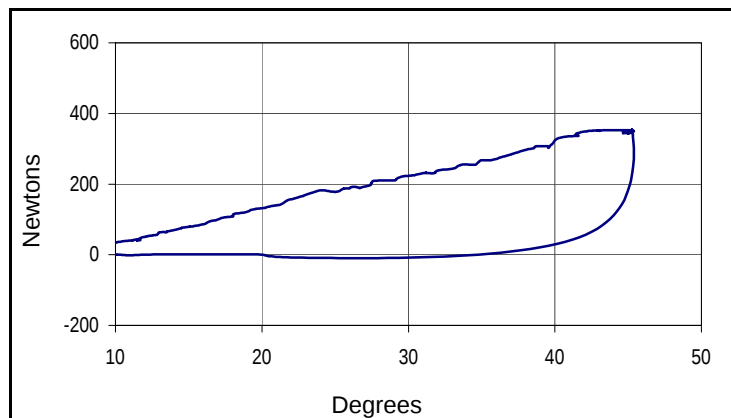
Test Date: 7/12/13



ATD Serial No.: 141

Test I.D.: TF01A

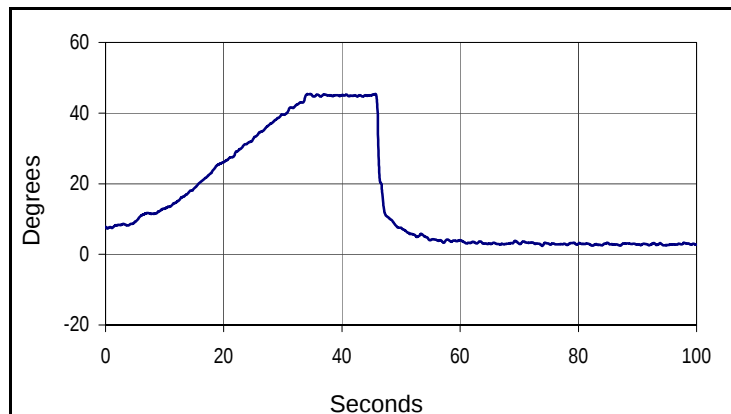
| Tested Parameter                   |     | Units   | Specification  | Result | Pass/Fail |
|------------------------------------|-----|---------|----------------|--------|-----------|
| Dummy Soak Time                    |     | Minutes | ≥240           | 560    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6   | 21.9   | Pass      |
|                                    | Min | °C      |                | 20.7   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0   | 32.7   | Pass      |
|                                    | Min | %       |                | 25.9   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6   | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0   | 29.5   | Pass      |
| Initial Reference Plane Angle      |     | Degrees | ≤ 20           | 7.8    | Pass      |
| Peak Force at 45° +/-0.5°          |     | Newtons | 320.0 to 390.0 | 354.2  | Pass      |
| Torso Rotation Rate                |     | deg/sec | 0.5 to 1.5     | 1.3    | Pass      |
| Final Reference Plane Angle        |     | Degrees | +/-8           | 2.4    | Pass      |
| Overall Test Results               |     |         |                | Pass   |           |



## Curve Description

## Force vs Torso Rotation

| Plot No.   | Type | Filter Freq   |
|------------|------|---------------|
| 001        | FIL  | 1 Hz          |
| Peak Force |      | Peak Rotation |
| 354.2      |      | 45.4          |



## Curve Description

## Torso Rotation

| Plot No. | Type | Filter Freq | Units   |
|----------|------|-------------|---------|
| 002      | FIL  | 1 Hz        | Degrees |
| Max      | Time | Min         | Time    |
| 45.4     | 34.7 | 2.4         | 73.9    |

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

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

Test Date: 7/23/13



ATD Serial No.: 034

Test I.D.: N/A

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

Describe the repair on repair or replacement of parts:

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Test Program: Hybrid III 50th Percentile Male External Measurements

Test Date: 7/23/13

ATD Serial No.: 034

Test I.D.: N/A



| Tested Parameter                               | Units | Specification | Result | Pass/Fail |
|------------------------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature                         | °C    | 20.6 to 22.2  | 21.1   | Pass      |
| Laboratory Relative Humidity                   | %     | 10 to 70      | 29.5   | Pass      |
| A - Total sitting height                       | mm    | 879 to 889    | 884    | Pass      |
| B - Shoulder pivot height                      | mm    | 505 to 521    | 512    | Pass      |
| C - H point height                             | mm    | 84 to 89      | 85     | Pass      |
| D - H point location from backline             | mm    | 135 to 140    | 137    | Pass      |
| E - Shoulder pivot from backline               | mm    | 84 to 94      | 89     | Pass      |
| F - Thigh clearance                            | mm    | 140 to 155    | 146    | Pass      |
| G - Back of elbow to wrist pivot               | mm    | 290 to 305    | 297    | Pass      |
| H - Head back to backline                      | mm    | 41 to 46      | 43     | Pass      |
| I - Shoulder to elbow length                   | mm    | 330 to 345    | 336    | Pass      |
| J - Elbow rest height                          | mm    | 190 to 211    | 201    | Pass      |
| K - Buttock to knee length                     | mm    | 579 to 604    | 586    | Pass      |
| L - Popliteal length                           | mm    | 429 to 455    | 438    | Pass      |
| M - Knee pivot height                          | mm    | 485 to 500    | 493    | Pass      |
| N - Buttock popliteal length                   | mm    | 452 to 477    | 472    | Pass      |
| O - Chest depth without jacket                 | mm    | 213 to 229    | 225    | Pass      |
| P - Foot length                                | mm    | 251 to 267    | 260    | Pass      |
| V - Shoulder breadth                           | mm    | 422 to 437    | 433    | Pass      |
| W - Foot breadth                               | mm    | 91 to 107     | 99     | Pass      |
| Y - Chest circumference<br>(with chest jacket) | mm    | 970 to 1001   | 981    | Pass      |
| Z - Waist circumference                        | mm    | 836 to 866    | 864    | Pass      |
| AA - Location for chest circumference          | mm    | 429 to 434    | 429    | Pass      |
| BB - Location for waist circumference          | mm    | 226 to 231    | 230    | Pass      |
| Overall Test Results                           |       |               | Pass   |           |

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

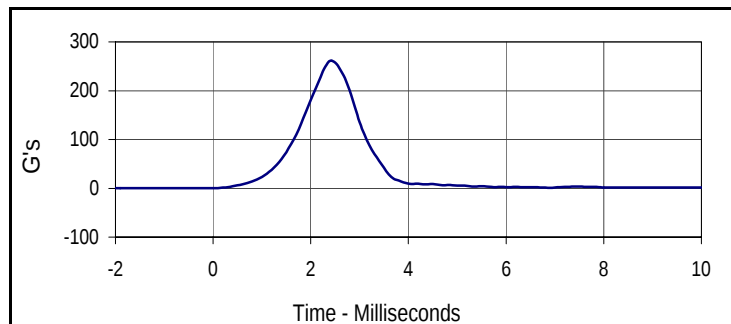
Test Date: 7/23/13



ATD Serial No.: 034

Test I.D.: M034HD043

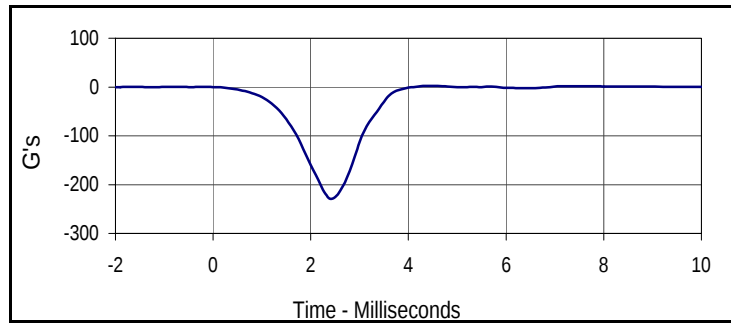
| Tested Parameter                   |     | Units   | Specification                  | Result | Pass/Fail |
|------------------------------------|-----|---------|--------------------------------|--------|-----------|
| Head Assembly Soak Time            |     | Minutes | ≥240                           | 260    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6                   | 21.5   | Pass      |
|                                    | Min | °C      |                                | 21.2   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0                   | 35.6   | Pass      |
|                                    | Min | %       |                                | 32.5   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6                   | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0                   | 33.4   | Pass      |
| Peak Resultant Acceleration        |     | G's     | 225.0 to 275.0                 | 261.3  | Pass      |
| Peak Lateral Acceleration          |     | G's     | ≤15.0                          | 5.6    | Pass      |
| Oscillations After Main Pulse      |     | %       | <10% of peak Res. Acceleration | 3.5    | Pass      |
| Is Acceleration Unimodal?          |     | Yes/No  | Yes                            | Yes    | Pass      |
| Overall Test Results               |     |         |                                | Pass   |           |



## Curve Description

## Head Resultant

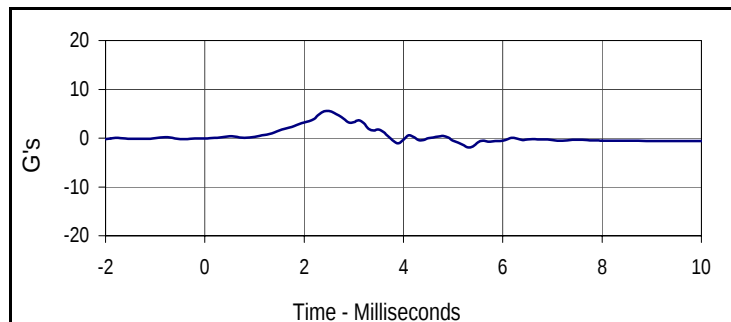
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 001      | RES  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 261.3    | 2.4  | 0.2       | -1.0  |



## Curve Description

## Head X

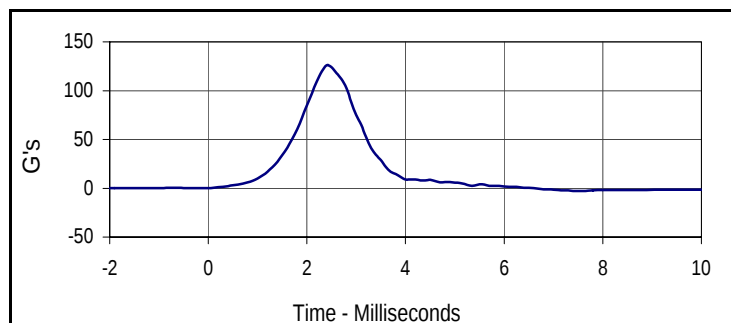
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 2.4      | 4.4  | -228.9    | 2.4   |



## Curve Description

## Head Y

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 5.6      | 2.5  | -1.9      | 5.3   |



## Curve Description

## Head Z

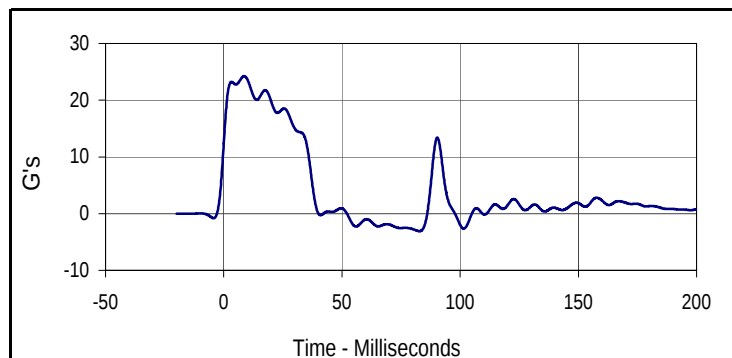
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 125.9    | 2.4  | 0.1       | -2.0  |

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 ATD Serial No.: 034

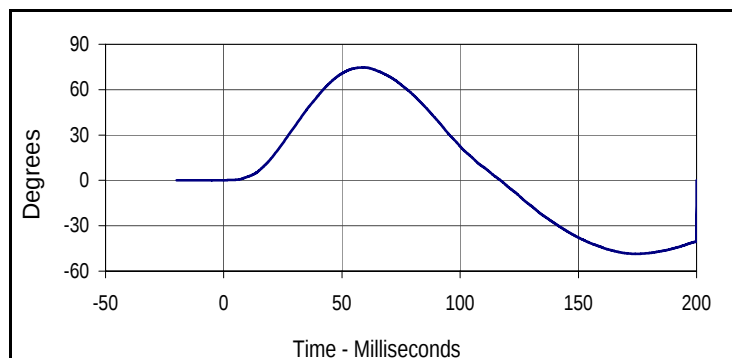
Test Date: 7/23/13  
 Test I.D.: M034NF043



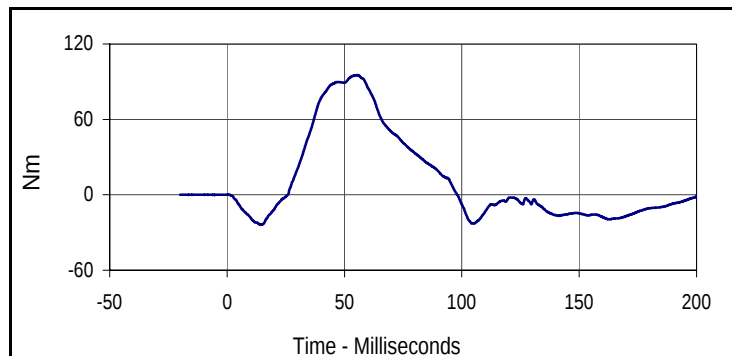
| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Neck Assembly Soak Time                         |          | Minutes | ≥240           | 310    | Pass      |
| Temperature During Soak                         | Max      | °C      | 20.6 to 22.2   | 21.5   | Pass      |
|                                                 | Min      | °C      |                | 21.2   | Pass      |
| Humidity During Soak                            | Max      | %       | 10.0 to 70.0   | 35.6   | Pass      |
|                                                 | Min      | %       |                | 32.5   | Pass      |
| Laboratory Temperature During Test              |          | °C      | 20.6 to 22.2   | 21.2   | Pass      |
| Laboratory Humidity During Test                 |          | %       | 10.0 to 70.0   | 33.4   | Pass      |
| Pendulum Velocity                               |          | m/s     | 6.89 to 7.13   | 6.91   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 22.5 to 27.5   | 23.6   | Pass      |
|                                                 | 20 Msec. | G's     | 17.6 to 22.6   | 19.9   | Pass      |
|                                                 | 30 Msec. | G's     | 12.5 to 18.5   | 15.0   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 29.0         | 15.0   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 34.0 to 42.0   | 37.6   | Pass      |
| Maximum "D" Plane Rotation                      | Max      | Degrees | 64.0 to 78.0   | 74.7   | Pass      |
|                                                 | Time     | Msec.   | 57.0 to 64.0   | 59.0   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 113.0 to 128.0 | 117.1  | Pass      |
| Moment About Occ. Condyle                       | Max      | Nm      | 88.1 to 108.5  | 95.2   | Pass      |
|                                                 | Time     | Msec.   | 47.0 to 58.0   | 55.5   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 97.0 to 107.0  | 98.1   | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |



| Curve Description     |      |           |       |
|-----------------------|------|-----------|-------|
| Pendulum Deceleration |      |           |       |
| Plot No.              | Type | SAE Class | Units |
| 001                   | FIL  | 60        | G's   |
| Max                   | Time | Min       | Time  |
| 24.2                  | 8.6  | -3.1      | 82.8  |



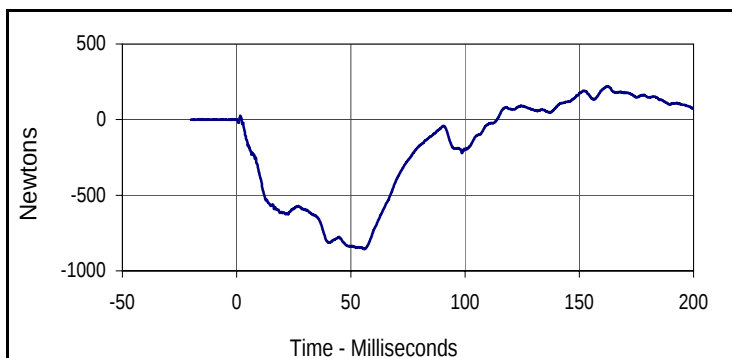
| Curve Description  |      |           |         |
|--------------------|------|-----------|---------|
| "D" Plane Rotation |      |           |         |
| Plot No.           | Type | SAE Class | Units   |
| 002                | FIL  | 60        | Degrees |
| Max                | Time | Min       | Time    |
| 74.7               | 59.0 | -48.6     | 174.4   |



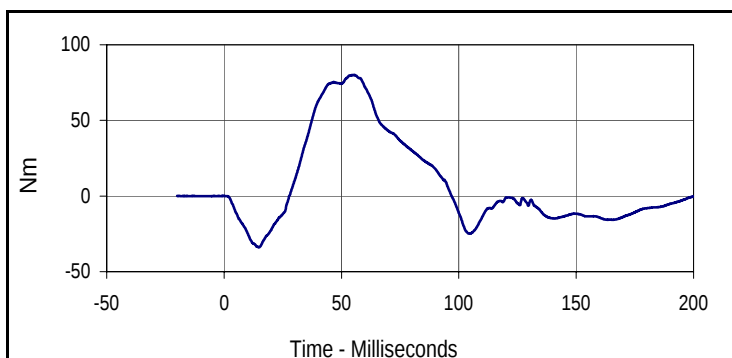
| Curve Description              |      |           |       |
|--------------------------------|------|-----------|-------|
| Moment About Occipital Condyle |      |           |       |
| Plot No.                       | Type | SAE Class | Units |
| 003                            | FIL  | 600       | Nm    |
| Max                            | Time | Min       | Time  |
| 95.2                           | 55.5 | -23.8     | 14.8  |

Test Program: Hybrid III 50th Percentile Male Neck Flexion Test  
 ATD Serial No.: 034

Test Date: 7/23/13  
 Test I.D.: M034NF043



| Curve Description |       |           |         |
|-------------------|-------|-----------|---------|
| Neck Force X      |       |           |         |
| Plot No.          | Type  | SAE Class | Units   |
| 004               | FIL   | 1000      | Newtons |
| Max               | Time  | Min       | Time    |
| 221.3             | 162.2 | -856.0    | 55.9    |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Neck Moment Y     |      |           |       |
| Plot No.          | Type | SAE Class | Units |
| 005               | FIL  | 600       | Nm    |
| Max               | Time | Min       | Time  |
| 80.1              | 55.4 | -33.9     | 14.9  |

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

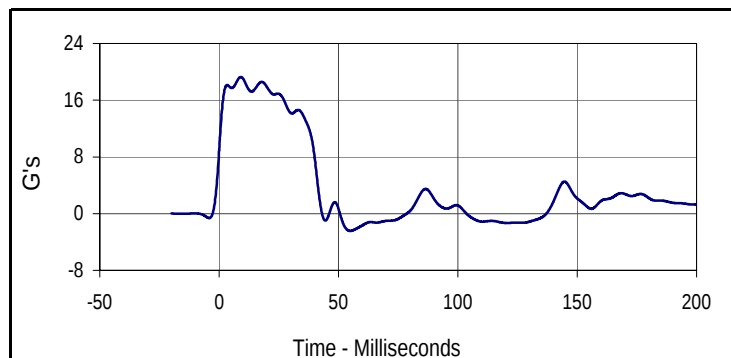
Test Date: 7/23/13



ATD Serial No.: 034

Test I.D.: M034NE043

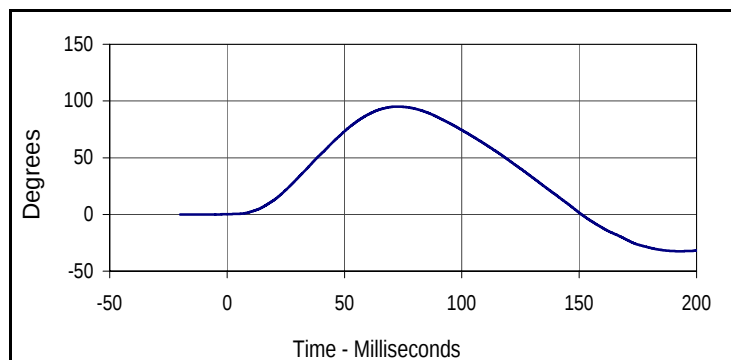
| Tested Parameter                                |          | Units   | Specification  | Result | Pass/Fail |
|-------------------------------------------------|----------|---------|----------------|--------|-----------|
| Neck Assembly Soak Time                         |          | Minutes | ≥240           | 345    | Pass      |
| Temperature During Soak                         | Max      | °C      | 20.6 to 22.2   | 21.5   | Pass      |
|                                                 | Min      | °C      |                | 21.2   | Pass      |
| Humidity During Soak                            | Max      | %       | 10.0 to 70.0   | 35.6   | Pass      |
|                                                 | Min      | %       |                | 32.5   | Pass      |
| Laboratory Temperature During Test              |          | °C      | 20.6 to 22.2   | 21.2   | Pass      |
| Laboratory Humidity During Test                 |          | %       | 10.0 to 70.0   | 33.4   | Pass      |
| Pendulum Velocity                               |          | m/s     | 5.94 to 6.19   | 5.96   | Pass      |
| Pendulum Deceleration                           | 10 Msec. | G's     | 17.2 to 21.2   | 19.1   | Pass      |
|                                                 | 20 Msec. | G's     | 14.0 to 19.0   | 17.9   | Pass      |
|                                                 | 30 Msec. | G's     | 11.0 to 16.0   | 14.2   | Pass      |
| Peak Pendulum Decel. after 30 Msec.             |          | G's     | ≤ 22.0         | 14.6   | Pass      |
| Deceleration Decay, Time to Cross 5 G's         |          | Msec.   | 38.0 to 46.0   | 41.0   | Pass      |
| Maximum "D" Plane Rotation                      | Max      | Degrees | 81.0 to 106.0  | 95.1   | Pass      |
|                                                 | Time     | Msec.   | 72.0 to 82.0   | 72.5   | Pass      |
| "D" Plane Rotation Decay, Time To Zero Crossing |          | Msec.   | 147.0 to 174.0 | 151    | Pass      |
| Moment About Occ. Condyle                       | Max      | Nm      | -52.9 to -79.9 | -65.4  | Pass      |
|                                                 | Time     | Msec.   | 65.0 to 79.0   | 67.8   | Pass      |
| Positive Moment Decay, Time To Zero Crossing    |          | Msec.   | 120.0 to 148.0 | 136.3  | Pass      |
| Overall Test Results                            |          |         |                |        | Pass      |



## Curve Description

## Pendulum Deceleration

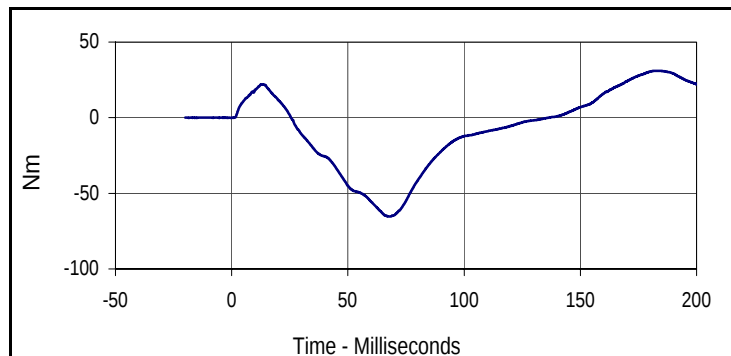
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 001      | FIL  | 60        | G's   |
| Max      | Time | Min       | Time  |
| 19.3     | 9.1  | -2.4      | 54.9  |



## Curve Description

## "D" Plane Rotation

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 002      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 95.1     | 72.5 | -32.4     | 192.7   |



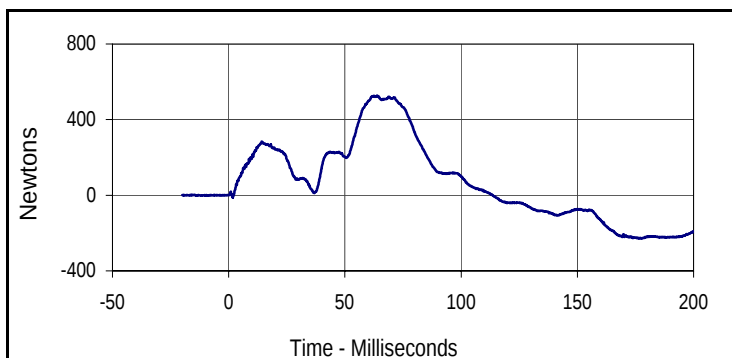
## Curve Description

## Moment About Occipital Condyle

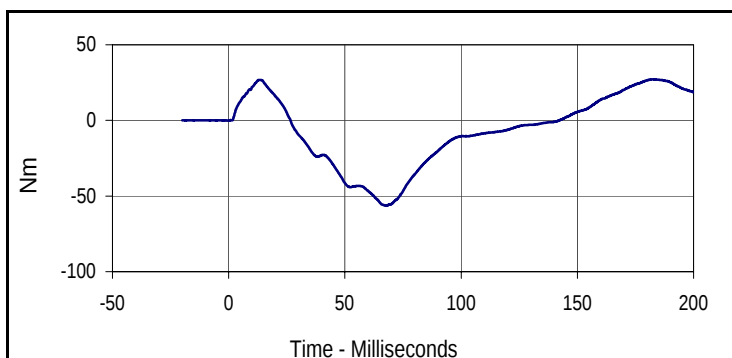
| Plot No. | Type  | SAE Class | Units |
|----------|-------|-----------|-------|
| 003      | FIL   | 600       | Nm    |
| Max      | Time  | Min       | Time  |
| 31.0     | 182.7 | -65.4     | 67.8  |

Test Program: Hybrid III 50th Percentile Male Neck Extension Test  
 ATD Serial No.: 034

Test Date: 7/23/13  
 Test I.D.: M034NE043



| Curve Description |      |           |         |
|-------------------|------|-----------|---------|
| Neck Force X      |      |           |         |
| Plot No.          | Type | SAE Class | Units   |
| 004               | FIL  | 1000      | Newtons |
| Max               | Time | Min       | Time    |
| 527.2             | 63.8 | -228.9    | 177.8   |



| Curve Description |       |           |       |
|-------------------|-------|-----------|-------|
| Neck Moment Y     |       |           |       |
| Plot No.          | Type  | SAE Class | Units |
| 005               | FIL   | 600       | Nm    |
| Max               | Time  | Min       | Time  |
| 27.1              | 182.7 | -56.4     | 67.9  |

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

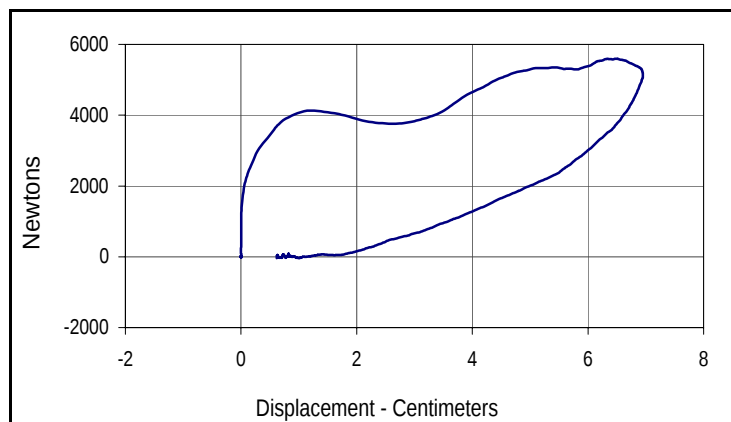
Test Date: 7/23/13



ATD Serial No.: 034

Test I.D.: M034CH043

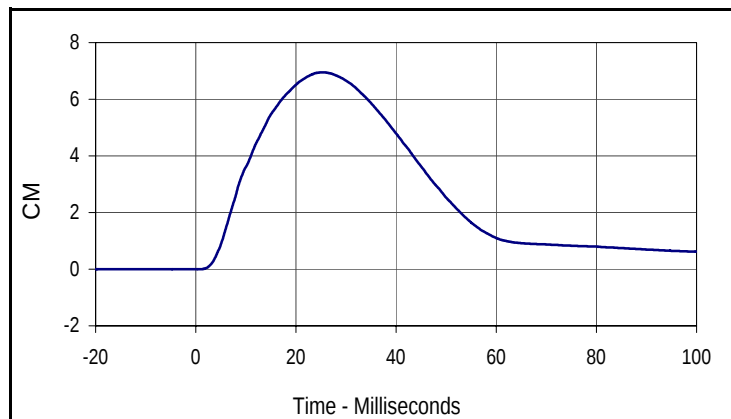
| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Dummy Soak Time                    |     | Minutes | ≥240          | 395    | Pass      |
| Temperature During Soak            | Max | °C      | 20.6 to 22.2  | 21.5   | Pass      |
|                                    | Min | °C      |               | 21.2   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 35.6   | Pass      |
|                                    | Min | %       |               | 32.5   | Pass      |
| Laboratory Temperature During Test |     | °C      | 20.6 to 22.2  | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 33.4   | Pass      |
| Probe Velocity                     |     | m/s     | 6.58 to 6.82  | 6.69   | Pass      |
| Peak Probe Force                   |     | Newtons | 5159 to 5893  | 5595   | Pass      |
| Peak Sternum Deflection            |     | CM      | 6.35 to 7.26  | 6.95   | Pass      |
| Internal Hysteresis                |     | %       | 69 to 85      | 70.4   | Pass      |
| Overall Test Results               |     |         |               | Pass   |           |



## Curve Description

## Probe Force vs. Chest Deflection

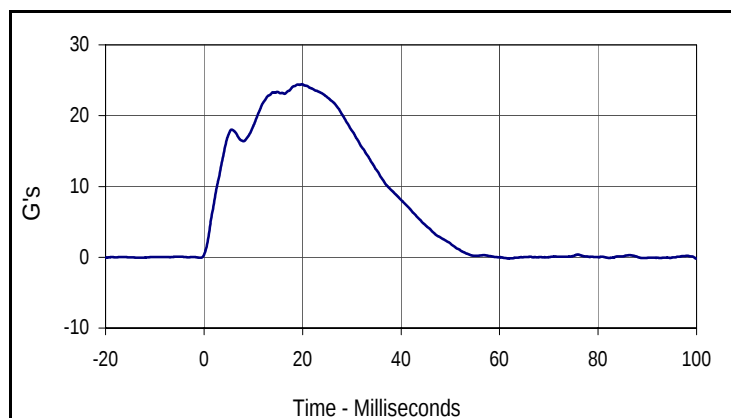
| Plot No.         | Type | SAE Class             | Hysteresis |
|------------------|------|-----------------------|------------|
| 001              | FIL  | 600                   | 70.4       |
| Peak Probe Force |      | Peak Chest Deflection |            |
| 5595             |      | 6.95                  |            |



## Curve Description

## Chest Deflection

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 600       | CM    |
| Max      | Time | Min       | Time  |
| 7.0      | 25.6 | 0.0       | -18.4 |



## Curve Description

## Impactor Acceleration

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 24.4     | 19.9 | -0.2      | 99.9  |

Test Program: Hybrid III 50th Percentile Male Knee Impact Test  
 ATD Serial No.: 034

Test Date: 7/23/13  
 Test I.D.: M034LK043, M034RK043

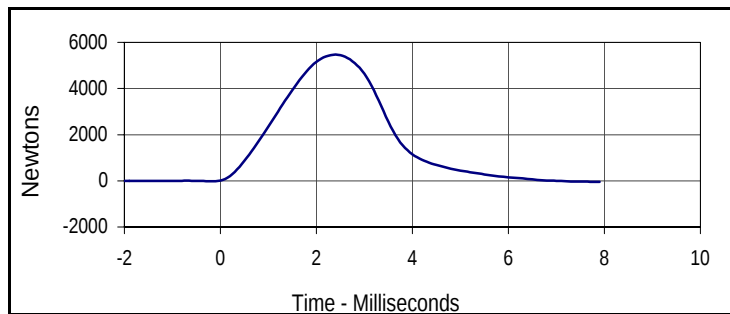


### Left Knee

| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Knee Assembly Soak Time            |     | Minutes | ≥240          | 430    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6  | 21.5   | Pass      |
|                                    | Min | °C      |               | 21.2   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 35.6   | Pass      |
|                                    | Min | %       |               | 32.5   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6  | 21.2   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 33.3   | Pass      |
| Pendulum Velocity at T=0           |     | m/sec   | 2.07 to 2.13  | 2.08   | Pass      |
| Peak Probe Force                   |     | Newtons | 4715 to 5782  | 5468   | Pass      |
| Overall Test Results               |     |         |               | Pass   |           |

### Right Knee

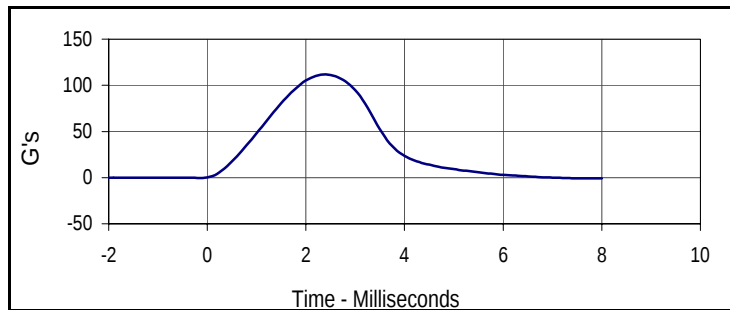
|                          |  |         |              |      |      |
|--------------------------|--|---------|--------------|------|------|
| Pendulum Velocity at T=0 |  | m/sec   | 2.07 to 2.13 | 2.09 | Pass |
| Peak Probe Force         |  | Newtons | 4715 to 5782 | 5679 | Pass |
| Overall Test Results     |  |         |              | Pass |      |



#### Curve Description

##### Left Knee Probe Force

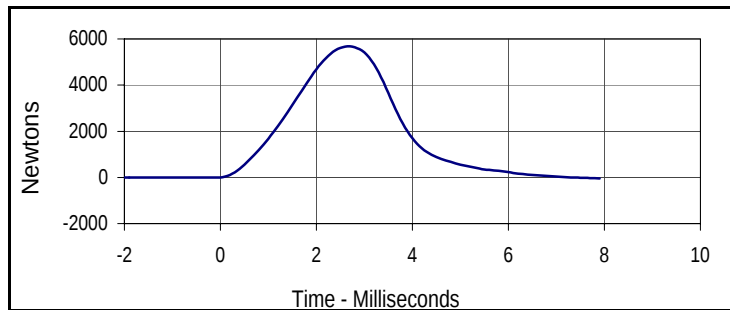
| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 001      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 5467.7   | 2.4  | -44.6     | 7.9     |



#### Curve Description

##### Left Knee Acceleration

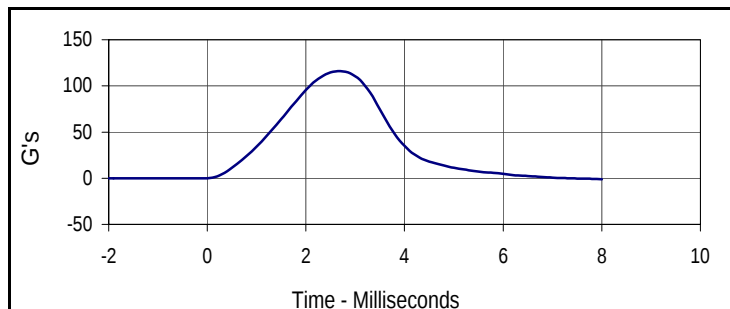
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 111.7    | 2.4  | -1.0      | 0.0   |



#### Curve Description

##### Right Knee Probe Force

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 003      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 5678.7   | 2.7  | -43.1     | 7.9     |



#### Curve Description

##### Right Knee Acceleration

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 116.1    | 2.7  | -1.6      | 0.0   |

Test Program: Hybrid III 50th Percentile Male Hip Joint-Femur Flexion Test

Test Date: 7/23/13

ATD Serial No.: 034

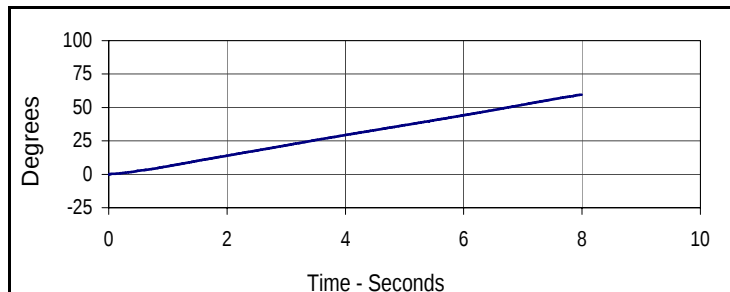
Test I.D.: M034LF043, M034RF043

**Left Hip Joint-Femur Results**

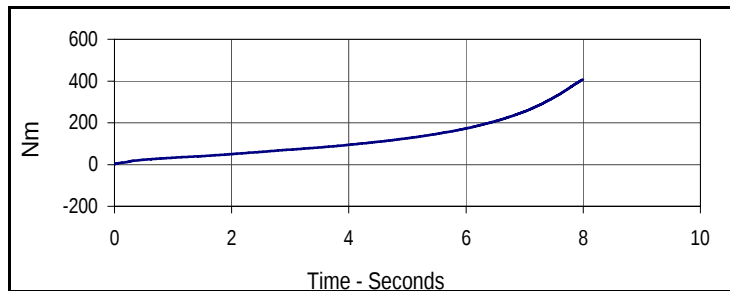
| Tested Parameter                   | Units   | Specification | Result | Pass/Fail |
|------------------------------------|---------|---------------|--------|-----------|
| Hip Joint-Femur Assembly Soak Time | Minutes | ≥240          | 480    | Pass      |
| Temperature During Soak            | Max     | 18.9 to 25.6  | 21.5   | Pass      |
|                                    | Min     |               | 21.2   | Pass      |
| Humidity During Soak               | Max     | 10.0 to 70.0  | 35.6   | Pass      |
|                                    | Min     |               | 32.5   | Pass      |
| Laboratory Temperature During Test | °C      | 18.9 to 25.6  | 21.3   | Pass      |
| Laboratory Humidity During Test    | %       | 10.0 to 70.0  | 33.3   | Pass      |
| Rotation Rate                      | deg/sec | 5 to 10       | 7.5    | Pass      |
| Femur Torque at 30°                | Nm      | ≤ 95          | 94.9   | Pass      |
| Rotation at 203 Nm                 | Degrees | 40.0 to 50.0  | 47.0   | Pass      |
| Overall Test Results               |         |               |        | Pass      |

**Right Hip Joint-Femur Results**

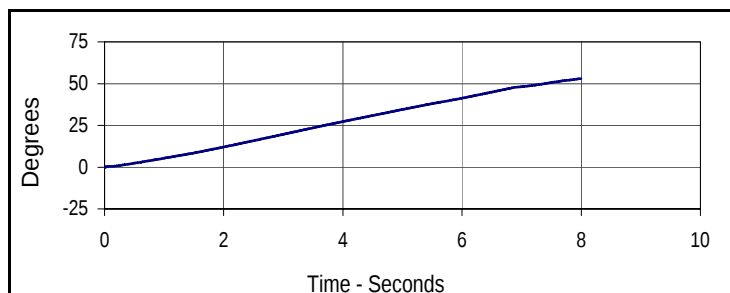
|                      |         |              |      |      |
|----------------------|---------|--------------|------|------|
| Rotation Rate        | deg/sec | 5 to 10      | 6.6  | Pass |
| Femur Torque at 30°  | Nm      | ≤ 95         | 79.7 | Pass |
| Rotation at 203 Nm   | Degrees | 40.0 to 50.0 | 46.2 | Pass |
| Overall Test Results |         |              |      | Pass |

**Curve Description****Left Hip-Femur Rotation**

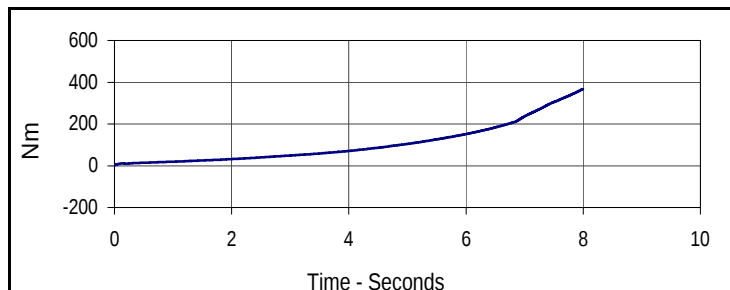
| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 001      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 59.6     | 8.0  | 0.0       | 0.0     |

**Curve Description****Left Femur Torque**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 407.0    | 8.0  | 0.0       | 0.0   |

**Curve Description****Right Hip-Femur Rotation**

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 003      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 53.0     | 8.0  | 0.0       | 0.0     |

**Curve Description****Right Femur Torque**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 367.1    | 8.0  | 0.0       | 0.0   |

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

Test Date: 7/25/13



ATD Serial No.: 141

Test I.D.: N/A

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

Describe the repair on repair or replacement of parts:

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Test Program: Hybrid III 5th Percentile Female External Measurements

Test Date: 7/25/13

ATD Serial No.: 141

Test I.D.: N/A



| Tested Parameter                               | Units | Specification  | Result | Pass/Fail |
|------------------------------------------------|-------|----------------|--------|-----------|
| Laboratory Temperature                         | °C    | 20.6 to 22.2   | 21.3   | Pass      |
| Laboratory Relative Humidity                   | %     | 10 to 70       | 33.6   | Pass      |
| A - Total sitting height                       | mm    | 774.7 to 800.1 | 784    | Pass      |
| B - Shoulder pivot height                      | mm    | 431.8 to 457.2 | 450    | Pass      |
| C - H point height                             | mm    | 81.3 to 86.3   | 85     | Pass      |
| D - H point location from backline             | mm    | 144.8 to 149.8 | 146    | Pass      |
| E - Shoulder pivot from backline               | mm    | 68.6 to 83.8   | 77     | Pass      |
| F - Thigh clearance                            | mm    | 119.4 to 134.6 | 126    | Pass      |
| G - Back of elbow to wrist pivot               | mm    | 243.9 to 259.1 | 250    | Pass      |
| H - Head back to backline                      | mm    | 40.7 to 45.7   | 44     | Pass      |
| I - Shoulder to elbow length                   | mm    | 276.8 to 297.2 | 285    | Pass      |
| J - Elbow rest height                          | mm    | 182.8 to 203.2 | 197    | Pass      |
| K - Buttock to knee length                     | mm    | 520.7 to 546.1 | 531    | Pass      |
| L - Popliteal length                           | mm    | 355.6 to 376.0 | 371    | Pass      |
| M - Knee pivot height                          | mm    | 393.7 to 419.1 | 401    | Pass      |
| N - Buttock popliteal length                   | mm    | 414.0 to 439.4 | 420    | Pass      |
| O - Chest depth without jacket                 | mm    | 175.3 to 190.5 | 185    | Pass      |
| P - Foot length                                | mm    | 218.5 to 233.7 | 221    | Pass      |
| R - Buttock to Knee Pivot Length               | mm    | 457.2 to 482.6 | 473    | Pass      |
| S - Head Breadth                               | mm    | 137.1 to 147.3 | 144    | Pass      |
| T - Head Depth                                 | mm    | 177.8 to 188.0 | 180    | Pass      |
| U - Hip Breadth                                | mm    | 299.7 to 314.9 | 302    | Pass      |
| V - Shoulder breadth                           | mm    | 350.5 to 365.7 | 359    | Pass      |
| W - Foot breadth                               | mm    | 78.8 to 94.0   | 90     | Pass      |
| X - Head circumference                         | mm    | 528.3 to 548.7 | 541    | Pass      |
| Y - Chest circumference<br>(with chest jacket) | mm    | 850.8 to 881.3 | 864    | Pass      |
| Z - Waist circumference                        | mm    | 759.5 to 789.9 | 768    | Pass      |
| AA - Location for chest circumference          | mm    | 299.7 to 309.9 | 300    | Pass      |
| BB - Location for waist circumference          | mm    | 160.1 to 170.2 | 165    | Pass      |
| Overall Test Results                           |       |                |        | Pass      |

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

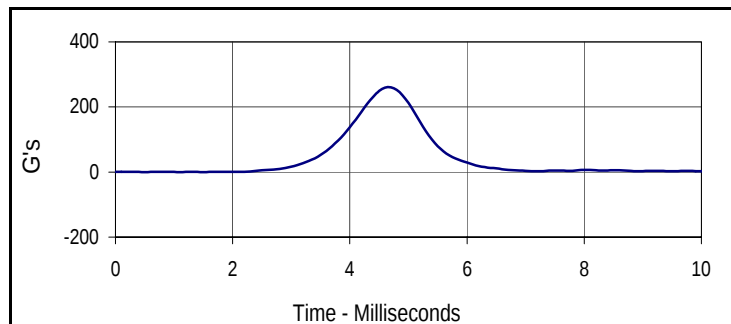
Test Date: 7/25/13



ATD Serial No.: 141

Test I.D.: F141HD056

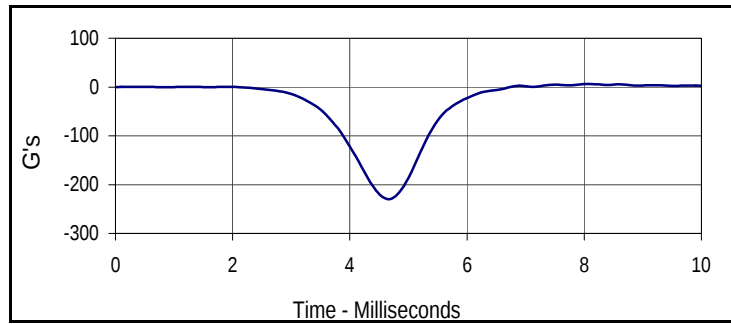
| Tested Parameter                   |     | Units   | Specification                  | Result | Pass/Fail |
|------------------------------------|-----|---------|--------------------------------|--------|-----------|
| Head Assembly Soak Time            |     | Minutes | ≥240                           | 245    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6                   | 21.5   | Pass      |
|                                    | Min | °C      |                                | 21.2   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0                   | 36.5   | Pass      |
|                                    | Min | %       |                                | 31.3   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6                   | 21.3   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0                   | 33.6   | Pass      |
| Peak Resultant Acceleration        |     | G's     | 250.0 to 300.0                 | 260.3  | Pass      |
| Peak Lateral Acceleration          |     | G's     | ≤15.0                          | 2.7    | Pass      |
| Oscillations After Main Pulse      |     | %       | <10% of peak Res. Acceleration | 2.5    | Pass      |
| Is Acceleration Unimodal?          |     | Yes/No  | Yes                            | Yes    | Pass      |
| Overall Test Results               |     |         |                                | Pass   |           |



Curve Description

Head Resultant

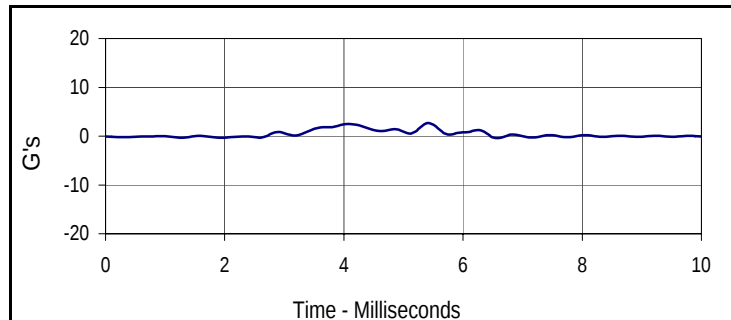
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 001      | RES  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 260.3    | 4.7  | 0.1       | 1.5   |



Curve Description

Head X

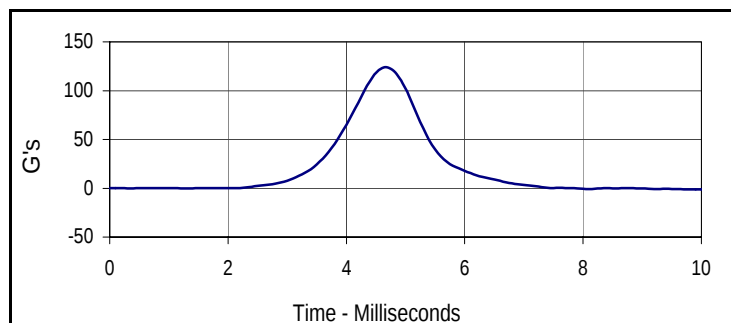
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 6.4      | 8.0  | -228.9    | 4.7   |



Curve Description

Head Y

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 2.7      | 5.4  | -0.4      | 6.6   |



Curve Description

Head Z

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 1000      | G's   |
| Max      | Time | Min       | Time  |
| 123.8    | 4.7  | -0.5      | 8.0   |

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

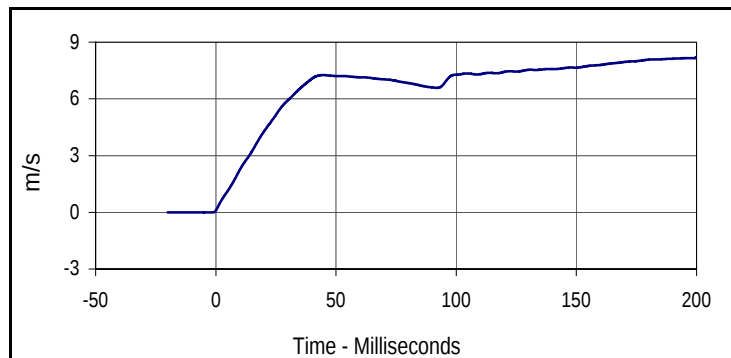
Test Date: 7/25/13

ATD Serial No.: 141

Test I.D.: F141NF056



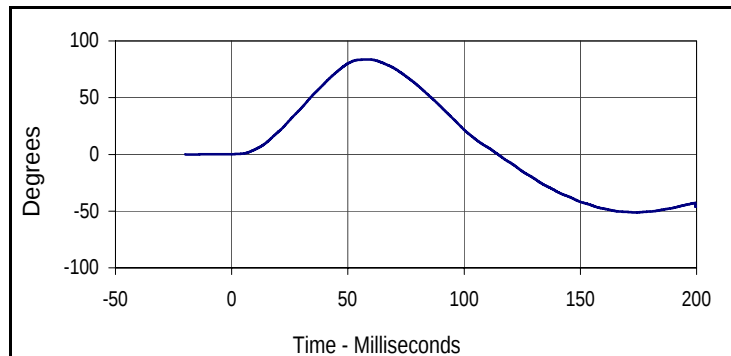
| Tested Parameter                     |          | Units   | Specification | Result | Pass/Fail |
|--------------------------------------|----------|---------|---------------|--------|-----------|
| Neck Assembly Soak Time              |          | Minutes | ≥240          | 300    | Pass      |
| Temperature During Soak              | Max      | °C      | 20.6 to 22.2  | 21.5   | Pass      |
|                                      | Min      | °C      |               | 21.2   | Pass      |
| Humidity During Soak                 | Max      | %       | 10.0 to 70.0  | 36.5   | Pass      |
|                                      | Min      | %       |               | 31.3   | Pass      |
| Laboratory Temperature During Test   |          | °C      | 20.6 to 22.2  | 21.3   | Pass      |
| Laboratory Humidity During Test      |          | %       | 10.0 to 70.0  | 33.5   | Pass      |
| Pendulum Velocity                    |          | m/s     | 6.89 to 7.13  | 6.97   | Pass      |
| Pendulum Deceleration                | 10 Msec. | m/s     | 2.1 to 2.5    | 2.3    | Pass      |
|                                      | 20 Msec. | m/s     | 4.0 to 5.0    | 4.3    | Pass      |
|                                      | 30 Msec. | m/s     | 5.8 to 7.0    | 5.9    | Pass      |
| "D" Plane Rotation                   | Max      | Degrees | 77.0 to 91.0  | 83.7   | Pass      |
| Peak Moment in Rotation              | Max      | Nm      | 69.0 to 83.0  | 79.5   | Pass      |
| Positive Moment Decay, Time To 10 Nm |          | Msec.   | 80.0 to 100.0 | 82.9   | Pass      |
| Overall Test Results                 |          |         |               | Pass   |           |



## Curve Description

## Pendulum Velocity

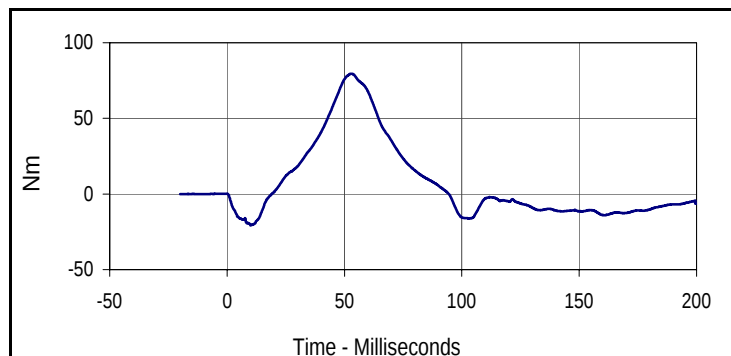
| Plot No. | Type  | SAE Class | Units |
|----------|-------|-----------|-------|
| 001      | FIL   | 180       | m/s   |
| Max      | Time  | Min       | Time  |
| 8.2      | 200.0 | 0.0       | -1.4  |



## Curve Description

## "D" Plane Rotation

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 002      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 83.7     | 58.9 | -51.2     | 173.7   |



## Curve Description

## Moment About Occipital Condyle

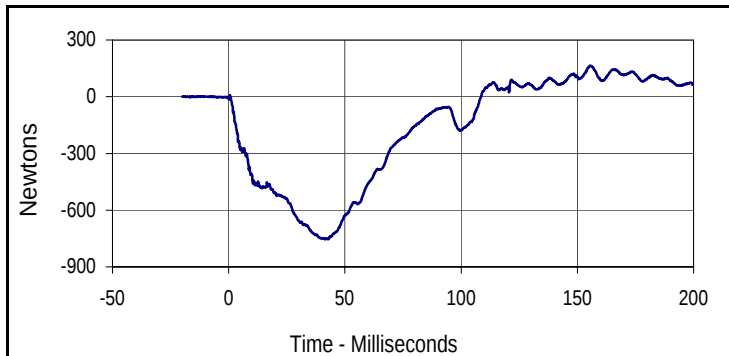
| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 79.5     | 52.9 | -20.8     | 10.0  |

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

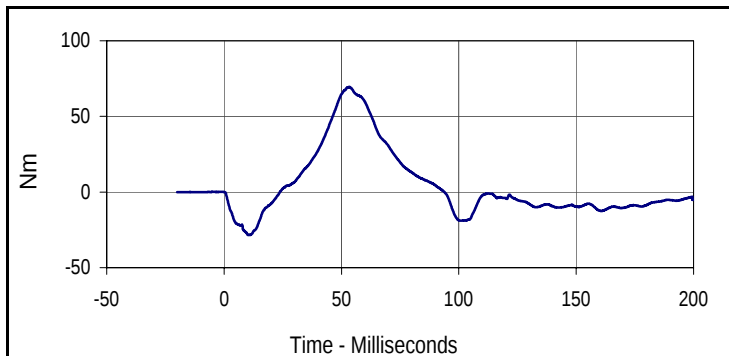
ATD Serial No.: 141

Test Date: 7/25/13

Test I.D.: F141NF056



| Curve Description  |       |           |         |
|--------------------|-------|-----------|---------|
| Upper Neck Force X |       |           |         |
| Plot No.           | Type  | SAE Class | Units   |
| 004                | FIL   | 1000      | Newtons |
| Max                | Time  | Min       | Time    |
| 165.2              | 155.5 | -754.3    | 41.6    |



| Curve Description |      |           |       |
|-------------------|------|-----------|-------|
| Neck Moment Y     |      |           |       |
| Plot No.          | Type | SAE Class | Units |
| 005               | FIL  | 600       | Nm    |
| Max               | Time | Min       | Time  |
| 69.4              | 53.4 | -28.4     | 10.2  |

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

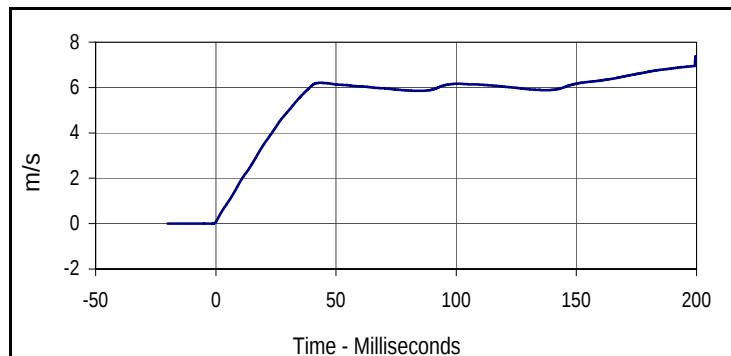
Test Date: 7/25/13



ATD Serial No.: 141

Test I.D.: F141NE056

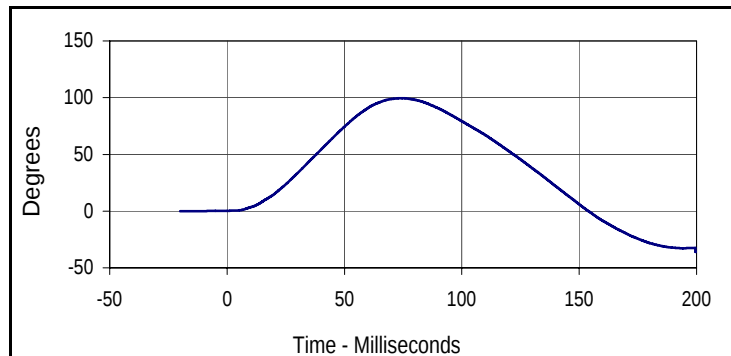
| Tested Parameter                      |          | Units   | Specification  | Result | Pass/Fail |
|---------------------------------------|----------|---------|----------------|--------|-----------|
| Neck Assembly Soak Time               |          | Minutes | ≥240           | 335    | Pass      |
| Temperature During Soak               | Max      | °C      | 20.6 to 22.2   | 21.5   | Pass      |
|                                       | Min      | °C      |                | 21.2   | Pass      |
| Humidity During Soak                  | Max      | %       | 10.0 to 70.0   | 36.5   | Pass      |
|                                       | Min      | %       |                | 31.3   | Pass      |
| Laboratory Temperature During Test    |          | °C      | 20.6 to 22.2   | 21.3   | Pass      |
| Laboratory Humidity During Test       |          | %       | 10.0 to 70.0   | 33.6   | Pass      |
| Pendulum Velocity                     |          | m/s     | 5.95 to 6.19   | 6.03   | Pass      |
| Pendulum Deceleration                 | 10 Msec. | m/s     | 1.5 to 1.9     | 1.8    | Pass      |
|                                       | 20 Msec. | m/s     | 3.1 to 3.9     | 3.5    | Pass      |
|                                       | 30 Msec. | m/s     | 4.6 to 5.6     | 4.9    | Pass      |
| "D" Plane Rotation                    | Max      | Degrees | 99.0 to 114.0  | 99.5   | Pass      |
| Peak Moment in Rotation               | Max      | Nm      | -53.0 to -65.0 | -58.8  | Pass      |
| Positive Moment Decay, Time To -10 Nm |          | Msec.   | 94.0 to 114.0  | 99.4   | Pass      |
| Overall Test Results                  |          |         |                | Pass   |           |



## Curve Description

## Pendulum Velocity

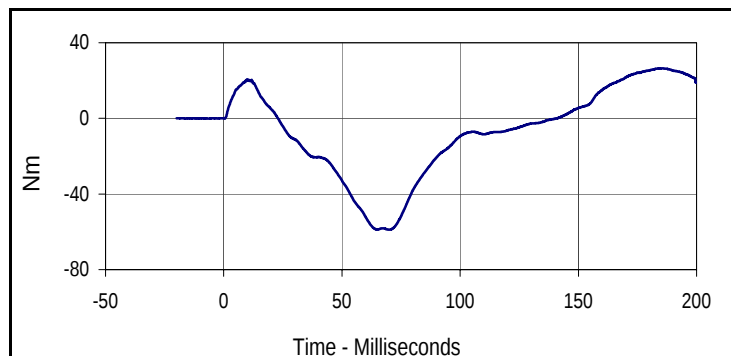
| Plot No. | Type  | SAE Class | Units |
|----------|-------|-----------|-------|
| 001      | FIL   | 180       | m/s   |
| Max      | Time  | Min       | Time  |
| 7.4      | 200.0 | 0.0       | -1.3  |



## Curve Description

## "D" Plane Rotation

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 002      | FIL  | 60        | Degrees |
| Max      | Time | Min       | Time    |
| 99.5     | 74.4 | -36.0     | 199.5   |



## Curve Description

## Moment About Occipital Condyle

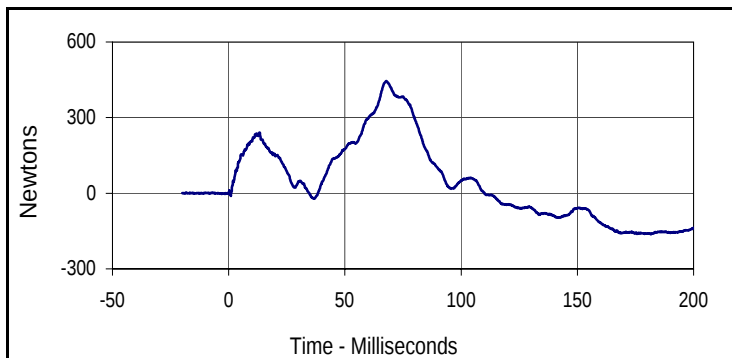
| Plot No. | Type  | SAE Class | Units |
|----------|-------|-----------|-------|
| 003      | FIL   | 600       | Nm    |
| Max      | Time  | Min       | Time  |
| 26.5     | 185.5 | -58.9     | 70.1  |

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

ATD Serial No.: 141

Test Date: 7/25/13

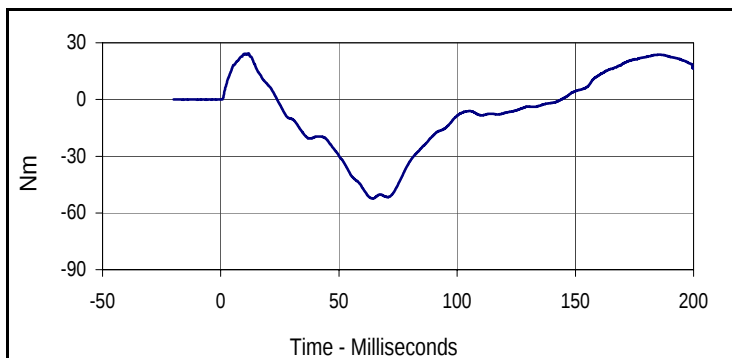
Test I.D.: F141NE056



Curve Description

Upper Neck Force X

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 004      | FIL  | 1000      | Newtons |
| Max      | Time | Min       | Time    |
| 445.0    | 67.7 | -162.9    | 181.6   |



Curve Description

Neck Moment Y

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 005      | FIL  | 600       | Nm    |
| Max      | Time | Min       | Time  |
| 24.5     | 11.7 | -52.4     | 64.2  |

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

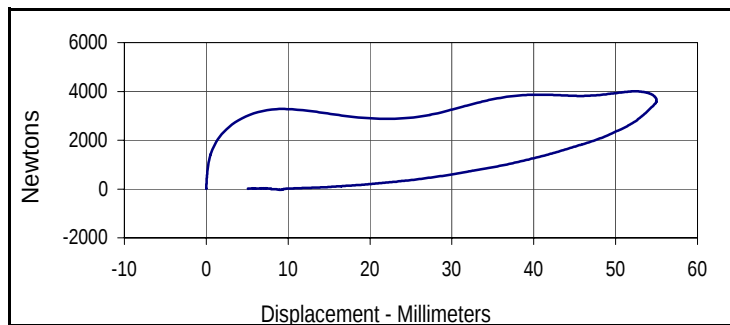
Test Date: 7/25/13



ATD Serial No.: 141

Test I.D.: F141CH056

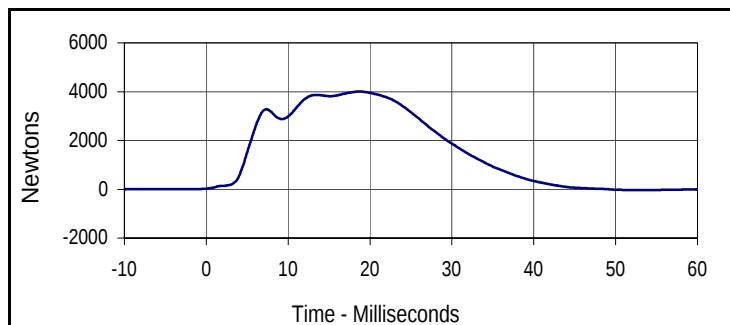
| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Dummy Soak Time                    |     | Minutes | ≥240          | 385    | Pass      |
| Temperature During Soak            | Max | °C      | 20.6 to 22.2  | 21.5   | Pass      |
|                                    | Min | °C      |               | 21.2   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 36.5   | Pass      |
|                                    | Min | %       |               | 31.3   | Pass      |
| Laboratory Temperature During Test |     | °C      | 20.6 to 22.2  | 21.3   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 33.6   | Pass      |
| Probe Velocity                     |     | m/s     | 6.59 to 6.83  | 6.61   | Pass      |
| Peak Chest Deflection              |     | mm      | 50.0 to 58.0  | 55.0   | Pass      |
| Peak Force Between 50 and 58 MM    |     | Newtons | 3900 to 4400  | 3933   | Pass      |
| Peak Force Between 18 and 50 MM    |     | Newtons | ≤4600         | 4003   | Pass      |
| Internal Hysteresis                |     | %       | 69 to 85      | 75.0   | Pass      |
| Overall Test Results               |     |         |               |        | Pass      |



## Curve Description

## Probe Force vs. Chest Deflection

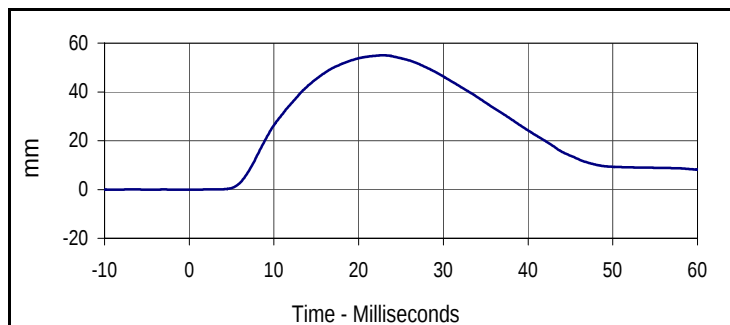
| Plot No.         | Type | SAE Class             | Hysteresis |
|------------------|------|-----------------------|------------|
| 001              | FIL  | 180                   | 75.0       |
| Peak Probe Force |      | Peak Chest Deflection |            |
| 4003.2           |      | 55.0                  |            |



## Curve Description

## Probe Force

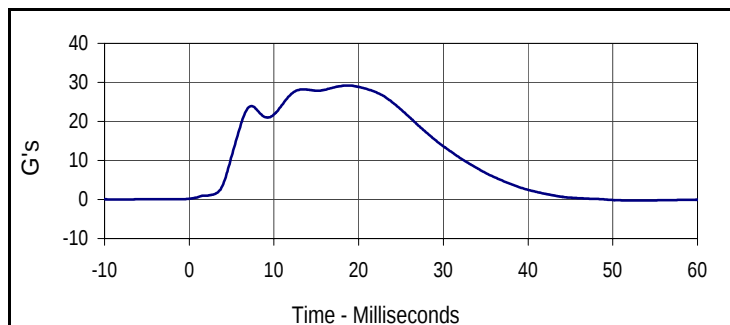
| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 002      | FIL  | 180       | Newtons |
| Max      | Time | Min       | Time    |
| 4003.2   | 18.8 | -38.5     | 53.0    |



## Curve Description

## Chest Deflection

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 003      | FIL  | 180       | mm    |
| Max      | Time | Min       | Time  |
| 55.0     | 22.9 | 0.0       | -1.2  |



## Curve Description

## Impactor Acceleration

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 180       | G's   |
| Max      | Time | Min       | Time  |
| 29.2     | 18.8 | -0.3      | 53.0  |

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

Test Date: 7/25/13

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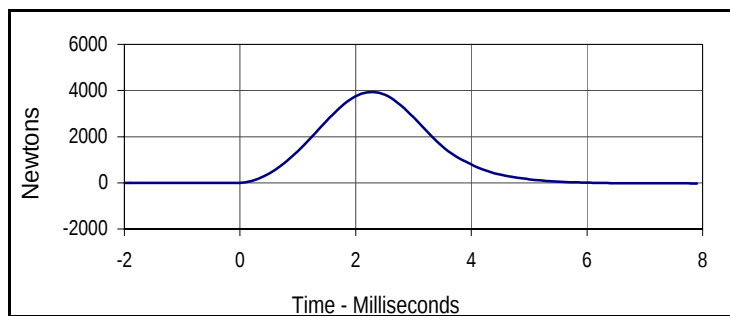
Test I.D.: F141LK056\_F141RK056

**Left Knee**

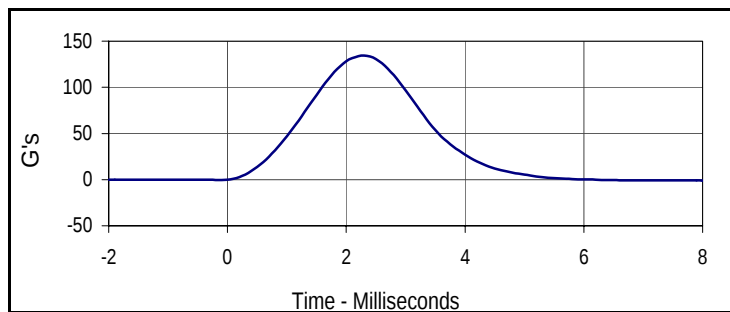
| Tested Parameter                   |     | Units   | Specification | Result | Pass/Fail |
|------------------------------------|-----|---------|---------------|--------|-----------|
| Knee Assembly Soak Time            |     | Minutes | ≥240          | 415    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6  | 21.5   | Pass      |
|                                    | Min | °C      |               | 21.2   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0  | 36.5   | Pass      |
|                                    | Min | %       |               | 31.3   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6  | 21.3   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0  | 33.5   | Pass      |
| Pendulum Velocity at T=0           |     | m/sec   | 2.07 to 2.13  | 2.10   | Pass      |
| Peak Probe Force                   |     | Newtons | 3450 to 4060  | 3939   | Pass      |
| Overall Test Results               |     |         |               | Pass   |           |

**Right Knee**

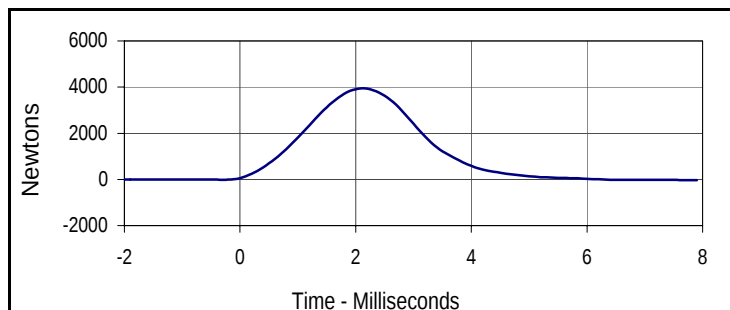
|                          |  |         |              |      |      |
|--------------------------|--|---------|--------------|------|------|
| Pendulum Velocity at T=0 |  | m/sec   | 2.07 to 2.13 | 2.10 | Pass |
| Peak Probe Force         |  | Newtons | 3450 to 4060 | 3943 | Pass |
| Overall Test Results     |  |         |              | Pass |      |

**Curve Description****Left Knee Probe Force**

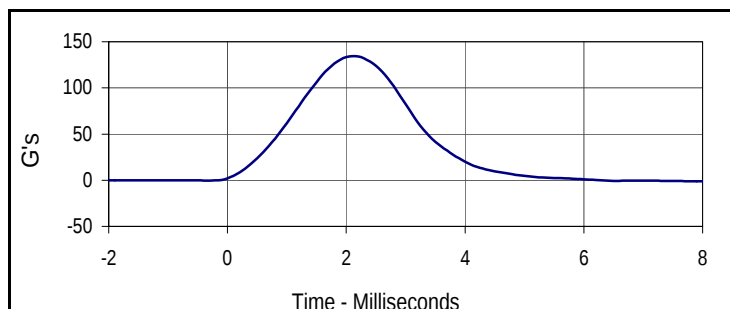
| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 001      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 3939.1   | 2.3  | -26.1     | 7.9     |

**Curve Description****Left Knee Acceleration**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 002      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 134.4    | 2.3  | -1.3      | 8.5   |

**Curve Description****Right Knee Probe Force**

| Plot No. | Type | SAE Class | Units   |
|----------|------|-----------|---------|
| 003      | FIL  | 600       | Newtons |
| Max      | Time | Min       | Time    |
| 3942.5   | 2.1  | -33.0     | 7.9     |

**Curve Description****Right Knee Acceleration**

| Plot No. | Type | SAE Class | Units |
|----------|------|-----------|-------|
| 004      | FIL  | 600       | G's   |
| Max      | Time | Min       | Time  |
| 134.5    | 2.1  | -1.3      | 9.0   |

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

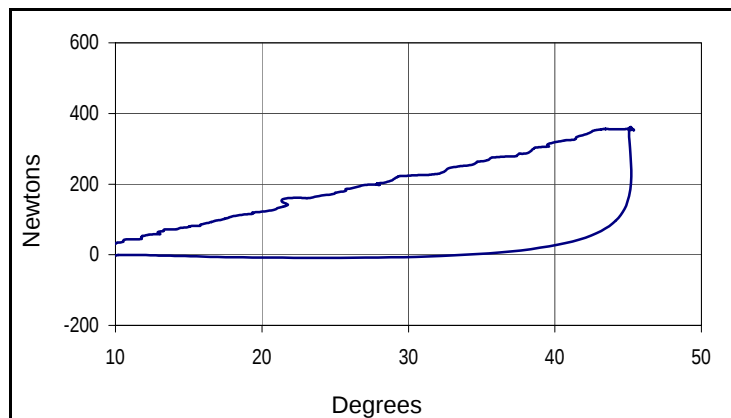
Test Date: 7/25/13



ATD Serial No.: 141

Test I.D.: TF056

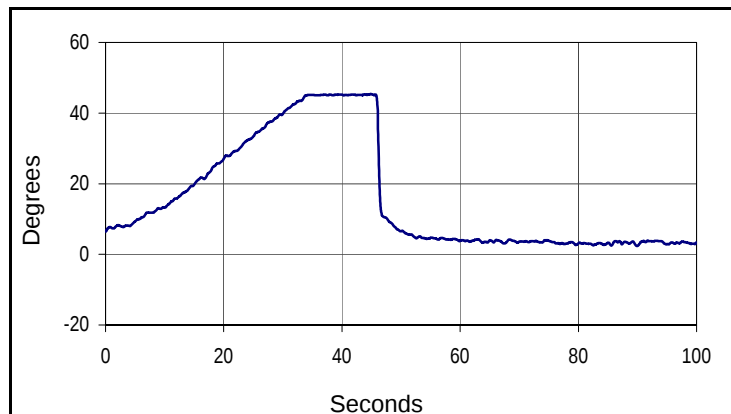
| Tested Parameter                   |     | Units   | Specification  | Result | Pass/Fail |
|------------------------------------|-----|---------|----------------|--------|-----------|
| Dummy Soak Time                    |     | Minutes | ≥240           | 440    | Pass      |
| Temperature During Soak            | Max | °C      | 18.9 to 25.6   | 21.5   | Pass      |
|                                    | Min | °C      |                | 21.2   | Pass      |
| Humidity During Soak               | Max | %       | 10.0 to 70.0   | 36.5   | Pass      |
|                                    | Min | %       |                | 31.3   | Pass      |
| Laboratory Temperature During Test |     | °C      | 18.9 to 25.6   | 21.3   | Pass      |
| Laboratory Humidity During Test    |     | %       | 10.0 to 70.0   | 33.5   | Pass      |
| Initial Reference Plane Angle      |     | Degrees | ≤ 20           | 6.4    | Pass      |
| Peak Force at 45° +/-0.5°          |     | Newtons | 320.0 to 390.0 | 361.9  | Pass      |
| Torso Rotation Rate                |     | deg/sec | 0.5 to 1.5     | 1.0    | Pass      |
| Final Reference Plane Angle        |     | Degrees | +/-8           | 3.4    | Pass      |
| Overall Test Results               |     |         |                | Pass   |           |



## Curve Description

## Force vs Torso Rotation

| Plot No.   | Type | Filter Freq   |
|------------|------|---------------|
| 001        | FIL  | 1 Hz          |
| Peak Force |      | Peak Rotation |
| 361.9      |      | 45.4          |



## Curve Description

## Torso Rotation

| Plot No. | Type | Filter Freq | Units   |
|----------|------|-------------|---------|
| 002      | FIL  | 1 Hz        | Degrees |
| Max      | Time | Min         | Time    |
| 45.4     | 44.9 | 2.4         | 89.9    |