

**REPORT NUMBER: SINCAP-KAR-19-005**

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

**FCA US, LLC.**

**2019 RAM 1500 CLASSIC EXPRESS QUAD CAB 4-DOOR TRUCK**

**NHTSA No: M20190314**

**PREPARED BY:**

**APPLUS IDIADA KARCO ENGINEERING, LLC.**

**9270 HOLLY ROAD**

**ADELANTO, CA 92301**



**OCTOBER 24, 2018**

**FINAL REPORT**

**PREPARED FOR:**

**U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF CRASHWORTHINESS STANDARDS**

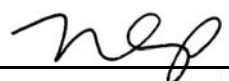
**MAIL CODE: NRM-110**

**1200 NEW JERSEY AVE, SE, ROOM W43-410  
WASHINGTON, D.C. 20590**

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NHTSA, Office of Crashworthiness Standards

Date: 

## TECHNICAL REPORT DOCUMENTATION PAGE

| <b>1. Report No.</b><br>SINCAP-KAR-19-005                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <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<br>Side Impact MDB Testing of a 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck<br>NHTSA No. M20190314                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    | <b>5. Report Date</b><br>October 24, 2018                                               |                         |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
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| <b>7. Authors</b><br>Mr. Malo L. Taua'ese, Engineering Technician, Applus IDIADA KARCO<br>Mr. Steven D. Matsusaka, Engineering Manager, Applus IDIADA KARCO                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                    | <b>8. Performing Organization Report No.</b><br>TR-P38301-01-NC                         |                         |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| <b>9. Performing Organization Name and Address</b><br>Applus IDIADA 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 (NRM-110)<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, October 10- 24, 2018 |                         |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
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| <b>15. Supplementary Notes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                    |                                                                                         |                         |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| <b>16. Abstract</b><br><p>A 55 / 28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck in accordance with the specifications of the Office of Crash Worthiness Standards Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the Applus IDIADA KARCO Engineering, LLC. facility in Adelanto, California on October 10, 2018.</p> <p>The impact velocity of the Moving Deformable Barrier was 62.08 km/h and the outside ambient temperature at the struck (driver's) side of the vehicle was 22.2° C. The target vehicle's maximum post-test static crush was 339 mm located at level 1. The test vehicle's occupant performance data is as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (ES-2re)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>36</sub>)</td> <td></td> <td>1000</td> <td>19.7</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>44</td> <td>17</td> </tr> <tr> <td>Total Abdominal Force</td> <td>N</td> <td>2500</td> <td>541</td> </tr> <tr> <td>Pubic Symphysis Force</td> <td>N</td> <td>6000</td> <td>917</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Passenger ATD (SID-ILs)</th> </tr> <tr> <th>Units</th> <th>IARV</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>36</sub>)</td> <td></td> <td>1000</td> <td>46.5</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>23</td> </tr> <tr> <td>Total Pelvic Force (Sum of Acetubular and Iliac Forces)</td> <td>N</td> <td>5525</td> <td>733</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>8</td> </tr> <tr> <td>Maximum Abdominal Rib Deflection</td> <td>mm</td> <td>45*</td> <td>1</td> </tr> </tbody> </table> <p>The doors on the struck side of the vehicle did not separate from the body at the hinges or latches. The opposite side doors did not open during the side impact event.</p> |                                    |                                                                                         | Measurement Description | Driver ATD (ES-2re) |  |  | Units | IARV | Result | Head Injury Criteria (HIC <sub>36</sub> ) |  | 1000 | 19.7 | Maximum Thoracic Rib Deflection | mm | 44 | 17 | Total Abdominal Force | N | 2500 | 541 | Pubic Symphysis Force | N | 6000 | 917 | Measurement Description | Passenger ATD (SID-ILs) |  |  | Units | IARV | Result | Head Injury Criteria (HIC <sub>36</sub> ) |  | 1000 | 46.5 | Resultant Lower Spine Acceleration | g | 82 | 23 | Total Pelvic Force (Sum of Acetubular and Iliac Forces) | N | 5525 | 733 | Maximum Thoracic Rib Deflection | mm | 38* | 8 | Maximum Abdominal Rib Deflection | mm | 45* | 1 |
| Measurement Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Driver ATD (ES-2re)                |                                                                                         |                         |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
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| Head Injury Criteria (HIC <sub>36</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                    | 1000                                                                                    | 19.7                    |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Maximum Thoracic Rib Deflection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | mm                                 | 44                                                                                      | 17                      |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Total Abdominal Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N                                  | 2500                                                                                    | 541                     |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Pubic Symphysis Force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N                                  | 6000                                                                                    | 917                     |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Measurement Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Passenger ATD (SID-ILs)            |                                                                                         |                         |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
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| Head Injury Criteria (HIC <sub>36</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                    | 1000                                                                                    | 46.5                    |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Resultant Lower Spine Acceleration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | g                                  | 82                                                                                      | 23                      |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Total Pelvic Force (Sum of Acetubular and Iliac Forces)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N                                  | 5525                                                                                    | 733                     |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Maximum Thoracic Rib Deflection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | mm                                 | 38*                                                                                     | 8                       |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |
| Maximum Abdominal Rib Deflection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | mm                                 | 45*                                                                                     | 1                       |                     |  |  |       |      |        |                                           |  |      |      |                                 |    |    |    |                       |   |      |     |                       |   |      |     |                         |                         |  |  |       |      |        |                                           |  |      |      |                                    |   |    |    |                                                         |   |      |     |                                 |    |     |   |                                  |    |     |   |

\* Proposed IARV

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|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>17. Key Words</b><br>New Car Assessment Program (NCAP)<br>Side Impact<br>Moving Deformable Barrier (MDB)<br>ES-2re<br>SID-IIs |                                                                 | <b>18. Distribution Statement</b><br>Copies of this report are available from:<br>National Highway Traffic Safety Administration<br>Technical Information Services Division, NPO-411<br>1200 New Jersey Ave., SE<br>Washington, DC 20590<br>e-mail: <a href="mailto:tis@nhtsa.dot.gov">tis@nhtsa.dot.gov</a><br>FAX 202-493-2833 |                  |
| <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>151                                                                                                                                                                                                                                                                                                   | <b>22. Price</b> |

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## **SECTION 1**

### **TEST PURPOSE AND PROCEDURE**

This moving deformable barrier side impact test is part of the MY 2019 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under contract number DTNH22-14-D-00355L. The purpose of this test is to generate comparative side impact performance in a 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Laboratory Test Procedure dated October 2015.

## **SECTION 2**

### **SUMMARY OF TEST RESULTS**

A 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 62.08 km/h (38.57 mph). The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by Applus IDIADA KARCO Engineering, LLC. in Adelanto, California, on October 10, 2018. Pre- and post-test photographs of the test vehicle, the MDB and the dummy (ES-2re and SID-IIs) are included in Appendix A of this report.

The dummies were placed in the driver and left rear designated seating position according to instructions specified in the OCWS Side Impact Laboratory Test Procedure, dated October 2015. The side impact event was documented by 11 cameras. Camera locations are included in Data Sheet No. 5 of this report.

The dummies were instrumented in the following manner:

**DRIVER ATD (ES-2re)**

Primary and redundant head CG tri-axial accelerometers

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen forward, middle, and rear y-axis load cells

Lower spine (12) tri-axial accelerometers

Pubic symphysis y-axis load cell

**PASSENGER ATD (SID-IIs)**

Primary and redundant head CG tri-axial accelerometers

Chest upper rib, middle rib and lower rib y-axis displacement potentiometers

Abdomen upper rib and lower rib y-axis displacement potentiometers

Lower spine (12) tri-axial accelerometers

Acetabulum and iliac wing y-axis load cells

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D of this report contains the test equipment and instrumentation calibration data.

Dummy injury readings were recorded as follows:

| Measurement Description                   | Units | Driver ATD (ES-2re) |        |
|-------------------------------------------|-------|---------------------|--------|
|                                           |       | Threshold           | Result |
| Head Injury Criteria (HIC <sub>36</sub> ) |       | 1000                | 19.7   |
| Maximum Thoracic Rib Deflection           | mm    | 44                  | 17     |
| Combined Abdominal Force                  | N     | 2500                | 541    |
| Pubic Symphysis Force                     | N     | 6000                | 917    |

| Measurement Description                                 | Units | Passenger ATD (SID-IIs) |        |
|---------------------------------------------------------|-------|-------------------------|--------|
|                                                         |       | Threshold               | Result |
| Head Injury Criteria (HIC <sub>36</sub> )               |       | 1000                    | 46.5   |
| Lower Spine (T12) Resultant Acceleration                | g     | 82                      | 23     |
| Total Pelvic Force (sum of acetabular and iliac forces) | N     | 5525                    | 733    |
| Maximum Thoracic Rib Deflection                         | mm    | 38*                     | 8      |
| Maximum Abdominal Rib Deflection                        | mm    | 45*                     | 1      |

\*Proposed IARV

Supplemental restraint information is given below:

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

## GENERAL COMMENTS

The doors on the struck side of the vehicle remained closed and latched. There was no separation at the hinges or latches. The doors on the non-struck side remained closed and latched. There was no ATD value that exceeded its limit.

### SECTION 3

#### OCCUPANT AND VEHICLE INFORMATION/DATA SHEETS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

#### 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: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

### TEST VEHICLE INFORMATION AND OPTIONS

|                            |                     |
|----------------------------|---------------------|
| NHTSA Number               | M20190314           |
| Model Year                 | 2019                |
| Make                       | RAM                 |
| Model                      | 1500                |
| Body Style                 | 4-Door Truck        |
| VIN                        | 1C6RR6FG6KS521307   |
| Body Color                 | Delmonico Red Pearl |
| Odometer Reading (km / mi) | 27 / 17             |
| Engine Displacement (L)    | 3.6                 |
| Type / No. of Cylinders    | V6                  |
| Engine Placement           | Longitudinal        |
| Transmission Type          | Automatic           |
| Transmission Speeds        | 8                   |
| Overdrive                  | Yes                 |
| Final Drive                | RWD                 |
| Roof Rack                  | No                  |
| Sunroof / T-Top            | No                  |
| Running Boards             | No                  |
| Tilt Steering Wheel        | Yes                 |
| Power Seats                | No                  |
| Anti-Lock Brakes (ABS)     | Yes                 |

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

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

Yes

### DATA FROM CERTIFICATION LABEL

|                     |              |
|---------------------|--------------|
| Manufactured By     | FCA US, LLC. |
| Date of Manufacture | Aug-18       |
| Vehicle Type        | Truck        |

|                 |      |
|-----------------|------|
| GVWR (kg)       | 3085 |
| GAWR Front (kg) | 1679 |
| GAWR Rear (kg)  | 1770 |

### VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

| Measured Parameter          | Front | Rear | Third | Total  |     |
|-----------------------------|-------|------|-------|--------|-----|
| Designated Seating Capacity | 3     | 3    |       | 6      |     |
| Capacity Weight (VCW) (kg)  |       |      |       | 825.0  | A   |
| DSC x 68.04 (kg)            |       |      |       | 408.2  | B   |
| Cargo Weight (RCLW) (kg)    |       |      |       | 136.0* | A-B |

\*For trucks or MPVs, if A-B > 136.0kg, RCLW = 136.0kg

### VEHICLE SEAT TYPE

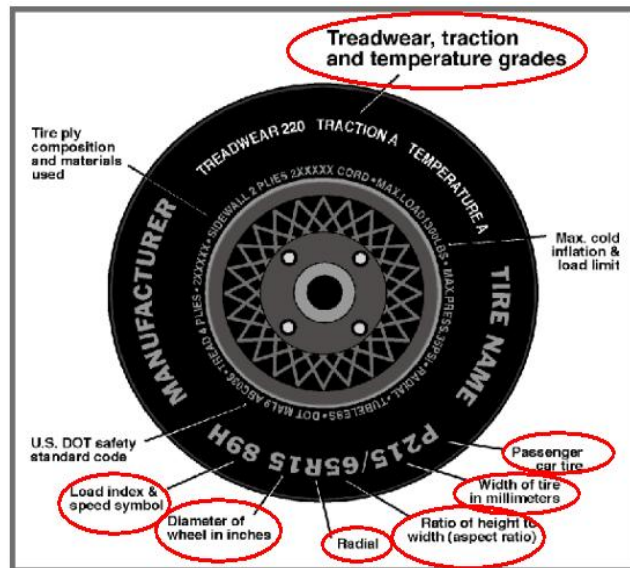
| Seating Location        | Type of Seat Pan |       |             |           | Type of Seat Back |            |         |
|-------------------------|------------------|-------|-------------|-----------|-------------------|------------|---------|
|                         | Bucket           | Bench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

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

### GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



| Measured Parameter       | Front                | Rear                 |
|--------------------------|----------------------|----------------------|
| Max. Tire Pressure (kpa) | 300                  | 300                  |
| Cold Pressure (kPa)      | 270                  | 270                  |
| Recommended Tire Size    | P275/60R20           | P275/60R20           |
| Tire Size on Vehicle     | P275/60R20           | P275/60R20           |
| Tire Manufacturer        | Good Year            | Good Year            |
| Tire Model               | Wrangler SR-A        | Wrangler SR-A        |
| Treadware                | 500                  | 500                  |
| Traction Grade           | A                    | A                    |
| Temperature Grade        | B                    | B                    |
| Tire Plies Sidewall      | 2 Polyester          | 2 Polyester          |
| Tire Plies Body          | 2 Polyester, 2 Steel | 2 Polyester, 2 Steel |
| Load Index/Speed Symbol  | 114S                 | 114S                 |
| Tire Material            | Polyester, Steel     | Polyester, Steel     |
| DOT Safety Code Left     | M6YN JD1R 3118       | M6YN JD1R 3118       |
| DOT Safety Code Right    | M6YN JD1R 3118       | M6YN JD1R 3118       |

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

## GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

### TIRE PRESSURES

|                | Units | LF  | RF  | LR  | RR  |
|----------------|-------|-----|-----|-----|-----|
| As Delivered   | kPa   | 270 | 270 | 270 | 270 |
| Tire Placard   | kPa   | 270 | 270 | 270 | 270 |
| Owner's Manual | kPa   | 270 | 270 | 270 | 270 |
| As Tested      | kPa   | 270 | 270 | 270 | 270 |

### MDB TIRE SPECIFICATIONS

|               | Units | Requirement | LF         | RF         | LR         | RR         |
|---------------|-------|-------------|------------|------------|------------|------------|
| Tire Size     |       | P205/75R15  | P205/75R15 | P205/75R15 | P205/75R15 | P205/75R15 |
| Tire Pressure | kPa   | 200 ± 21    | 200        | 200        | 200        | 200        |

### TEST VEHICLE AXLE WEIGHTS

|       | Units | As Delivered (UVW) |        |        | As Tested (ATW) |        |        | Fully Loaded |        |        |
|-------|-------|--------------------|--------|--------|-----------------|--------|--------|--------------|--------|--------|
|       |       | Front              | Rear   | Total  | Front           | Rear   | Total  | Front        | Rear   | Total  |
| Left  | kg    | 618.0              | 527.5  |        | 650.5           | 635.0  |        | 678.5        | 666.5  |        |
| Right | kg    | 629.5              | 480.5  |        | 650.5           | 572.5  |        | 609.0        | 566.5  |        |
| Ratio | %     | 55.3%              | 44.7%  | 100.0% | 51.9%           | 48.1%  | 100.0% | 51.1%        | 48.9%  | 100.0% |
| Total | kg    | 1247.5             | 1008.0 | 2255.5 | 1301.0          | 1207.5 | 2508.5 | 1287.5       | 1233.0 | 2520.5 |

### TARGET TEST WEIGHT CALCULATION

| Measured Parameter                  | Units | Value  |       |
|-------------------------------------|-------|--------|-------|
| Total Delivered Weight (UVW)        | kg    | 2255.5 | A     |
| Actual Weight of 2 P572 ATD Used    | kg    | 125.0  | B     |
| Rated Cargo/Luggage Wt (RCLW)       | kg    | 136.0  | C     |
| Calculated Vehicle Target Wt (TVTW) | kg    | 2516.5 | A+B+C |

Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight -4.5 kg to -9.0 kg)? ☒ Yes ☐ No

### TEST VEHICLE ATTITUDE AND CG

| Measurement Description                                      | Units | Fully Loaded | As Tested | Meets Requirement*** |
|--------------------------------------------------------------|-------|--------------|-----------|----------------------|
| LF                                                           | mm    | 951          | 942       | Yes                  |
| RF                                                           | mm    | 967          | 962       | Yes                  |
| LR                                                           | mm    | 958          | 966       | Yes                  |
| RR                                                           | mm    | 988          | 978       | Yes                  |
| Vehicle CG (Aft of Front Axle)                               | mm    | 1742         | 1714      |                      |
| Vehicle CG (Left (+)/Right (-) from Longitudinal Centerline) | mm    | 59           | 22        |                      |

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

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

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

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

| Component Description     | Weight (kg) |
|---------------------------|-------------|
| Spare tire Tools          | 3.5         |
|                           |             |
| Ballast / Equipment Added | 132.5       |

|                                                |  |
|------------------------------------------------|--|
| Test Height Adjustable Setting (If Applicable) |  |
|------------------------------------------------|--|

**DATA SHEET NO. 2****SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA**Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18**SEAT POSITIONING**

The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the mid-track, lowest, mid-angle position. The struck side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rearmost, lowest, mid-angle position.

**SCRL ANGLE RANGE**

| Seat                      | SCRL (°) |       |       |
|---------------------------|----------|-------|-------|
|                           | Max      | Min   | Mid   |
| Driver Seat               | Fixed    | Fixed | Fixed |
| Front Passenger Seat      | Fixed    | Fixed | Fixed |
| Front Center Seat         |          |       |       |
| Struck Side Rear Seat     | Fixed    | Fixed | Fixed |
| Non-Struck Side Rear Seat | Fixed    | Fixed | Fixed |
| Rear Center Seat          | Fixed    | Fixed | Fixed |

**SEAT HEIGHT AND ANGLE**

| Seat                      | As Tested SCRL Angle (Mid) (°) | As Tested SCRP Height (mm) | SCRP Height Position | SCRP Height (mm) |              |             |
|---------------------------|--------------------------------|----------------------------|----------------------|------------------|--------------|-------------|
|                           |                                |                            |                      | Rearmost         | Mid Fore/Aft | Forwardmost |
| Driver Seat               | Fixed                          | 888                        | Max                  |                  |              |             |
|                           |                                |                            | Mid                  | 877              | 888          | 898         |
|                           |                                |                            | Min                  |                  |              |             |
| Front Passenger Seat      | Fixed                          | 949                        | Max                  |                  |              |             |
|                           |                                |                            | Mid                  | 928              | 949          | 950         |
|                           |                                |                            | Min                  |                  |              |             |
| Front Center Seat         | Fixed                          | Fixed                      | Max                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Mid                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Min                  | Fixed            | Fixed        | Fixed       |
| Struck Side Rear Seat     | Fixed                          | Fixed                      | Max                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Mid                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Min                  | Fixed            | Fixed        | Fixed       |
| Non-Struck Side Rear Seat | Fixed                          | Fixed                      | Max                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Mid                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Min                  | Fixed            | Fixed        | Fixed       |
| Rear Center Seat          | Fixed                          | Fixed                      | Max                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Mid                  | Fixed            | Fixed        | Fixed       |
|                           |                                |                            | Min                  | Fixed            | Fixed        | Fixed       |

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

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

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

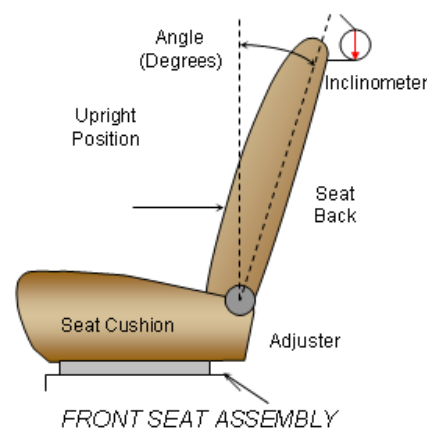
#### SEAT FORE/AFT POSITION

| Seat                      | Total Fore/Aft Travel |          | Test Position From Forwardmost Position |         |
|---------------------------|-----------------------|----------|-----------------------------------------|---------|
|                           | mm                    | Detents* | mm                                      | Detent* |
| Driver Seat               | 230                   | 24       | 115                                     | 12      |
| Front Passenger Seat      | 230                   | 24       | 115                                     | 12      |
| Front Center Seat         | Fixed                 | Fixed    | Fixed                                   | Fixed   |
| Struck Side Rear Seat     | Fixed                 | Fixed    | Fixed                                   | Fixed   |
| Non-Struck Side Rear Seat | Fixed                 | Fixed    | Fixed                                   | Fixed   |
| Rear Center Seat          | Fixed                 | Fixed    | Fixed                                   | Fixed   |

\*Detent zero (0) is the forward most detent

#### SEAT BACK ADJUSTMENT

The driver's seat back is positioned to the manufacturer's designated design angle. The right front passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is fixed. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck side rear seat back. Seat back angle is measured using the outboard head restraint post.



#### SEAT BACK POSITION

| Seat                                 | Total Seat Back Angle Range |          | Test Position from Most Upright |         |
|--------------------------------------|-----------------------------|----------|---------------------------------|---------|
|                                      | Degrees                     | Detents* | Degree                          | Detent* |
| Driver Seat w/ Seated Dummy          | 54.8                        | 24       | 9.7                             | 10      |
| Front Passenger Seat                 | 66.9                        | 26       | 10.2                            | 10      |
| Front Center Seat                    | Fixed                       | Fixed    | Fixed                           | Fixed   |
| Struck Side Rear Seat w/Seated Dummy | Fixed                       | Fixed    | Fixed                           | Fixed   |
| Non-Struck Side Rear Seat            | Fixed                       | Fixed    | Fixed                           | Fixed   |
| Rear Center Seat                     | Fixed                       | Fixed    | Fixed                           | Fixed   |

\*Detent zero (0) is the forward most detent

**DATA SHEET NO. 2 ... (CONTINUED)****SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA**Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18**SEAT BELT ANCHORAGE ADJUSTMENT**

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. The positions are marked H, M1,..., L from top to bottom.

|             | Total No. of Positions | Placed in Position |
|-------------|------------------------|--------------------|
| Driver Seat | 4                      | M1                 |
| Rear Seat   | Fixed                  | Fixed              |

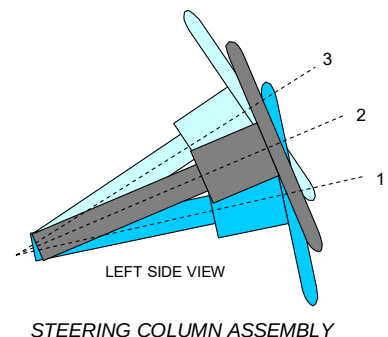
**HEAD RESTRAINT ADJUSTMENT**

The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

|             | Total No. of Positions | Placed in Position |
|-------------|------------------------|--------------------|
| Driver Seat | 3                      | H                  |
| Rear Seat   | 2                      | L                  |

**STEERING COLUMN ADJUSTMENT**

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



|                                   | Degrees | Fore-Aft Position (mm) |
|-----------------------------------|---------|------------------------|
| Lowermost - Position 1            | 14.7    |                        |
| Geometric Center - Position 2     | 23.2    |                        |
| Uppermost - Position 3            | 31.6    |                        |
| Telescoping Steering Wheel Travel |         |                        |
| Test Position                     | 23.2    |                        |

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

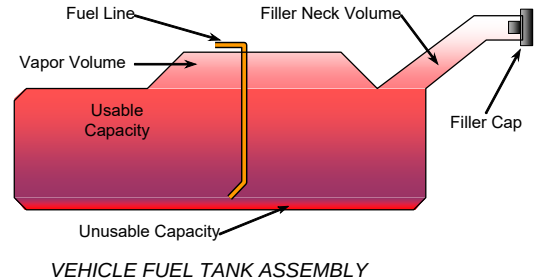
### SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

#### FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump operates for a few seconds after the ignition switch is turned ON. After that, the fuel pump operates only while the engine is running.



#### FUEL TANK CAPACITY

| Description                                             | Liters |
|---------------------------------------------------------|--------|
| Usable Capacity of "Standard Tank" (see Form No. 1)     | 98.42  |
| Usable Capacity of "Optional Tank" (see Form No. 1)     | 121.13 |
| Usable Capacity of "Standard Tank" (see Owner's Manual) | 98.42  |
| Usable Capacity of "Optional Tank" (see Owner's Manual) | 121.13 |
| 93% of Usable Capacity                                  | 112.54 |
| Actual amount of Solvent Used in Test                   | 121.13 |
| 1/3 of Usable Capacity                                  | 32.77  |

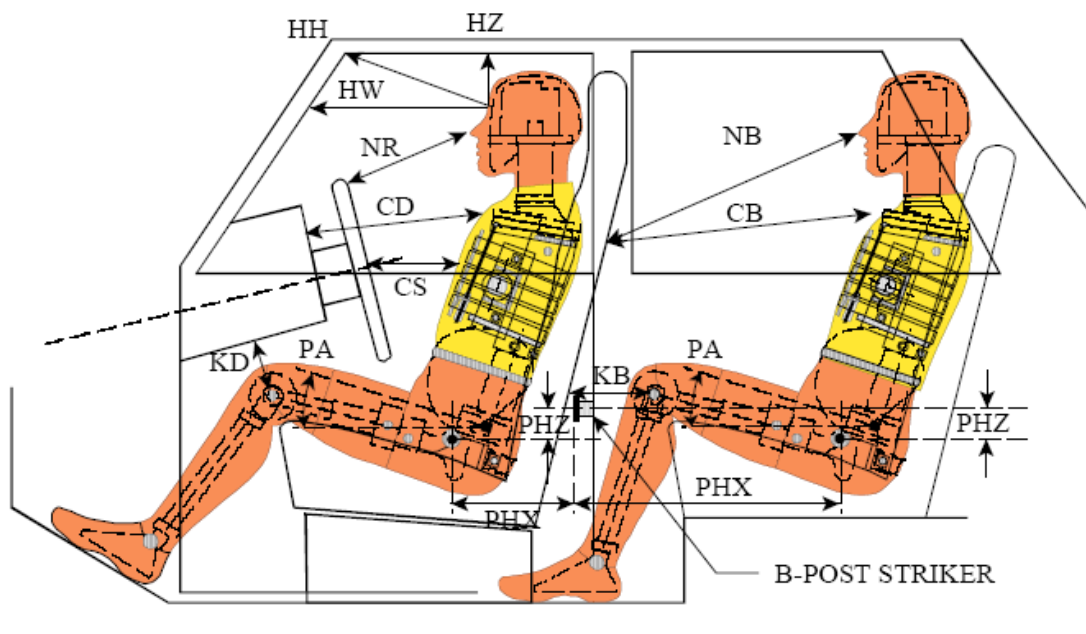
Is the Actual Amount of Solvent Used in the test equal to 93%  $\pm$  1% of the Usable Capacity stated in the Form No. 1? ☒ Yes ☐ No

### DATA SHEET NO. 3

#### DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



**LEFT SIDE VIEW**

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

#### DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION

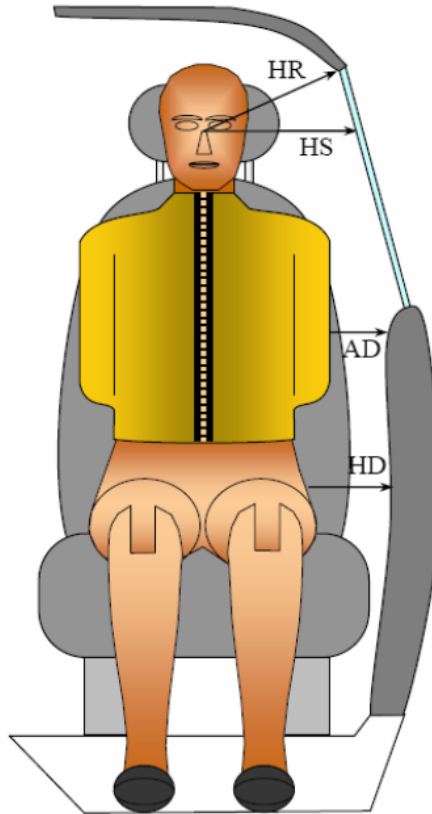
| Driver Code   | Pass. Code    | Description                   | Driver      |           | Passenger   |           |
|---------------|---------------|-------------------------------|-------------|-----------|-------------|-----------|
|               |               |                               | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| HH            |               | Head to Header                | 493         |           |             |           |
| HW            |               | Head to Windshield            | 691         |           |             |           |
| HZ            | HZ            | Head to Roof                  | 226         |           | 298         |           |
| NR            | NB            | Nose to Rim/Seat Back         | 503         |           | 425         |           |
| CD            | CB            | Chest to Dash/Seat Back       | 631         |           | 417         |           |
| CS            |               | Chest to Steering Wheel       | 401         |           |             |           |
| KD(L)/KDA(L)° | KB(L)/KBA(L)° | Left Knee to Dash/Seat Back   | 145         | 23.4      | 188         | 21.8      |
| KD(R)/KDA(R)° | KB(R)/KBA(R)° | Right Knee to Dash/Seat Back  | 114         | 24.3      | 182         | 18.8      |
| PAX°          | PAX°          | Pelvic Tilt Angle X           |             | 16.6      |             | 18.1      |
|               | PAY°          | Pelvic Tilt Angle Y           |             | 0.1       |             | 0.1       |
| PHX           | PHX           | Hip Point to Striker (x-axis) | 182         |           | 162         |           |
| PHZ           | PHZ           | Hip Point to Striker (z-axis) | 14          |           | 43          |           |

## DATA SHEET NO. 4

### DUMMY LATERAL CLEARANCE DIMENSIONS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



### DUMMY LATERAL CLEARANCE DIMENSION INFORMATION

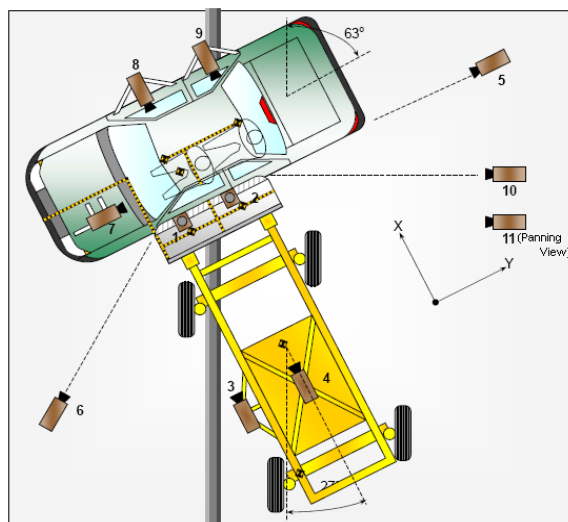
| Code | Measurement Description | Units | Driver | Passenger |
|------|-------------------------|-------|--------|-----------|
| HR   | Head to Side Header     | mm    | 208    | 255       |
| HS   | Head to Side Window     | mm    | 360    | 355       |
| AD   | Arm to Door             | mm    | 113    | 150       |
| HD   | H-Point to Door         | mm    | 148    | 176       |

## DATA SHEET NO. 5

### CAMERA AND INSTRUMENTATION DATA

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



### CAMERA LOCATIONS AND DATA

| No. | View                      | Coordinates (mm) |       |       | Lens Length (mm) | Operating Frame Rate (fps) |
|-----|---------------------------|------------------|-------|-------|------------------|----------------------------|
|     |                           | X                | Y     | Z     |                  |                            |
| 1   | Overhead Overall          | 1220             | 2287  | -5486 | 14               | 1000                       |
| 2   | Overhead Close-Up         | 609              | 2287  | -5102 | 35               | 1000                       |
| 3   | Left Impact Point (MDB)   | -2134            | 0     | -1143 | 25               | 1000                       |
| 4   | Side Overall (MDB)        | -3912            | 838   | -1829 | 12.5             | 1000                       |
| 5   | Rear                      | -64              | 2485  | -1348 | 85               | 1000                       |
| 6   | Left Front                | -2266            | -3564 | -1475 | 24               | 1000                       |
| 7   | Driver Front (On-Board)   | 711              | -878  | 800   | 8.5              | 1000                       |
| 8   | Driver Side (On-Board)    | 1836             | 625   | 520   | 8.5              | 1000                       |
| 9   | Passenger Side (On-Board) | 1820             | 1549  | 568   | 8.5              | 1000                       |
| 10  | Real Time Overall         |                  |       |       | Zoom             | 30                         |
| 11  | Real Time Inrun           |                  |       |       | Zoom             | 30                         |

Reference: Impact Point Projected to Ground; +X = To Front of MDB, +Y = To Right of MDB, +Z = Down

\*All measurements accurate to  $\pm 6$  mm

### INSTRUMENTATION

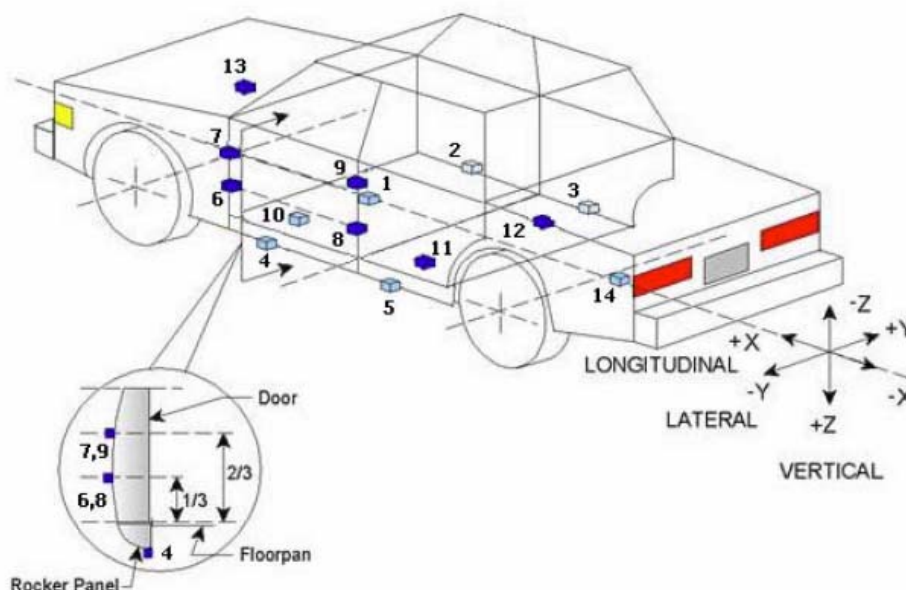
|                                  |    |
|----------------------------------|----|
| Driver Dummy Channels            | 16 |
| Passenger Dummy Channels         | 19 |
| Vehicle Structure Accelerometers | 23 |
| MDB Accelerometers               | 5  |
| Total                            | 63 |

## DATA SHEET NO. 6

### TEST VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



### VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

| Loc. No. | Sensor Description              | Coordinates (mm) |      |       |
|----------|---------------------------------|------------------|------|-------|
|          |                                 | X                | Y    | Z     |
| 1        | Vehicle CG                      | 3100             | 0    | -645  |
| 2        | Right Sill at Front Seat        | 3660             | 860  | -600  |
| 3        | Right Sill at Rear Seat         | 2600             | 860  | -600  |
| 4        | Left Sill at Front Door         | 3460             | -910 | -370  |
| 5        | Left Sill at Rear Door          | 2800             | -910 | -370  |
| 6        | A-Pillar Lower                  | 4120             | -940 | -610  |
| 7        | A-Pillar Middle                 | 4120             | -940 | -810  |
| 8        | B-Pillar Lower                  | 3100             | -900 | -800  |
| 9        | B-Pillar Middle                 | 3100             | -900 | -1090 |
| 10       | Front Seat Track                | 3460             | -680 | -740  |
| 11       | Rear Seat Structure             | 2740             | -550 | -760  |
| 12       | Right Rear Occupant Compartment | 2740             | 550  | -760  |
| 13       | Engine Block                    | 4920             | 150  | 1000  |
| 14       | Rear Floorpan Above Axle        | 2250             | 0    | -790  |

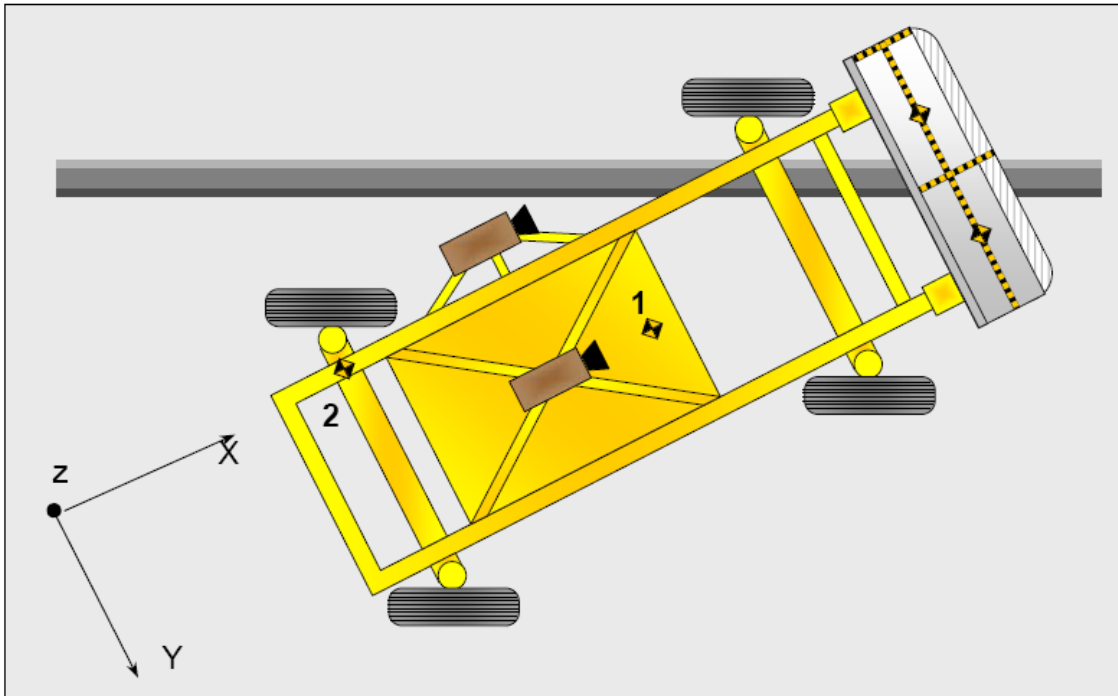
Reference: X – Rear surface of vehicle (+ forward)  
 Y – Vehicle centerline (+ to right)  
 Z – Ground plane (+ down)

## DATA SHEET NO. 7

### MDB ACCELEROMETER LOCATIONS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



### MDB ACCELEROMETER LOCATIONS

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

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

**DATA SHEET NO. 8**  
**POST-TEST OBSERVATIONS**

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314  
 Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

**TEST DUMMY INFORMATION AND CONTACT POINTS**

| Dummy Body Part   | Front Seat Dummy (ES-2re)   | Rear Seat Dummy (SID-IIs)   |
|-------------------|-----------------------------|-----------------------------|
| Face              | None                        | Curtain Airbag              |
| Top of Head       | Side Header                 | Curtain Airbag, Side Header |
| Left Side of Head | Curtain Airbag, Side Header | Curtain Airbag              |
| Back of Head      | Side Header, Headrest       | Curtain Airbag, Headrest    |
| Left Shoulder     | Curtain Airbag              | Door Panel                  |
| Upper Torso       | Side Airbag, Seat           | None                        |
| Lower Torso       | Side Airbag, Seat           | Door Panel                  |
| Left Hip          | Seat                        | Seat                        |
| Left Knee         | Door Panel                  | Door Panel                  |

**POST-TEST DOOR PERFORMANCE**

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

**DATA SHEET NO. 8 ... (CONTINUED)****POST-TEST OBSERVATIONS**Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18**POST-TEST SEAT PERFORMANCE**

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

**POST-TEST STRUCTURAL OBSERVATIONS**

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

**DATA SHEET NO. 8 ... (CONTINUED)****POST-TEST OBSERVATIONS**Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

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

**IMPACT POINT LOCATION DATA**

| Measured Parameter                                                        | Units | Tolerance                     | Value |
|---------------------------------------------------------------------------|-------|-------------------------------|-------|
| Vehicle Wheel Base                                                        | mm    |                               | 3561  |
| Vertical Impact Reference Line (Aft of Front Axle)(Intended Impact Point) | mm    |                               | 508   |
| Actual Impact Point (Aft of Front Axle)                                   | mm    |                               | 501   |
| Horizontal Offset (+ forward / - rearward)                                | mm    | ± 50 of Intended Impact Point | 7     |
| Vertical Offset (+ down / - up)                                           | mm    | ± 20 of Intended Impact Point | 9     |

**DATA SHEET NO. 9****MDB SUMMARY OF RESULTS**Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18**MDB SPECIFICATIONS**

| Measurement Description                 | Length (mm) |
|-----------------------------------------|-------------|
| Overall Width of Framework Carriage     | 1251        |
| Overall Length including Honeycomb Face | 4115        |
| Wheel Base of Framework Carriage        | 2595        |
| CG location aft of Front Axle           | 1118        |

**MDB WEIGHTS**

|        | Units | Front Axle | Rear Axle | Total  |
|--------|-------|------------|-----------|--------|
| Left   | kg    | 402.0      | 298.0     | 700.0  |
| Right  | kg    | 377.0      | 290.0     | 667.0  |
| Ratio  | %     | 57.0%      | 43.0%     | 100.0% |
| Totals | kg    | 779.0      | 588.0     | 1367.0 |

**SPEED AND IMPACT DATA**

| Measured Parameter                              | Units   | Requirement  | Value |
|-------------------------------------------------|---------|--------------|-------|
| Trap No. 1 Velocity (Primary)                   | km/h    | 61.1 to 62.7 | 62.08 |
| Trap No. 2 Velocity (Redundant)                 | km/h    | 61.1 to 62.7 | 62.04 |
| MDB CL to Target Vehicle CL                     | degrees | 88.5 to 91.5 | 90.2  |
| MDB Forward Line of Motion to Target Vehicle CL | degrees | 62.5 to 63.5 | 62.9  |
| MDB Crabbed Angle to MDB Forward Line of Motion | degrees | 26.0 to 28.0 | 27.4  |

**MAXIMUM STATIC CRUSH OF HONEYCOMB FACE**

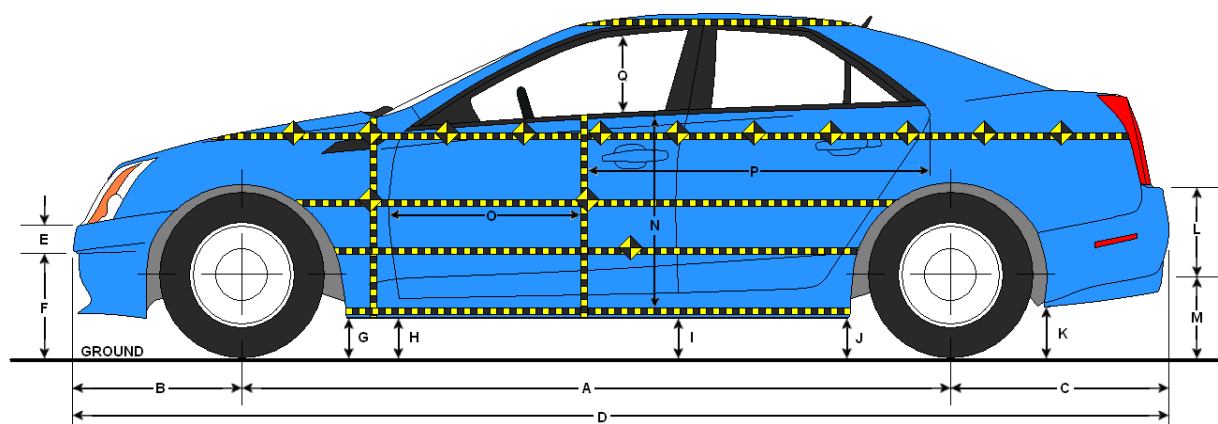
| Vertical Location |                  |             | From Centerline |           | Max. Crush (mm) |
|-------------------|------------------|-------------|-----------------|-----------|-----------------|
| Row               | Description      | Height (mm) | Distance (mm)   | Direction |                 |
| A                 | Center of Bumper | 432         | 800             | Left      | 114             |
| B                 | Top of Bumper    | 533         | 800             | Left      | 120             |
| C                 | Mid Level        | 686         | 800             | Right     | 140             |
| D                 | Top of Stack     | 813         | 800             | Right     | 222             |

## DATA SHEET NO. 10

### TEST VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



**LEFT SIDE VIEW**

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

| Code | Description                                | Pre-Test | Post-Test | Difference |
|------|--------------------------------------------|----------|-----------|------------|
| A    | Wheelbase                                  | 3561     | 3551      | -10        |
| B    | Front Axle to FSOV                         | 1025     | 1049      | 24         |
| C    | Rear Axle to RSOV                          | 1237     | 1217      | -20        |
| D    | Total Length at Centerline                 | 5822     | 5816      | -6         |
| E    | Front Bumper Thickness                     | 129      | 128       | -1         |
| F    | Front Bumper Bottom to Ground              | 564      | 554       | -10        |
| G    | Sill Height at Front Wheel Well            | 463      | 458       | -5         |
| H    | Sill Height at Front Door Leading Edge     | 406      | 396       | -10        |
| I    | Sill Height at B-Pillar                    | 479      | 448       | -31        |
| J1   | Sill Height at Rear Wheel Well             | 408      | 417       | 9          |
| J2   | Pinch Weld Height at Rear Wheel Well       | 381      | 415       | 34         |
| K    | Sill Height Aft of Rear Wheel Well         | 470      | 489       | 19         |
| L    | Rear Bumper Thickness                      | 200      | 199       | -1         |
| M    | Rear Bumper Bottom to Ground               | 523      | 543       | 20         |
| N    | Sill Height to Bottom of Front Window Sill | 881      | 818       | -63        |
| O    | Front Door Leading Edge to Impact CL       | 801      | 796       | -5         |
| P    | Rear Door Trailing Edge to Impact CL       | 1117     | 1097      | -20        |
| Q    | Front Window Opening                       | 495      | 521       | 26         |
| R    | Right Side Length                          | 4810     | 4832      | 22         |
| S    | Left Side Length                           | 4823     | 4791      | -32        |
| T    | Vehicle Width at B-Pillar                  | 2014     | 1913      | -101       |

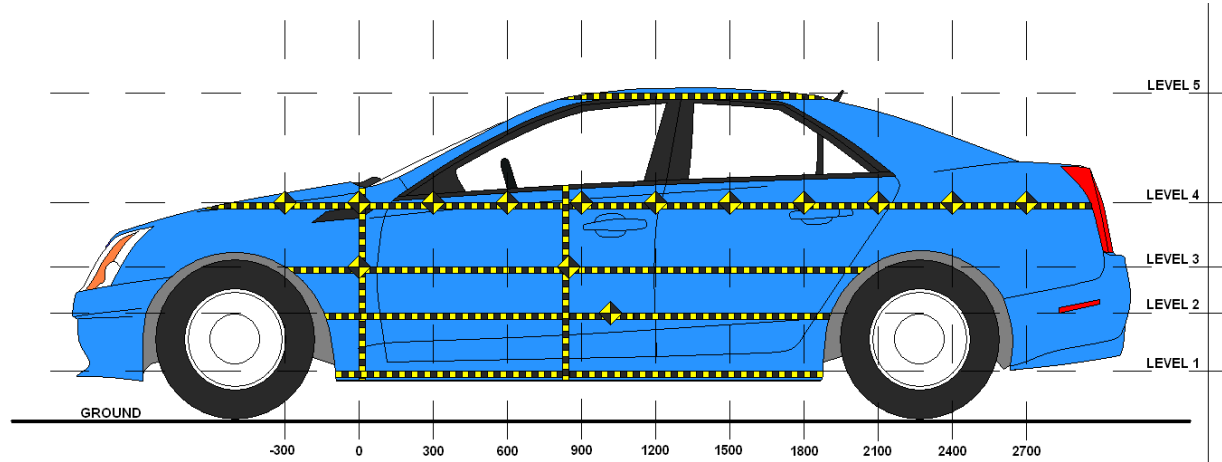
All measurements in mm with tolerance of  $\pm 3$ mm

## DATA SHEET NO. 11

### TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



**LEFT SIDE VIEW**

| Level | Description      | Height Above Ground (mm) | Maximum Exterior Static Crush | Distance from Impact |
|-------|------------------|--------------------------|-------------------------------|----------------------|
| 1     | Sill Top         | 456                      | 339                           | 1650                 |
| 2     | Occupant H-Point | 948                      | 183                           | 900                  |
| 3     | Mid-Door         | 907                      | 202                           | 900                  |
| 4     | Window Sill      | 1291                     | 110                           | 1200                 |
| 5     | Window Top       | 1877                     | 71                            | 1800                 |

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

## TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

## EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL

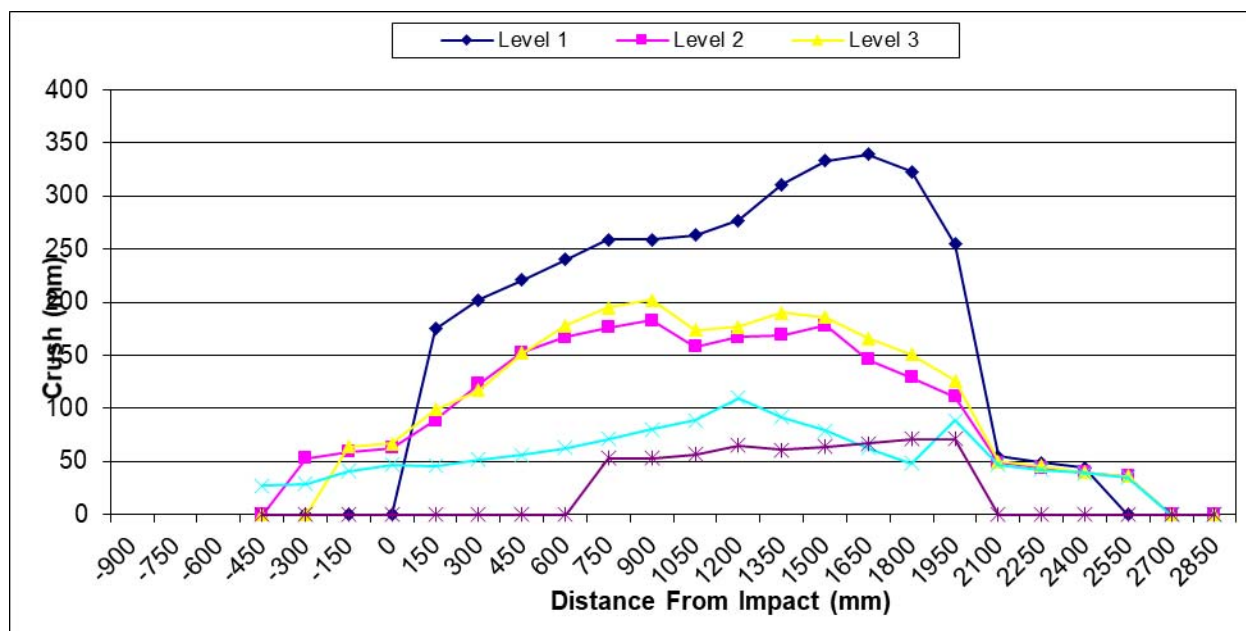
|      | Pre-Test (mm) |     |     |     |     | Post-Test (mm) |     |     |     |     | Difference (mm) |     |     |     |    |
|------|---------------|-----|-----|-----|-----|----------------|-----|-----|-----|-----|-----------------|-----|-----|-----|----|
|      | 1             | 2   | 3   | 4   | 5   | 1              | 2   | 3   | 4   | 5   | 1               | 2   | 3   | 4   | 5  |
| -900 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| -750 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| -600 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| -450 |               |     |     | 630 |     |                |     |     | 657 |     |                 |     |     | 27  |    |
| -300 |               | 490 |     | 611 |     |                | 543 |     | 640 |     |                 | 53  |     | 29  |    |
| -150 |               | 485 | 487 | 596 |     |                | 544 | 551 | 637 |     |                 | 59  | 64  | 41  |    |
| 0    |               | 485 | 486 | 584 |     |                | 548 | 553 | 631 |     |                 | 63  | 67  | 47  |    |
| 150  | 565           | 483 | 485 | 577 |     | 740            | 572 | 584 | 623 |     | 175             | 89  | 99  | 46  |    |
| 300  | 562           | 485 | 491 | 570 |     | 764            | 608 | 608 | 622 |     | 202             | 123 | 117 | 52  |    |
| 450  | 559           | 491 | 492 | 566 |     | 780            | 644 | 644 | 622 |     | 221             | 153 | 152 | 56  |    |
| 600  | 557           | 491 | 492 | 561 |     | 797            | 658 | 670 | 624 |     | 240             | 167 | 178 | 63  |    |
| 750  | 556           | 491 | 491 | 557 | 781 | 815            | 667 | 686 | 628 | 834 | 259             | 176 | 195 | 71  | 53 |
| 900  | 556           | 491 | 490 | 551 | 784 | 815            | 674 | 692 | 631 | 837 | 259             | 183 | 202 | 80  | 53 |
| 1050 | 554           | 489 | 488 | 547 | 784 | 817            | 647 | 662 | 636 | 841 | 263             | 158 | 174 | 89  | 57 |
| 1200 | 553           | 489 | 488 | 545 | 779 | 830            | 656 | 665 | 655 | 844 | 277             | 167 | 177 | 110 | 65 |
| 1350 | 554           | 488 | 487 | 543 | 785 | 865            | 657 | 677 | 635 | 846 | 311             | 169 | 190 | 92  | 61 |
| 1500 | 552           | 487 | 487 | 540 | 784 | 885            | 665 | 673 | 619 | 848 | 333             | 178 | 186 | 79  | 64 |
| 1650 | 553           | 487 | 487 | 538 | 783 | 892            | 633 | 653 | 601 | 850 | 339             | 146 | 166 | 63  | 67 |
| 1800 | 553           | 488 | 488 | 538 | 780 | 876            | 617 | 639 | 586 | 851 | 323             | 129 | 151 | 48  | 71 |
| 1950 | 560           | 489 | 490 | 542 | 785 | 815            | 600 | 616 | 631 | 856 | 255             | 111 | 126 | 89  | 71 |
| 2100 | 575           | 506 | 507 | 550 |     | 630            | 555 | 557 | 597 |     | 55              | 49  | 50  | 47  |    |
| 2250 | 578           | 499 | 500 | 548 |     | 627            | 543 | 546 | 590 |     | 49              | 44  | 46  | 42  |    |
| 2400 | 578           | 494 | 496 | 544 |     | 622            | 534 | 536 | 583 |     | 44              | 40  | 40  | 39  |    |
| 2550 |               | 490 | 493 | 542 |     |                | 526 | 529 | 577 |     |                 | 36  | 36  | 35  |    |
| 2700 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |
| 2850 |               |     |     |     |     |                |     |     |     |     |                 |     |     |     |    |

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

### TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

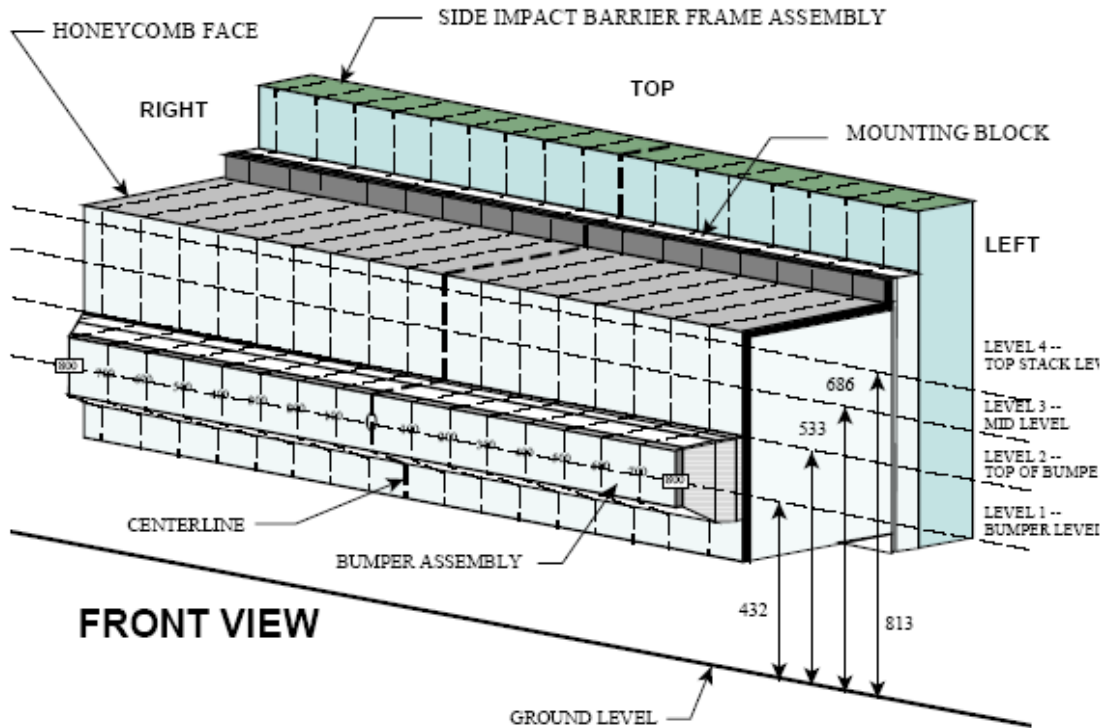


## DATA SHEET NO. 12

### MDB EXTERIOR STATIC CRUSH MEASUREMENTS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



NOTE: Dimensions are shown in millimeters, mm

### DEFORMABLE BARRIER STATIC CRUSH

| Stack Level | Distance Right of Center |     |     |     |     |     |     |     | C/L | Distance Left of Center |     |     |     |     |     |     |     |
|-------------|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-------------------------|-----|-----|-----|-----|-----|-----|-----|
|             | 800                      | 700 | 600 | 500 | 400 | 300 | 200 | 100 |     | 100                     | 200 | 300 | 400 | 500 | 600 | 700 | 800 |
| 1           | 39                       | 14  | 14  | 24  | 29  | 34  | 41  | 46  | 59  | 53                      | 59  | 66  | 69  | 78  | 86  | 93  | 114 |
| 2           | 40                       | 32  | 40  | 47  | 52  | 55  | 62  | 59  | 71  | 77                      | 78  | 87  | 94  | 101 | 108 | 113 | 120 |
| 3           | 140                      | 107 | 92  | 77  | 57  | 47  | 62  | 76  | 82  | 80                      | 77  | 81  | 90  | 97  | 107 | 115 | 129 |
| 4           | 222                      | 187 | 160 | 122 | 107 | 104 | 137 | 142 | 122 | 112                     | 120 | 110 | 108 | 111 | 121 | 141 | 161 |

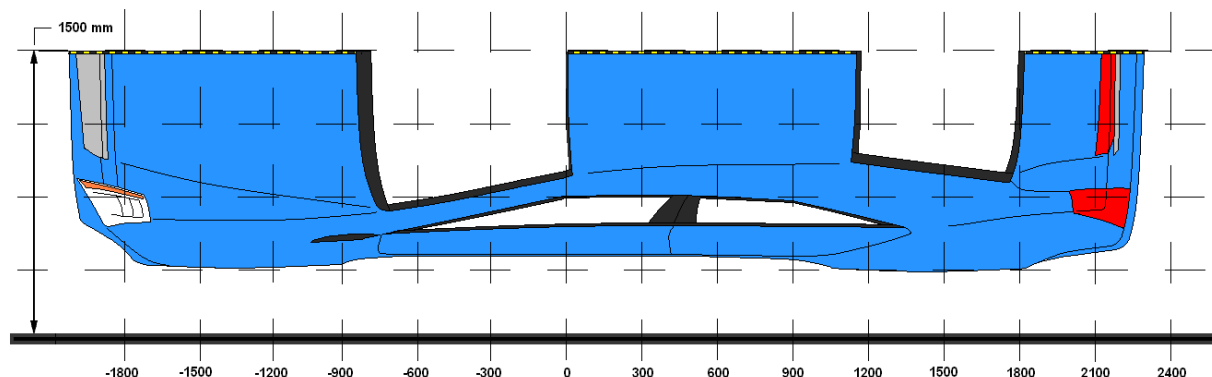
All dimensions in millimeters.

## DATA SHEET NO. 13

### VEHICLE AND MDB DAMAGE PROFILE DISTANCES

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



### VEHICLE DAMAGE PROFILE DISTANCES

| DPD | Distance From Impact Point (mm) | Level | Pre-Test (mm) | Post-Test (mm) | Crush (mm) |
|-----|---------------------------------|-------|---------------|----------------|------------|
| 1   | 2550                            | 3     | 493           | 529            | 36         |
| 2   | 1950                            | 1     | 560           | 815            | 255        |
| 3   | 1350                            | 1     | 554           | 865            | 311        |
| 4   | 750                             | 1     | 556           | 815            | 259        |
| 5   | 150                             | 1     | 565           | 740            | 175        |
| 6   | -450                            | 4     | 630           | 657            | 27         |

### MDB DAMAGE PROFILE DISTANCES

| DPD | From MDB Centerline |           | Level | Crush (mm) |
|-----|---------------------|-----------|-------|------------|
|     | Distance (mm)       | Direction |       |            |
| 1   | 800                 | Left      | 4     | 161        |
| 2   | 500                 | Left      | 4     | 111        |
| 3   | 200                 | Left      | 4     | 120        |
| 4   | 200                 | Right     | 4     | 137        |
| 5   | 500                 | Right     | 4     | 122        |
| 6   | 800                 | Right     | 4     | 222        |

## DATA SHEET NO. 14

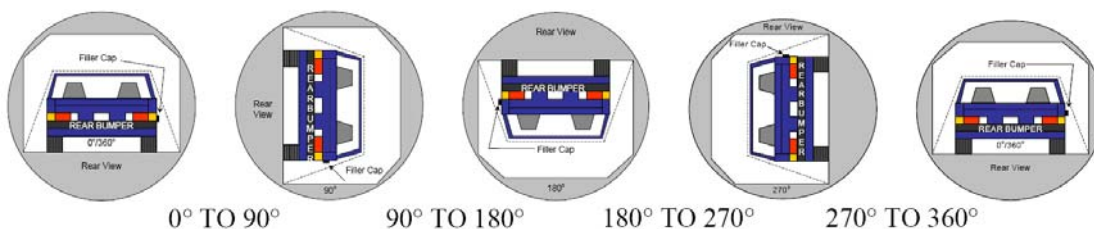
### FMVSS NO. 301 STATIC ROLLOVER RESULTS

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18

Temperature at Time of Impact: 32.2 °C Test Time: 4:30 P.M.

- A. From impact until vehicle motion ceases: 0 oz.  
(Maximum allowable = 1 oz.)
- B. For the 5 minute period after motion ceases: 0 oz.  
(Maximum allowable = 5 oz.)
- C. For the following 25 minutes: 0 oz.  
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: There was no Stoddard solvent spillage.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



#### SOLVENT COLLECTION TIME TABLE IN SECONDS

| Test Phase   | Rotation Time | Hold Time | Total Time |
|--------------|---------------|-----------|------------|
| 0° To 90°    | 79            | 300       | 379        |
| 90° To 180°  | 80            | 300       | 380        |
| 180° To 270° | 79            | 300       | 379        |
| 270° To 360° | 81            | 300       | 381        |

#### FMVSS 301 SPILLAGE TABLE

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

#### SOLVENT SPILLAGE LOCATION TABLE

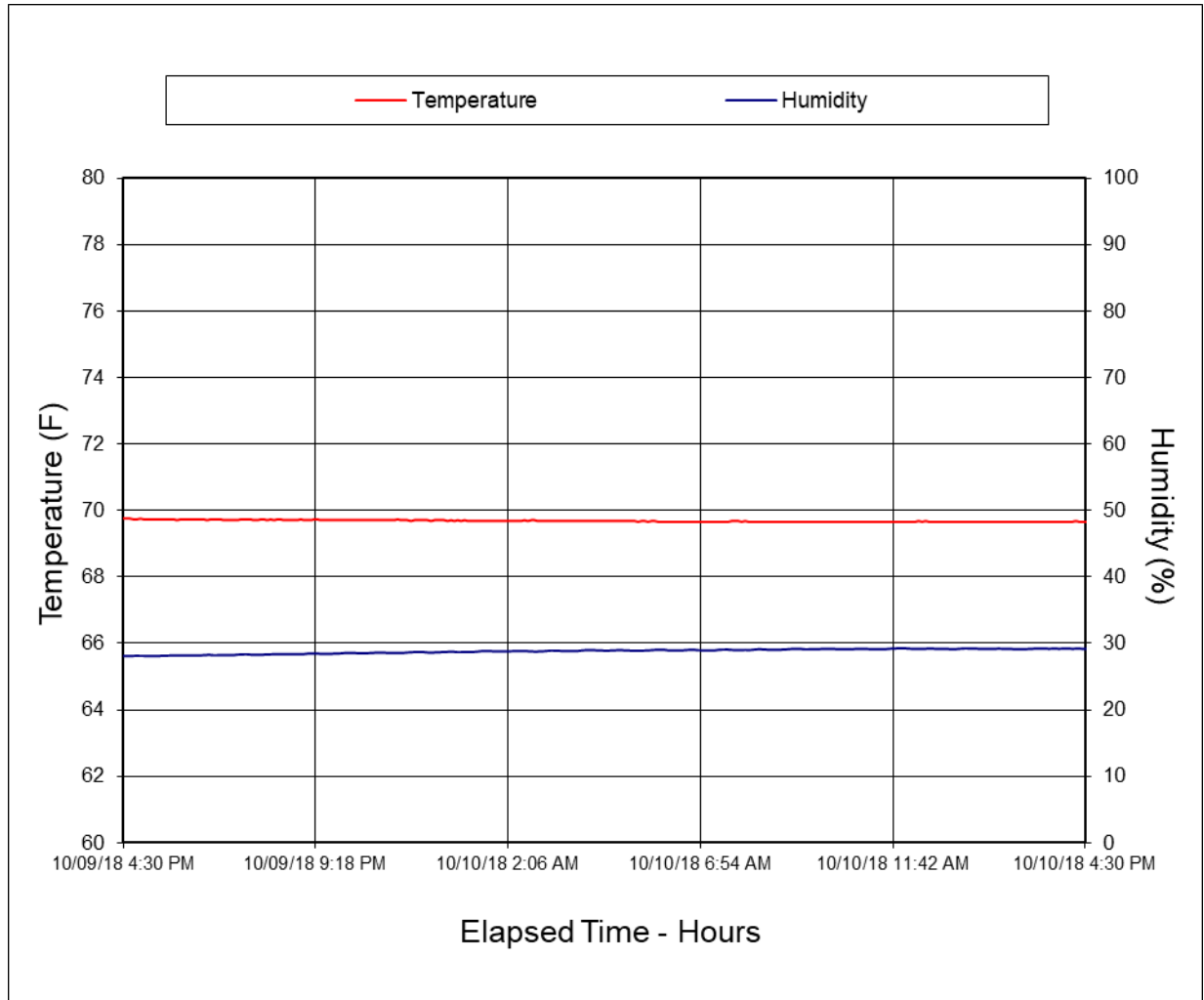
| Test Phase   | Spillage Location |
|--------------|-------------------|
| 0° To 90°    | N/A               |
| 90° To 180°  | N/A               |
| 180° To 270° | N/A               |
| 270° To 360° | N/A               |

## DATA SHEET NO. 15

### DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck NHTSA No. M20190314

Test Program: NCAP MDB Side Impact Test Test Date: 10/10/18



**APPENDIX A**  
**PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

| Figure |                                                                                        | Page |
|--------|----------------------------------------------------------------------------------------|------|
| 1      | As-Delivered Right Front $\frac{3}{4}$ View of Test Vehicle                            | A-1  |
| 2      | As-Delivered Left Rear $\frac{3}{4}$ View of Test Vehicle                              | A-1  |
| 3      | Pre-Test Frontal View of Test Vehicle                                                  | A-2  |
| 4      | Post-Test Frontal View of Test Vehicle                                                 | A-2  |
| 5      | Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle                                 | A-3  |
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FIGURE 1. As-Delivered Right Front  $\frac{3}{4}$  View of Test Vehicle



FIGURE 2. As-Delivered Left Rear  $\frac{3}{4}$  View of Test Vehicle



FIGURE 3. Pre-Test Frontal View of Test Vehicle



FIGURE 4. Post-Test Frontal View of Test Vehicle



FIGURE 5. Pre-Test Left Front  $\frac{3}{4}$  View of Test Vehicle



FIGURE 6. Post-Test Left Front  $\frac{3}{4}$  View of Test Vehicle



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



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



FIGURE 9. Pre-Test Left Rear  $\frac{3}{4}$  View of Test Vehicle



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



FIGURE 11. Pre-Test Rear View of Test Vehicle



FIGURE 12. Post-Test Rear View of Test Vehicle



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



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



FIGURE 15. Pre-Test Overhead View of Test Area

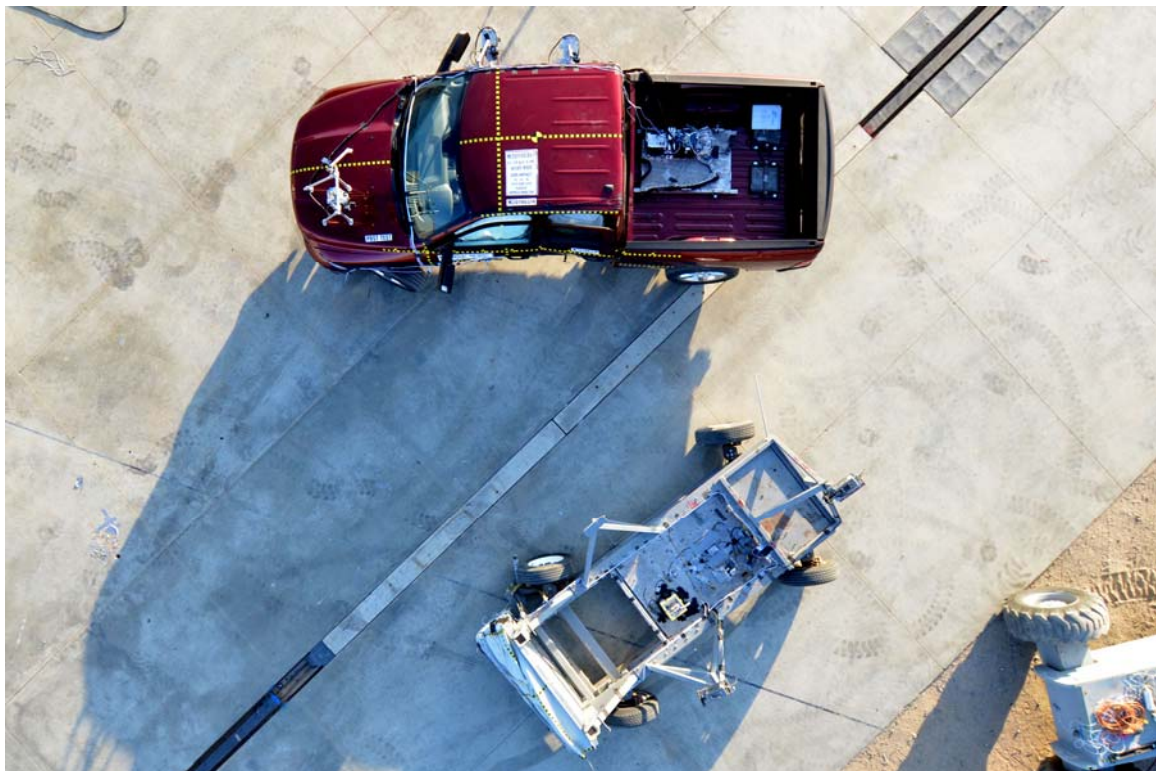


FIGURE 16. Post-Test Overhead View of Test Area



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



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



FIGURE 37. View of Disengaged Parking Brake



FIGURE 38. Pre-Test View of Parking Brake



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



FIGURE 40. Pre-Test Close-Up Left Side View of Driver Seat Back



FIGURE 41. Pre-Test Close-Up View of Driver Seat Back or Head Restraint



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



FIGURE 43. Post-Test Driver Dummy and Door Clearance View



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



FIGURE 45. Post-Test Right Side View of Driver Dummy and Front Seat Occupant Compartment



FIGURE 46. Pre-Test Driver Inner Door Panel View



FIGURE 47. Post-Test Driver Inner Door Panel View  
Showing Driver Dummy Contact Locations



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



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



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



FIGURE 51. Post-Test Driver Dummy Close-Up Torso Contact with Side Airbag View



FIGURE 52. Post-Test Driver Dummy Close-Up Pelvis Contact  
with Vehicle Interior View



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



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



FIGURE 55. Pre-Test Left Side View of Rear Passenger Dummy  
Showing Belt and Chalking



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



FIGURE 57. Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View



FIGURE 58. Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning



FIGURE 59. Pre-Test Frontal View of Rear Passenger Dummy  
Head and Shoulders in Relation to Head Restraint



FIGURE 60. Pre-Test Overhead View of Rear Passenger  
Seat Pan Prior to Dummy Positioning



FIGURE 61. Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan



FIGURE 62. Pre-Test View of Rear Passenger Dummy's Neck  
Showing Position of Adjustable Neck Bracket



FIGURE 63. Pre-Test View of Rear Passenger Dummy's Head  
Showing Dummy's Head is Level



FIGURE 64. Pre-Test Placement of Rear Passenger Dummy's Feet



FIGURE 65. Pre-Test View of Belt Anchorage for Rear Passenger Dummy



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



FIGURE 67. Pre-Test Close-Up Left Side View of Rear Passenger Seat Back



FIGURE 68. Pre-Test Close-Up View of Rear Passenger Seat Back or Head Restraint



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



FIGURE 70. Post-Test Rear Passenger Dummy and Door Clearance View



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



FIGURE 72. Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment



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



FIGURE 74. Post-Test Rear Passenger Inner Door Panel View  
Showing Rear Passenger Dummy Contact Locations



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



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



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

# Photograph Not Applicable

## Vehicle Not Equipped with Rear Passenger Side Airbag

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



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

# Photograph Not Applicable

## Vehicle Not Equipped with Rear Passenger Side Airbag

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



FIGURE 81. Post-Test Rear Passenger Dummy Close-Up Knee Contact View

Photograph Not Available

FIGURE 82. Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



FIGURE 83. Post-Test View of Fuel Filler Cap or Fuel Filler Neck



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



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



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



FIGURE 87. Post-Test Top View of MDB Impactor Face



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



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



FIGURE 90. Pre-Test Right Side View of MDB Impactor Face



FIGURE 91. Post-Test Right Side View of MDB Impactor Face



FIGURE 92. Close-Up View of Vehicle's Certification Label

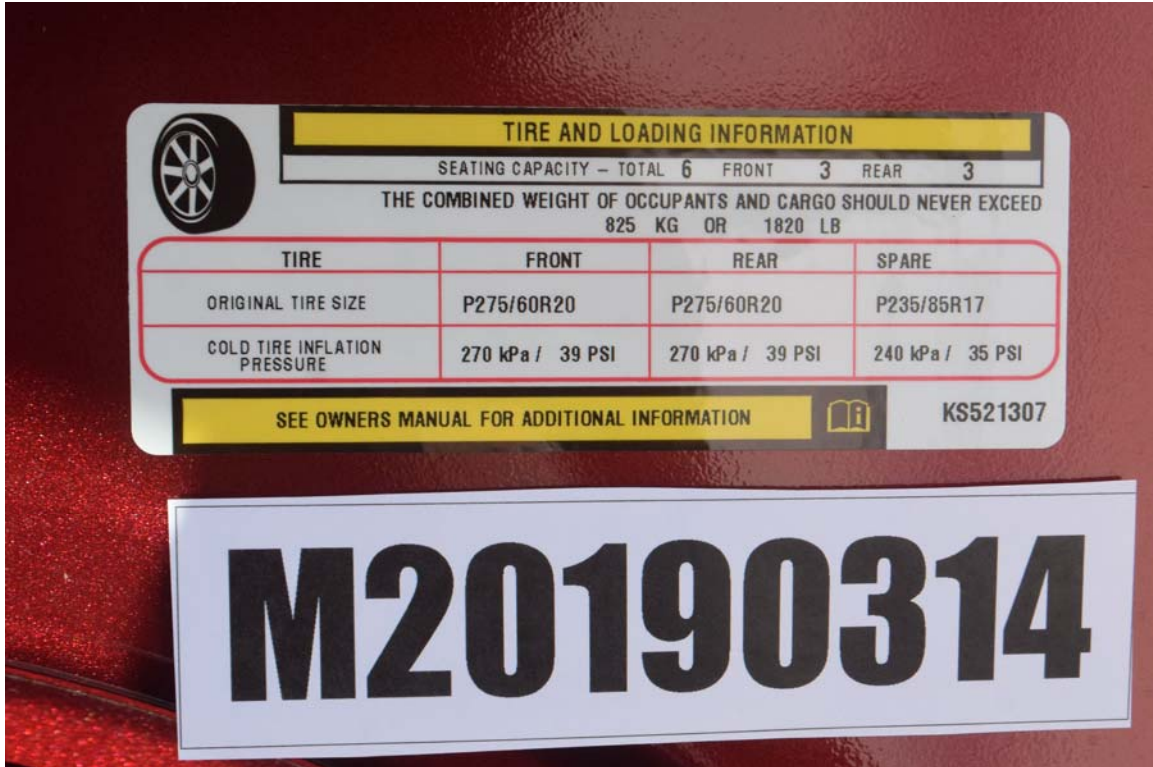


FIGURE 93. Close-Up View of Vehicle's Tire Information Placard or Label

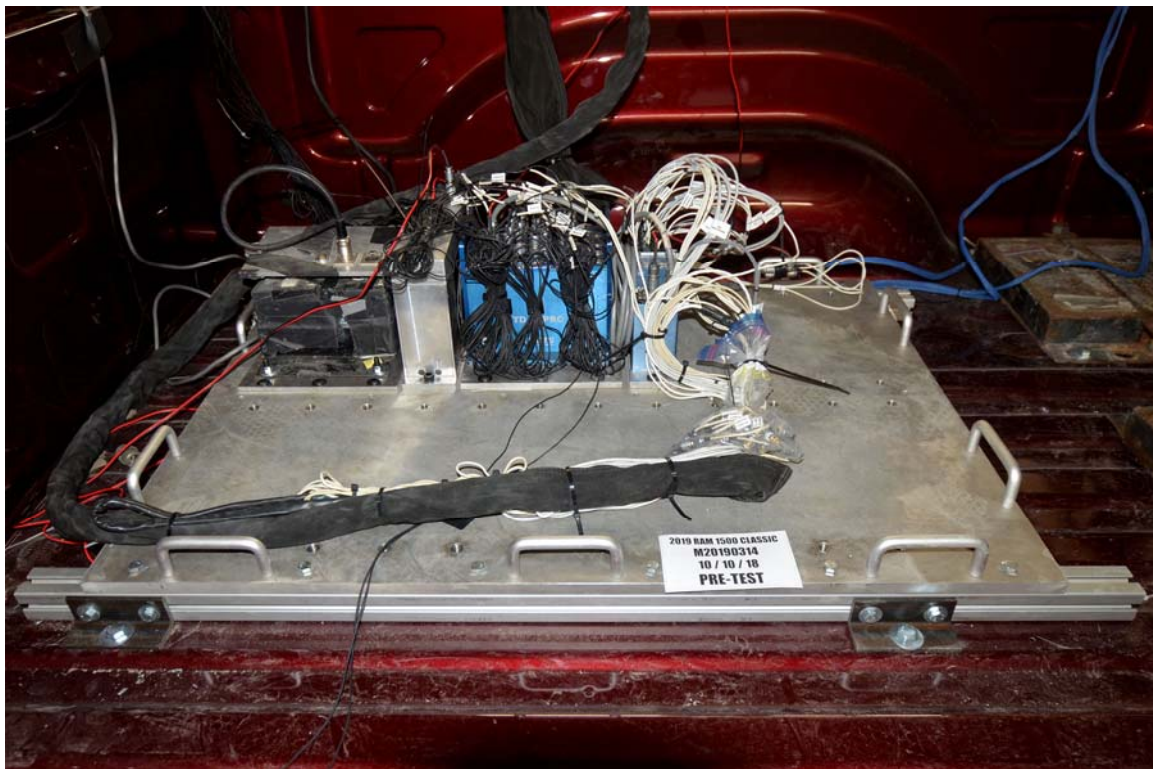


FIGURE 94. Pre-Test Ballast View



FIGURE 95. Post-Test Primary and Redundant Speed Trap Read-Out



FIGURE 96. FMVSS No. 301 Static Rollover 0 Degrees



FIGURE 97. FMVSS No. 301 Static Rollover 90 Degrees

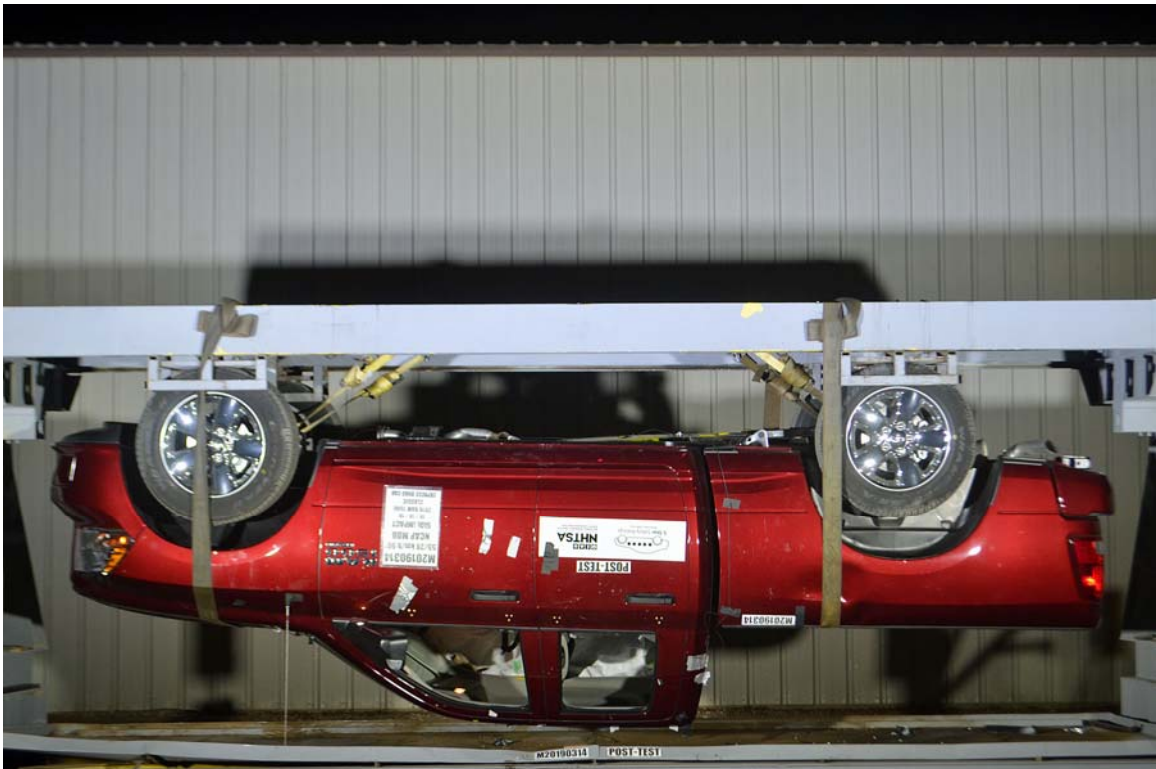


FIGURE 98. FMVSS No. 301 Static Rollover 180 Degrees

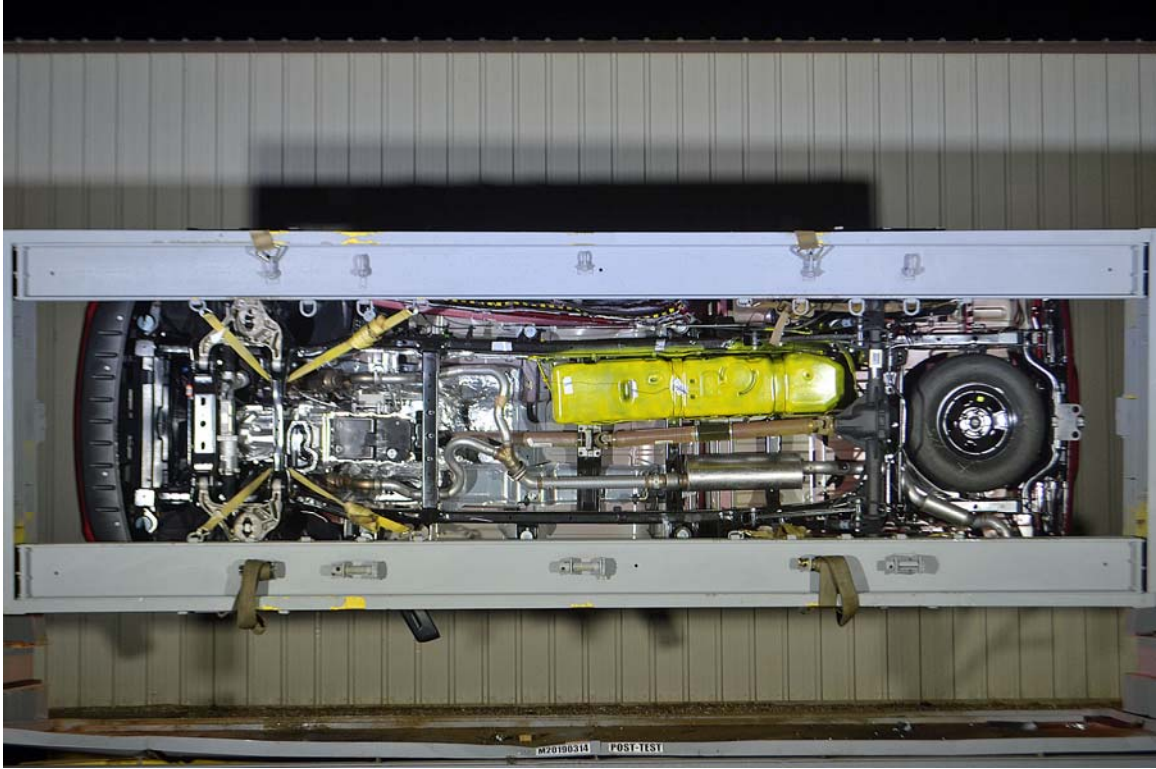


FIGURE 99. FMVSS No. 301 Static Rollover 270 Degrees



FIGURE 100. FMVSS No. 301 Static Rollover 360 Degrees



### FIGURE 101. Impact Event

2019 MY MODEL YEAR

RAM 1500 CLASSIC EXPRESS QUAD CAB 4x2

THIS VEHICLE IS MANUFACTURED TO MEET SPECIFIC UNITED STATES REQUIREMENTS. THIS VEHICLE IS NOT MANUFACTURED FOR SALE OR REGISTRATION OUTSIDE OF THE UNITED STATES.

MANUFACTURER'S SUGGESTED RETAIL PRICE OF THIS MODEL INCLUDING DEALER PREPARATION

Base Price: \$31,095

RAM 1500 TRADER QUAD CAB 4x2

Exterior Color: Delmonico Red Pearl-Coat Exterior Paint

Interior Color: Black/Diesel Gray Interior Colors

Engine: 3500 cc / 20 / 40 Becht Seat

Transmission: 3-Speed Automatic 454H6 Transmission

Standard Equipment (and JSS replaced by optional equipment)

FUNCTIONAL SAFETY FEATURES

Advanced Multistage Front Airbags

Supplemental Side-Curtain Front and Rear Airbags

Supplemental Front Mounted Side Airbags

Supplemental Side-Curtain Airbags

ParkView® Rear Backup Camera

3.7L Rear Drive Shaft

Traction-Tow with 4-Pin Connector Wiring

7-Pin Wiring Harness

26-Gal Fuel Tank

Locking Tailgate

4-Wheel Disc Anti-Lock Brakes

Electronic Stability Control

Speed Control

Safety Key® Theft Deterrent System

INTERIOR FEATURES

Radio 3.0

6-Speakers

Media Hub (USB, Aux, Charge Port)

Auto-Dimming Rear View Mirror with Display

Tilt Steering Column

Black Rotary Shifter

Electronic Climate Control

Rear Armrest with Three Cup Holders

Power Door Locks

Power Front Windows w/ 1-Touch Up and Down Feature

40 / 20 / 40 Split Seat Belt

Rear Folding Seat

Rear Under-Seat Storage Compartment

Black Vinyl Floor Covering

EXTERIOR FEATURES

17-inch x 7.0-inch Steel Wheels

P275/60R20 BSW All Season Tires

Halogen Fog Headlights

Automatic Headlamps

Black Front Bumper

Black Rear Bumper

Black Grille

Scratch-Resistant Bedliner

OPTIONAL EQUIPMENT (May Replace Standard Equipment)

Delmonico Red Pearl-Coat Exterior Paint

Express Package 221

\$100

\$2,200

Carpet Floor Covering  
Front Fog Lamps  
Body-Color Front Fenders  
Body-Color Rear Bumper  
Body-Color Grille  
17-inch x 7.0-inch Aluminum Wheels  
Center Hub  
Deluxe Class IV Receiver-Brake  
Deluxe Spray-In Bedliner  
Power Lock Tail-Tow Mirrors w/ Manual Fold-Away  
Interior Mirrors with Turn Signals  
Exterior Mirrors with Turn Signals  
Deluxe Class IV Receiver-Brake  
Trailer Brake Control  
Express Value Package  
20-Inch x 7.0-inch Aluminum Chrome Cast Wheels  
Chrome 40 / 20 / 40 Becht Seat  
Overhead Console  
Recovery Day / Night Mirror  
Remote Keyless Entry with All-Secure  
Temperature and Compass Gauge  
GPS Antenna Input  
iConnect™ 3 with 5-inch Display  
SiriusXM® Sat Radio w/ 1-yr Sat Kit 800-643-2172  
Full Size Temporary Use Spare Tire  
P275/60R20 BSW All Season Tires  
Front and Rear Rubber Floor Mats  
32-Gallon Fuel Tank  
Flex Fuel Vehicle

\$895

\$3,395

\$145

\$435

DESTINATION CHARGE

\$1,895

TOTAL PRICE: \$38,960

WARRANTY COVERAGE

5-year or 60,000-mile Powertrain Limited Warranty.

3-year or 36,000-mile Basic Limited Warranty.

Ask Dealer for a copy of the limited warranties or

see your owner's manual for details.

5 YEAR / 60,000 MILE

POWERTRAIN WARRANTY

Assembly Point/Port of Entry: WARREN, MICHIGAN, U.S.A.

1-800-RIFG0003/521307

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For more information visit: [www.ramtrucks.com](http://www.ramtrucks.com)  
or call 1-866-RAMINFO

FCA US LLC

Fuel Economy and Environment

FIGURE 102. Monroney Label

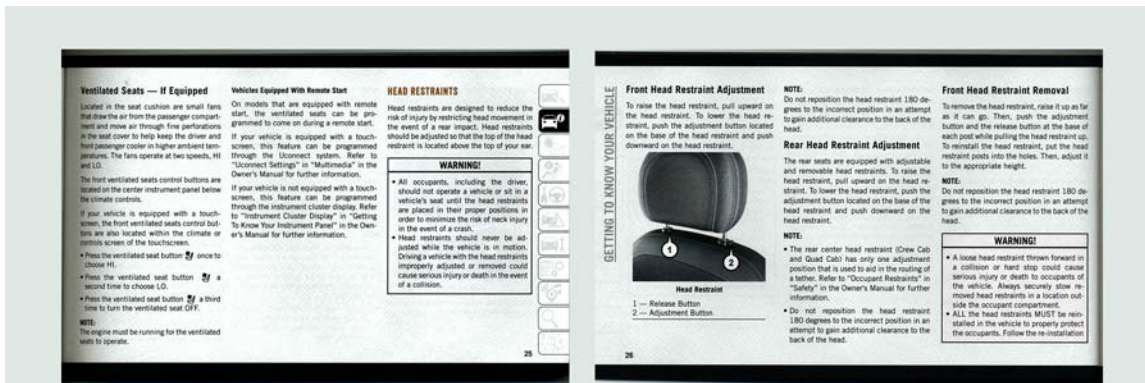


FIGURE 103. Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

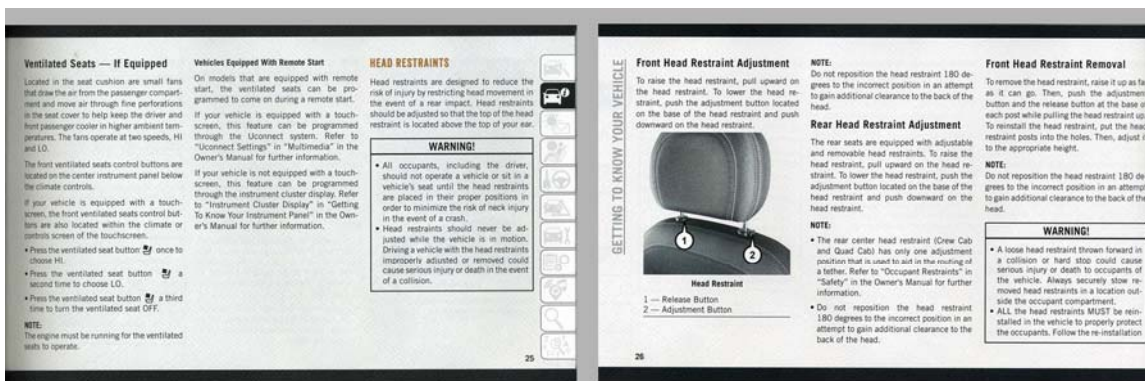


FIGURE 104. Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual

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

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

### Additional Driver & Passenger Dummy Instrumentation Data

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)

Passenger Upper Abdomen Rib Deflection (Y)  
Passenger Lower Abdomen Rib Deflection (Y)  
Driver Head Acceleration Redundant (X)  
Driver Head Acceleration Redundant (Y)  
Driver Head Acceleration Redundant (Z)  
Passenger Head Acceleration Redundant (X)  
Passenger Head Acceleration Redundant (Y)  
Passenger Head Acceleration Redundant (Z)

### **Vehicle Instrumentation Data**

Vehicle Center of Gravity Acceleration (X)  
Vehicle Center of Gravity Acceleration (Y)  
Vehicle Center of Gravity Acceleration (Z)  
Right Side Sill at Front Seat Acceleration (X)  
Right Side Sill at Front Seat Acceleration (Y)  
Right Side Sill at Front Seat Acceleration (Z)  
Right Side Sill at Rear Seat Acceleration (X)  
Right Side Sill at Rear Seat Acceleration (Y)  
Right Side Sill at Rear Seat Acceleration (Z)  
Left Side Sill at Front Seat Acceleration (Y)  
Left Side Sill at Rear Seat Acceleration (Y)  
Lower A-Post Acceleration (Y)  
Middle A-Post Acceleration (Y)  
Lower B-Post Acceleration (Y)  
Middle B-Post Acceleration (Y)  
Front Seat Track Acceleration (Y)  
Rear Seat Structure Acceleration (Y)  
Right Rear Occupant Compartment Acceleration (Y)  
Engine Block (X)  
Engine Block (Y)  
Rear Floorpan Above Axle Acceleration (X)  
Rear Floorpan Above Axle Acceleration (Y)  
Rear Floorpan Above Axle Acceleration (Z)

### **MDB Instrumentation Data**

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

MDB Rear Acceleration (X)

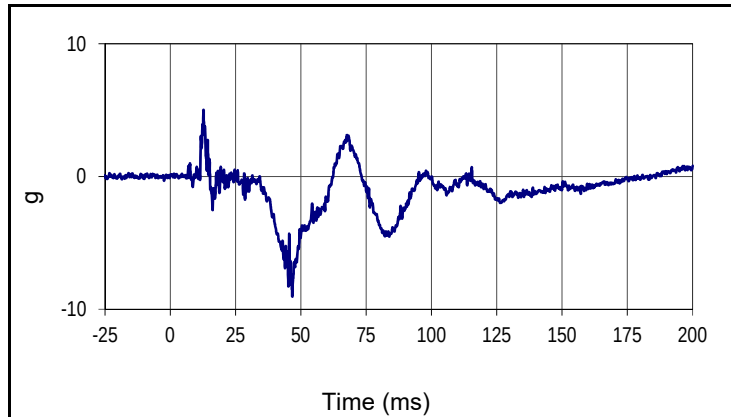
MDB Rear Acceleration (Y)

Left MDB Contact Switch

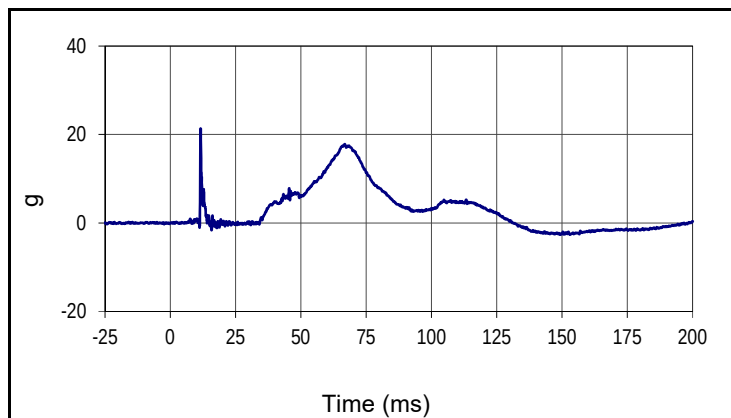
Right MDB Contact Switch

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

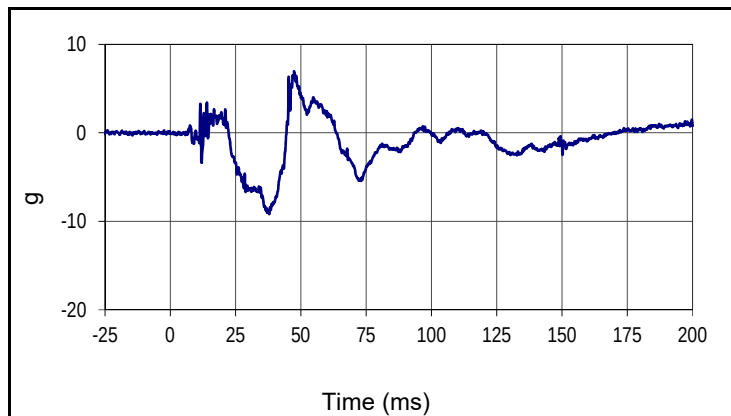
NHTSA No.: M20190314  
 Test Date: 10/10/18



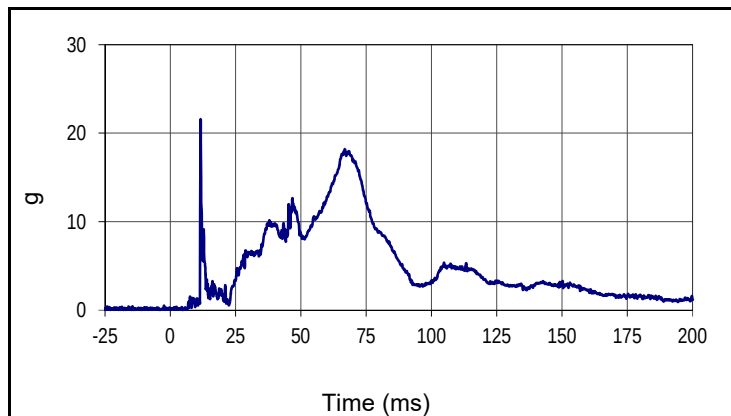
| Curve Description                  |      |           |       |
|------------------------------------|------|-----------|-------|
| Driver Head Acceleration X Primary |      |           |       |
| Plot No.                           |      | SAE Class | Units |
| 001                                |      | 1000      | g     |
| Max                                | Time | Min       | Time  |
| 5.0                                | 12.7 | -9.0      | 46.7  |



| Curve Description                  |      |           |       |
|------------------------------------|------|-----------|-------|
| Driver Head Acceleration Y Primary |      |           |       |
| Plot No.                           |      | SAE Class | Units |
| 002                                |      | 1000      | g     |
| Max                                | Time | Min       | Time  |
| 21.3                               | 11.6 | -2.6      | 153.0 |



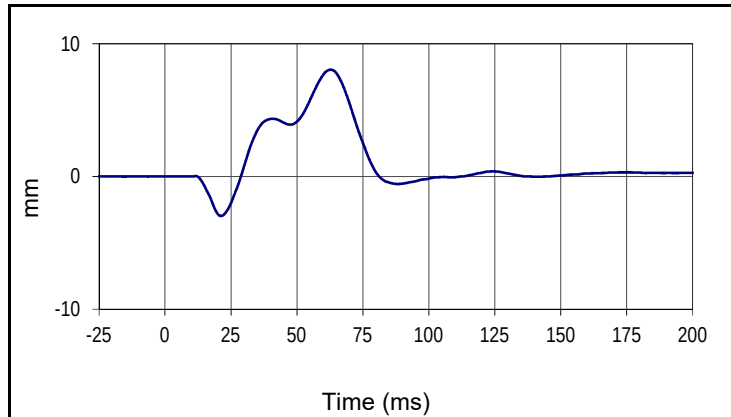
| Curve Description                  |      |           |       |
|------------------------------------|------|-----------|-------|
| Driver Head Acceleration Z Primary |      |           |       |
| Plot No.                           |      | SAE Class | Units |
| 003                                |      | 1000      | g     |
| Max                                | Time | Min       | Time  |
| 7.0                                | 47.4 | -9.2      | 37.9  |



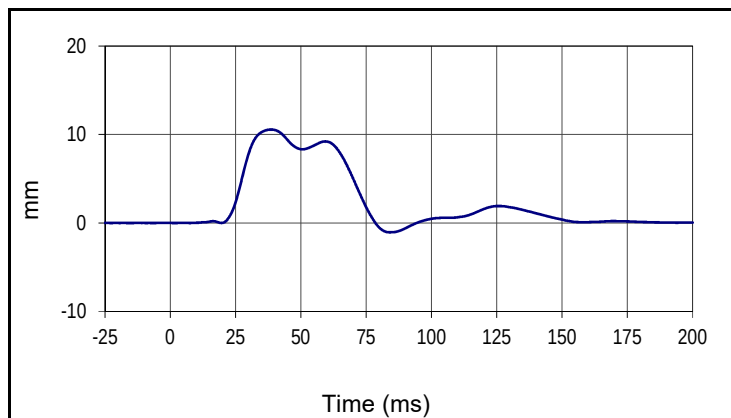
| Curve Description                          |      |           |       |
|--------------------------------------------|------|-----------|-------|
| Driver Head Resultant Acceleration Primary |      |           |       |
| Plot No.                                   |      | SAE Class | Units |
| 004                                        |      | 1000      | g     |
| Max                                        | Time | Min       | Time  |
| 21.5                                       | 11.6 | 0.0       | 4.8   |

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

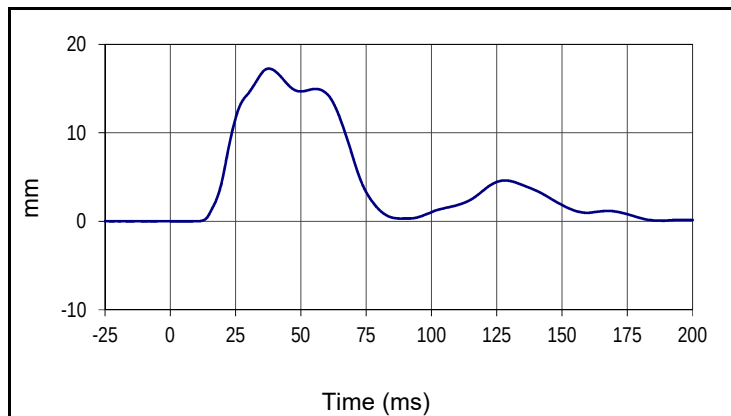
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 Test Date: 10/10/18



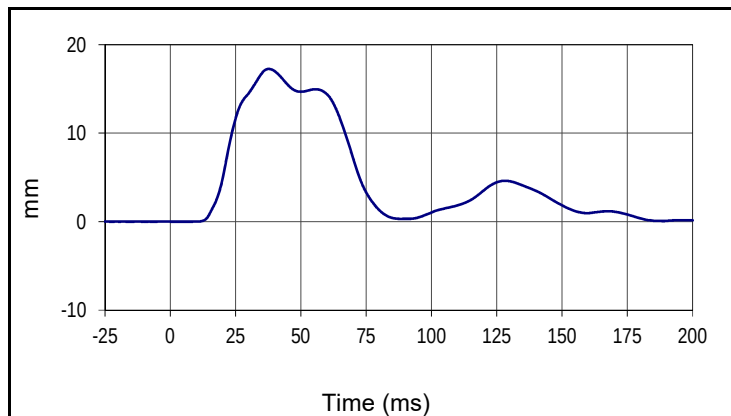
| Curve Description                    |      |           |       |
|--------------------------------------|------|-----------|-------|
| Driver Upper Thorax Rib Deflection Y |      |           |       |
| Plot No.                             |      | SAE Class | Units |
| 005                                  |      | 180       | mm    |
| Max                                  | Time | Min       | Time  |
| 8.0                                  | 62.8 | -3.0      | 21.2  |



| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Driver Middle Thorax Rib Deflection Y |      |           |       |
| Plot No.                              |      | SAE Class | Units |
| 006                                   |      | 180       | mm    |
| Max                                   | Time | Min       | Time  |
| 10.6                                  | 38.7 | -1.1      | 84.0  |



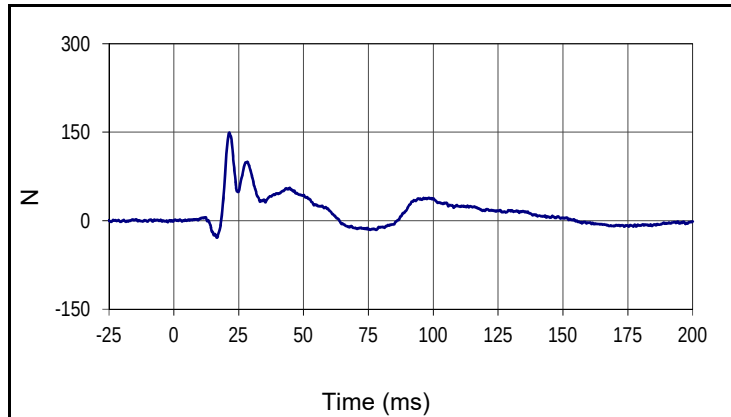
| Curve Description                    |      |           |       |
|--------------------------------------|------|-----------|-------|
| Driver Lower Thorax Rib Deflection Y |      |           |       |
| Plot No.                             |      | SAE Class | Units |
| 007                                  |      | 180       | mm    |
| Max                                  | Time | Min       | Time  |
| 17.3                                 | 37.6 | 0.0       | 2.2   |



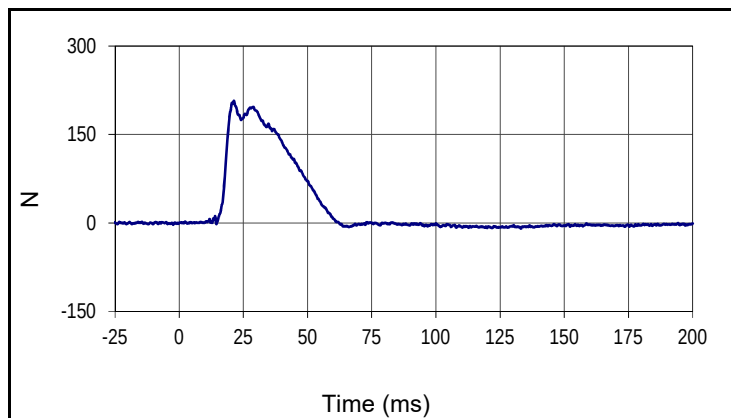
| Curve Description                      |      |           |       |
|----------------------------------------|------|-----------|-------|
| Driver Thorax Rib Deflection Maximum Y |      |           |       |
| Plot No.                               |      | SAE Class | Units |
| 008                                    |      | 180       | mm    |
| Max                                    | Time | Min       | Time  |
| 17.3                                   | 37.6 | 0.0       | 2.2   |

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

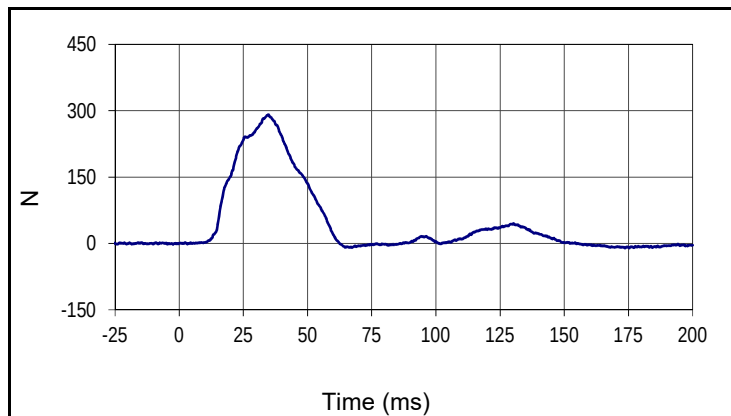
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 Test Date: 10/10/18



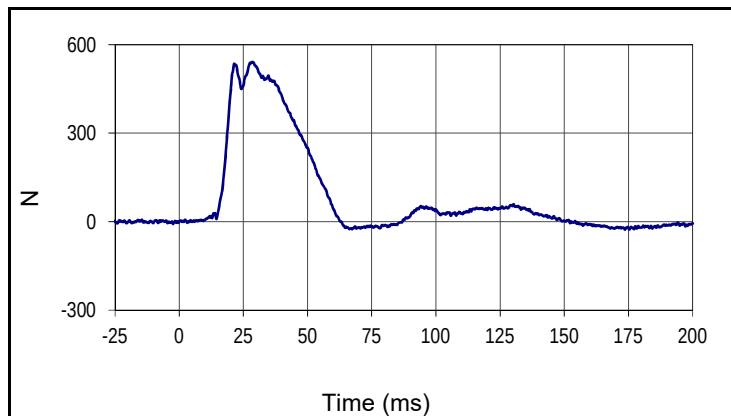
| Curve Description                 |      |           |       |
|-----------------------------------|------|-----------|-------|
| Driver Anterior Abdominal Force Y |      |           |       |
| Plot No.                          |      | SAE Class | Units |
| 009                               |      | 600       | N     |
| Max                               | Time | Min       | Time  |
| 149.1                             | 21.3 | -29.0     | 16.6  |



| Curve Description               |      |           |       |
|---------------------------------|------|-----------|-------|
| Driver Middle Abdominal Force Y |      |           |       |
| Plot No.                        |      | SAE Class | Units |
| 010                             |      | 600       | N     |
| Max                             | Time | Min       | Time  |
| 207.1                           | 21.3 | -9.4      | 133.1 |



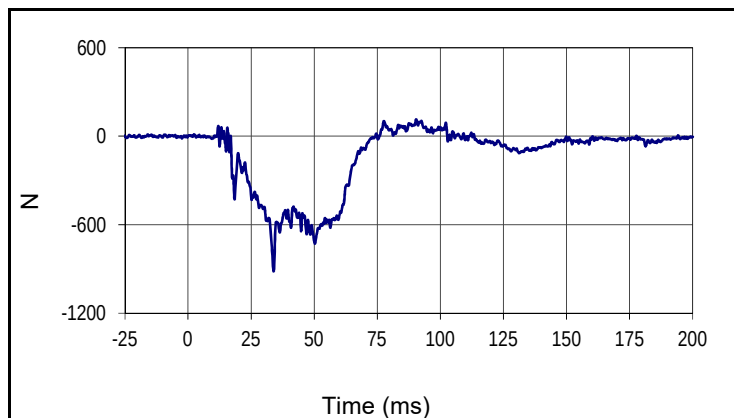
| Curve Description                  |      |           |       |
|------------------------------------|------|-----------|-------|
| Driver Posterior Abdominal Force Y |      |           |       |
| Plot No.                           |      | SAE Class | Units |
| 011                                |      | 600       | N     |
| Max                                | Time | Min       | Time  |
| 291.2                              | 34.7 | -10.5     | 175.3 |



| Curve Description              |      |           |       |
|--------------------------------|------|-----------|-------|
| Driver Total Abdominal Force Y |      |           |       |
| Plot No.                       |      | SAE Class | Units |
| 012                            |      | 600       | N     |
| Max                            | Time | Min       | Time  |
| 541.3                          | 28.4 | -27.0     | 173.6 |

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

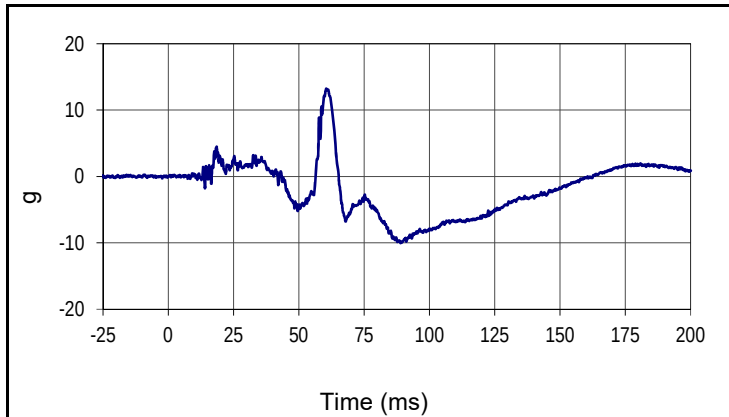
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 Test Date: 10/10/18



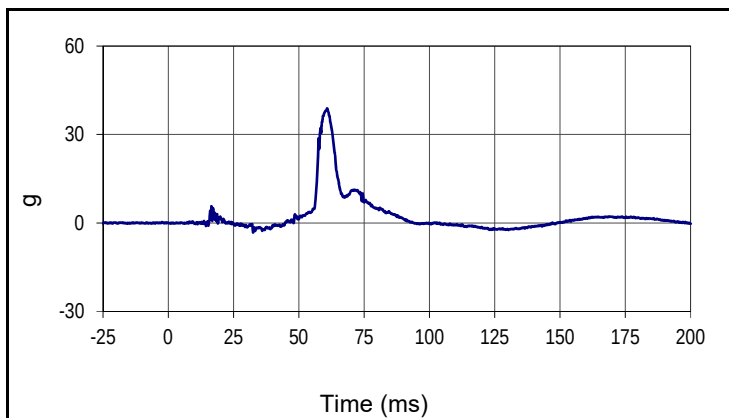
| Curve Description              |      |           |       |
|--------------------------------|------|-----------|-------|
| Driver Pubic Symphysis Force Y |      |           |       |
| Plot No.                       |      | SAE Class | Units |
| 013                            |      | 600       | N     |
| Max                            | Time | Min       | Time  |
| 114.2                          | 90.4 | -916.8    | 33.9  |

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

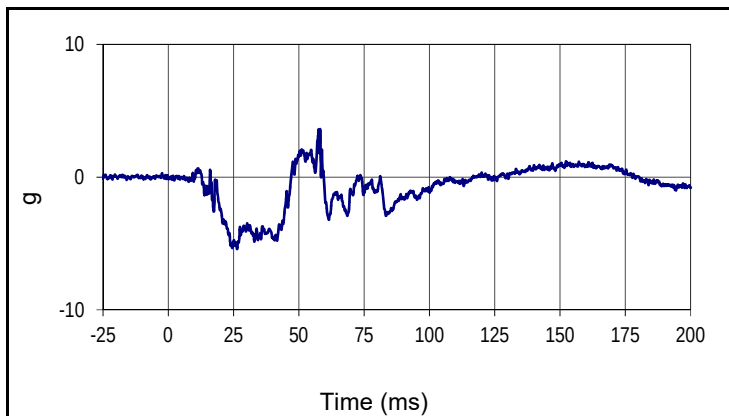
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 Test Date: 10/10/18



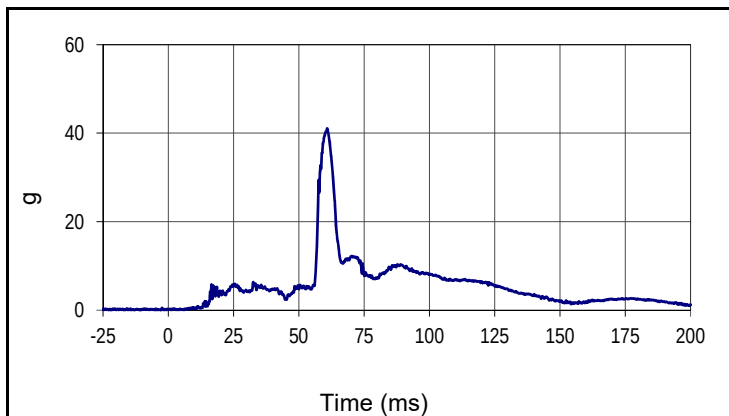
| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration X Primary |      |           |       |
| Plot No.                              |      | SAE Class | Units |
| 014                                   |      | 1000      | g     |
| Max                                   | Time | Min       | Time  |
| 13.2                                  | 60.5 | -10.0     | 89.0  |



| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration Y Primary |      |           |       |
| Plot No.                              |      | SAE Class | Units |
| 015                                   |      | 1000      | g     |
| Max                                   | Time | Min       | Time  |
| 38.8                                  | 60.8 | -3.2      | 32.5  |



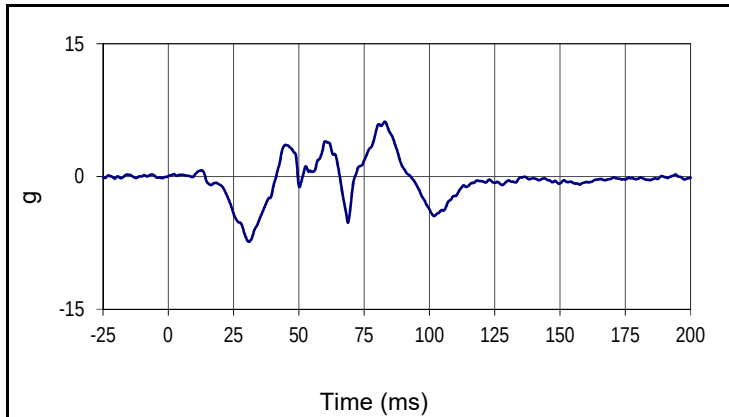
| Curve Description                     |      |           |       |
|---------------------------------------|------|-----------|-------|
| Passenger Head Acceleration Z Primary |      |           |       |
| Plot No.                              |      | SAE Class | Units |
| 016                                   |      | 1000      | g     |
| Max                                   | Time | Min       | Time  |
| 3.6                                   | 58.1 | -5.4      | 26.3  |



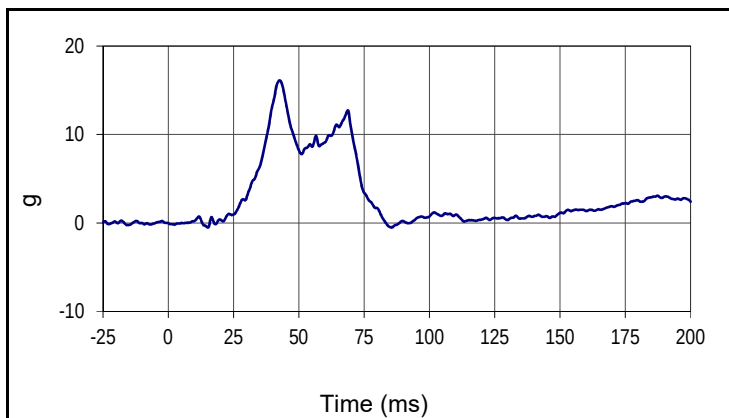
| Curve Description                             |      |           |       |
|-----------------------------------------------|------|-----------|-------|
| Passenger Head Acceleration Resultant Primary |      |           |       |
| Plot No.                                      |      | SAE Class | Units |
| 017                                           |      | 1000      | g     |
| Max                                           | Time | Min       | Time  |
| 41.1                                          | 60.8 | 0.0       | 4.1   |

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

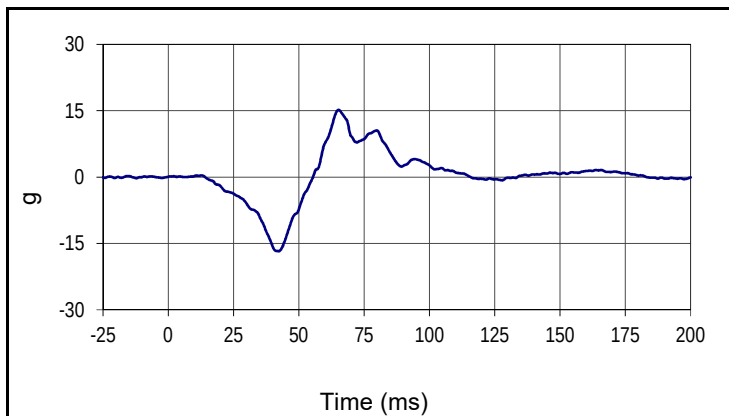
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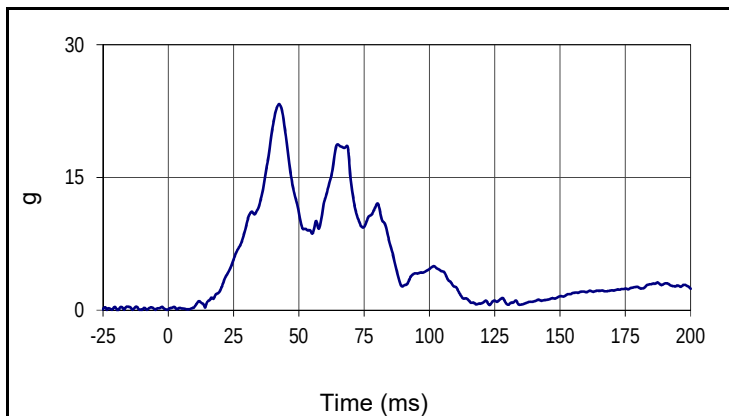
| Curve Description                        |      |           |       |
|------------------------------------------|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration X |      |           |       |
| Plot No.                                 |      | SAE Class | Units |
| 018                                      |      | 180       | g     |
| Max                                      | Time | Min       | Time  |
| 6.2                                      | 82.9 | -7.4      | 30.8  |



| Curve Description                        |      |           |       |
|------------------------------------------|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration Y |      |           |       |
| Plot No.                                 |      | SAE Class | Units |
| 019                                      |      | 180       | g     |
| Max                                      | Time | Min       | Time  |
| 16.1                                     | 42.6 | -0.5      | 85.5  |



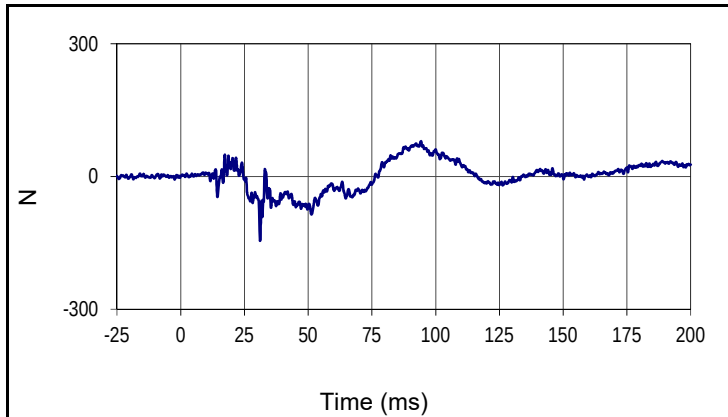
| Curve Description                        |      |           |       |
|------------------------------------------|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration Z |      |           |       |
| Plot No.                                 |      | SAE Class | Units |
| 020                                      |      | 180       | g     |
| Max                                      | Time | Min       | Time  |
| 15.2                                     | 65.2 | -16.8     | 42.2  |



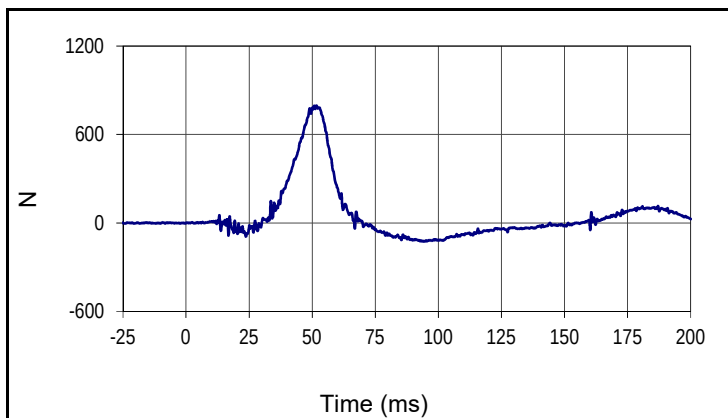
| Curve Description                           |      |           |       |
|---------------------------------------------|------|-----------|-------|
| Passenger Lower Spine T12 Acceleration Res. |      |           |       |
| Plot No.                                    |      | SAE Class | Units |
| 021                                         |      | 180       | g     |
| Max                                         | Time | Min       | Time  |
| 23.3                                        | 42.4 | 0.1       | 7.3   |

Test Vehicle: 2019 RAM 1500 Classic Express Quad Cab 4-Door Truck  
 Test Program: NCAP MDB Side Impact Test

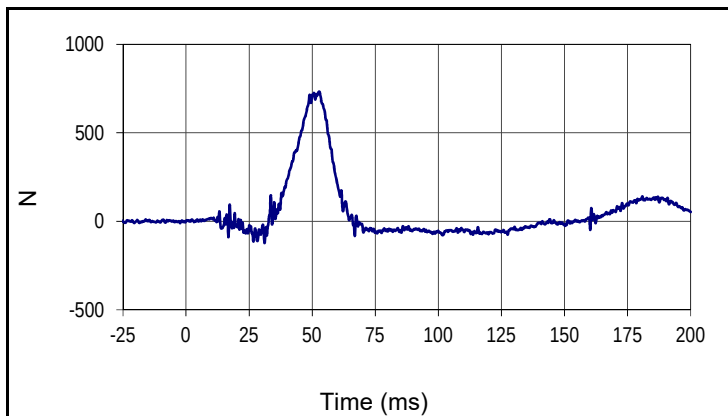
NHTSA No.: M20190314  
 Test Date: 10/10/18



| Curve Description                      |      |           |       |
|----------------------------------------|------|-----------|-------|
| Passenger Iliac Force on Impact Side Y |      |           |       |
| Plot No.                               |      | SAE Class | Units |
| 022                                    |      | 600       | N     |
| Max                                    | Time | Min       | Time  |
| 79.6                                   | 94.2 | -145.4    | 31.1  |



| Curve Description                           |      |           |       |
|---------------------------------------------|------|-----------|-------|
| Passenger Acetabulum Force on Impact Side Y |      |           |       |
| Plot No.                                    |      | SAE Class | Units |
| 023                                         |      | 600       | N     |
| Max                                         | Time | Min       | Time  |
| 796.6                                       | 51.7 | -125.5    | 94.6  |



| Curve Description            |      |           |       |
|------------------------------|------|-----------|-------|
| Passenger Total Pelvic Force |      |           |       |
| Plot No.                     |      | SAE Class | Units |
| 024                          |      | 600       | N     |
| Max                          | Time | Min       | Time  |
| 733.3                        | 52.8 | -122.5    | 31.1  |

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

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



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**ES-2re 50th Male Side Impact ATD**  
**External Measurements**

ATD Serial No.: F035

Test Date: 2018-09-20

| Tested Parameter                                 | Units | Spec Low | Spec. High           | Result | Pass/Fail |
|--------------------------------------------------|-------|----------|----------------------|--------|-----------|
| Laboratory Temperature                           | °C    | 20.6     | 22.2                 | 21.4   | Pass      |
| Laboratory Relative Humidity                     | %     | 10       | 70                   | 32     | Pass      |
| 1 - Sitting Height                               | mm    | 900      | 918                  | 912    | Pass      |
| 2 - Seat to Shoulder Joint                       | mm    | 558      | 572                  | 566    | Pass      |
| 3 - Seat to Lower Face of Thoracic Spine Box     | mm    | 346      | 356                  | 350    | Pass      |
| 4 - Seat to Hip Joint (bolt center)              | mm    | 97       | 103                  | 102    | Pass      |
| 5 - Sole to Seat, Sitting                        | mm    | 433      | 451                  | 435    | Pass      |
| 6 - Head Width                                   | mm    | 152      | 158                  | 155    | Pass      |
| 7 - Shoulder/Arm Width                           | mm    | 461      | 479                  | 472    | Pass      |
| 8 - Thorax Width                                 | mm    | 322      | 332                  | 325    | Pass      |
| 9 - Abdomen Width                                | mm    | 273      | 287                  | 282    | Pass      |
| 10 - Pelvis Lap Width                            | mm    | 359      | 373                  | 371    | Pass      |
| 11 - Head Depth                                  | mm    | 196      | 206                  | 205    | Pass      |
| 12 - Thorax Depth                                | mm    | 262      | 272                  | 267    | Pass      |
| 13 - Abdomen Depth                               | mm    | 194      | 204                  | 202    | Pass      |
| 14 - Pelvis Depth                                | mm    | 235      | 245                  | 242    | Pass      |
| 15 - Back of Buttocks to Hip Joint (bolt Center) | mm    | 150      | 160                  | 153    | Pass      |
| 16 - Back of Buttocks to Front Knee              | mm    | 597      | 615                  | 602    | Pass      |
|                                                  |       |          | Overall Test Results | Pass   |           |

Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto



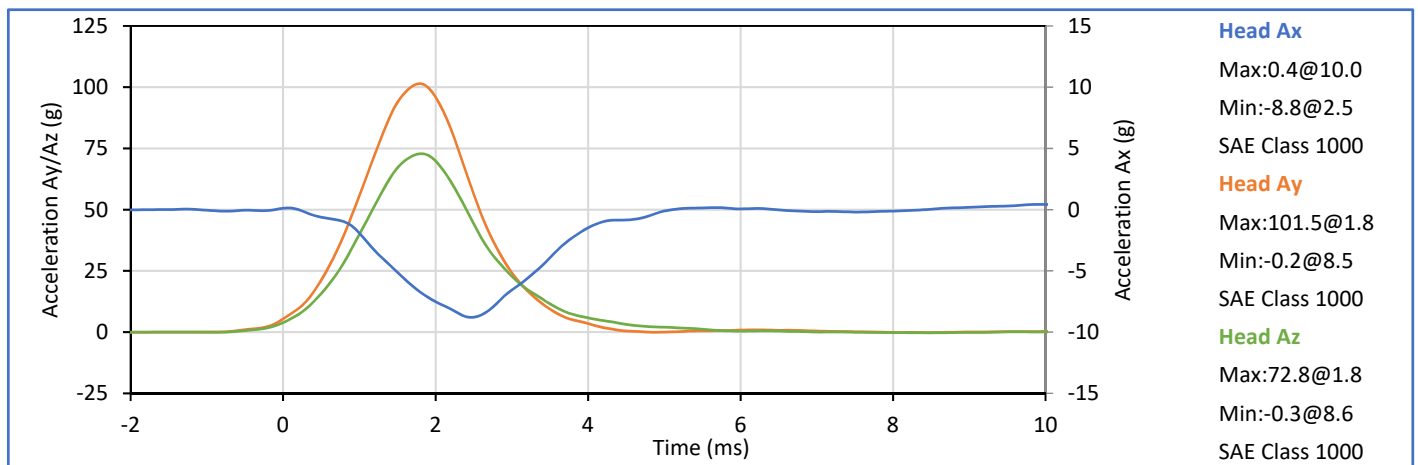
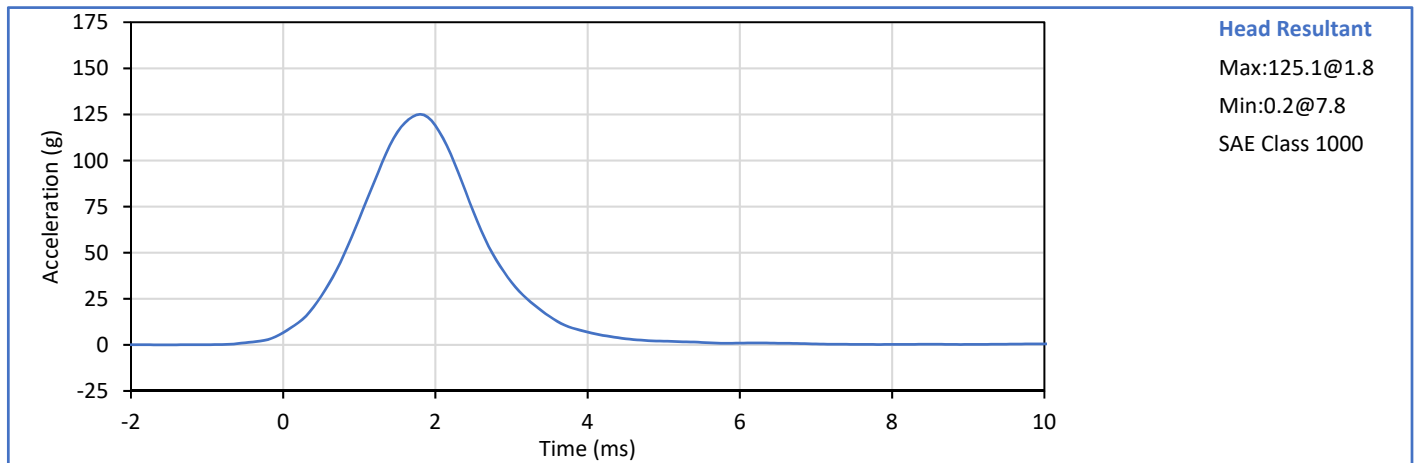
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 Info@karco.com www.karco.com

## ES-2re 50th Male Side Impact ATD Head Drop

ATD Serial No.: F035

Test Date: 2018-09-21

| Tested Parameter              | Units  | Spec. Low | Spec. High           | Result | Pass/Fail |
|-------------------------------|--------|-----------|----------------------|--------|-----------|
| Laboratory Temperature        | °C     | 18.9      | 25.6                 | 21.4   | Pass      |
| Laboratory Humidity           | %      | 10        | 70                   | 28     | Pass      |
| Peak Resultant Acceleration   | g      | 125.0     | 155.0                | 125.1  | Pass      |
| Peak Head Ax                  | g      | -15.0     | 15.0                 | 0.4    | Pass      |
| Oscillations After Main Pulse | %      | 0.0       | 15.0                 | 0.8    | Pass      |
| Is Acceleration Unimodal?     | Yes/No | Yes       |                      | Yes    | Pass      |
|                               |        |           | Overall Test Results | Pass   |           |



Technician: \_\_\_\_\_

*T. Lowman*

T. Lowman

Approved By: \_\_\_\_\_

*P. Puzzuto*

P. Puzzuto



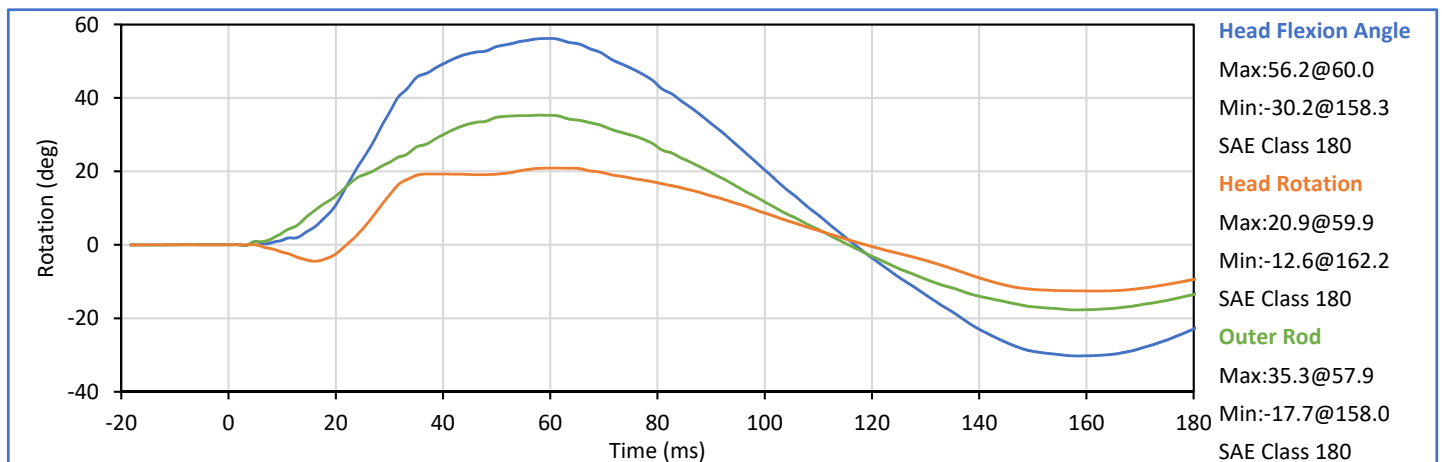
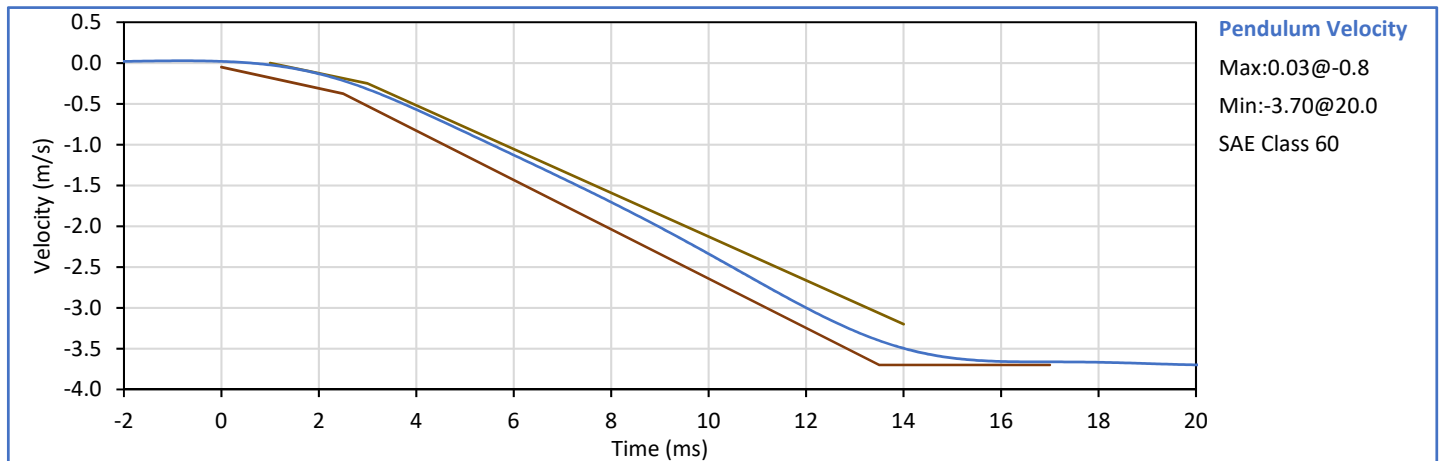
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## ES-2re 50th Male Side Impact ATD Neck Flexion

ATD Serial No.: F035

Test Date: 2018-09-20

| Tested Parameter              | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|-------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature        | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity           | %     | 10        | 70         | 24     | Pass      |
| Pendulum Velocity             | m/s   | 3.30      | 3.50       | 3.48   | Pass      |
| Peak Headform Flexion         | deg   | 49.0      | 59.0       | 56.2   | Pass      |
| Time of Peak Headform Flexion | ms    | 54.0      | 66.0       | 60.0   | Pass      |
| Flexion Decay (Peak to zero)  | ms    | 53.0      | 88.0       | 56.9   | Pass      |
| Overall Test Results          |       |           |            |        | Pass      |



Technician: J. Hernandez

J. Hernandez

Approved By: P. Puzzuto

P. Puzzuto



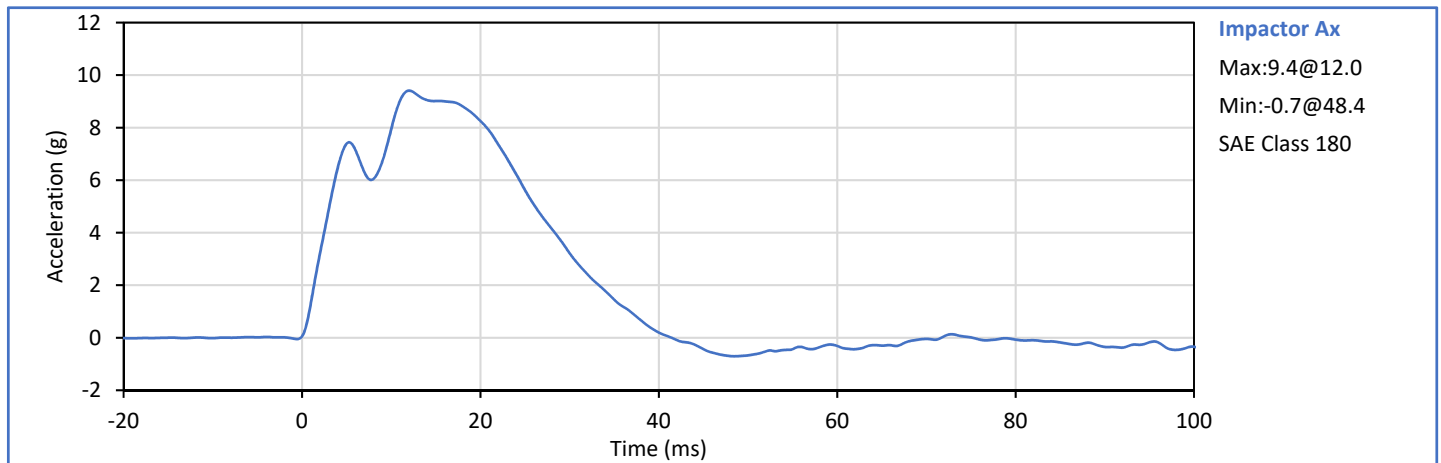
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Info@karco.com www.karco.com

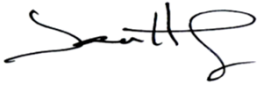
# ES-2re 50th Male Side Impact ATD Shoulder Impact Test

ATD Serial No.: F035

Test Date: 2018-09-24

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.6   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 33     | Pass      |
| Impactor Velocity      | m/s   | 4.20      | 4.40       | 4.29   | Pass      |
| Peak Impactor Ax       | g     | 7.5       | 10.5       | 9.4    | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto



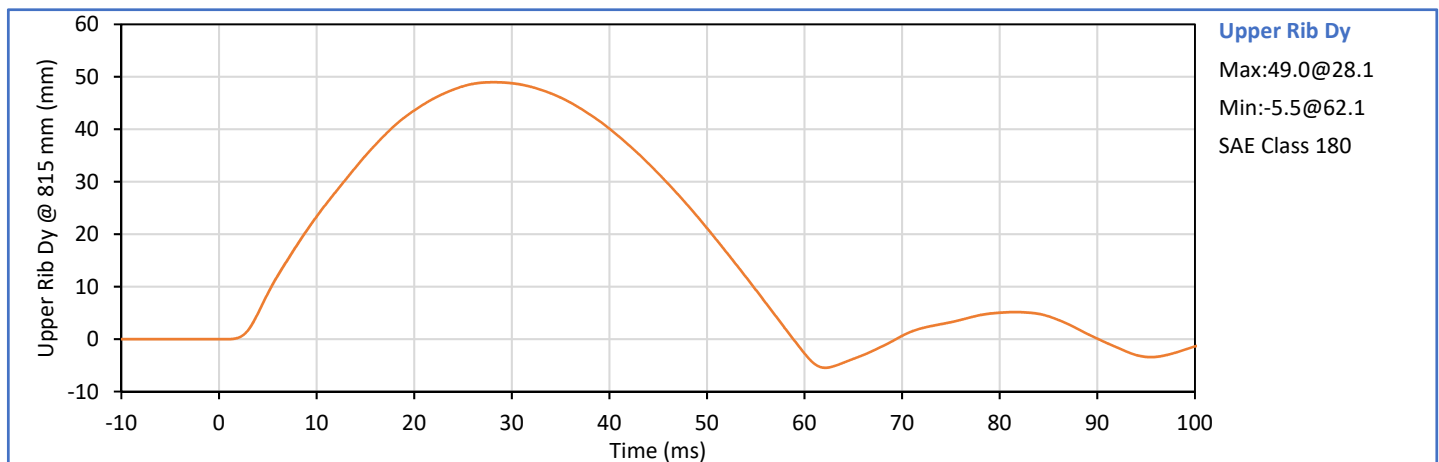
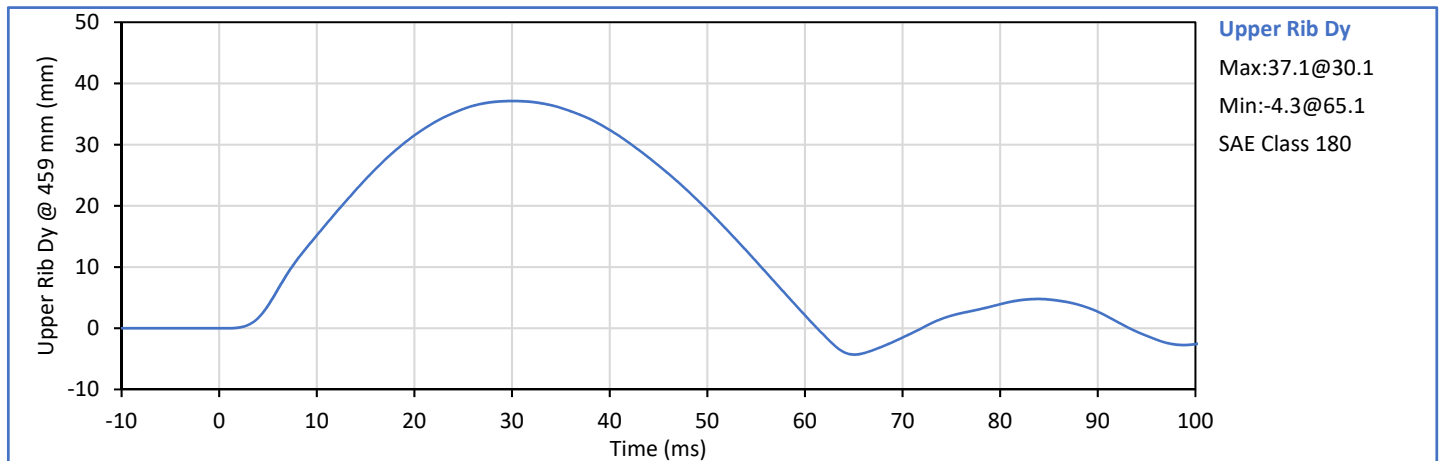
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## ES-2re 50th Male Side Impact ATD Upper Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-09-24

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 32     | Pass      |
| Upper Rib Dy @ (459mm) | mm    | 36.0      | 40.0       | 37.1   | Pass      |
| Upper Rib Dy @ (815mm) | mm    | 46.0      | 51.0       | 49.0   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto



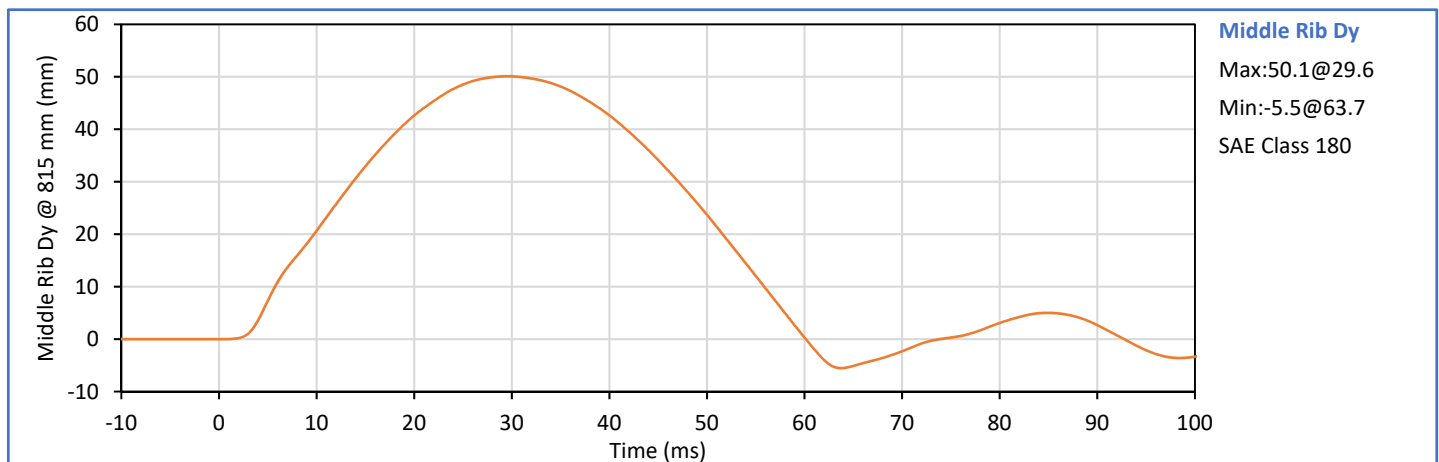
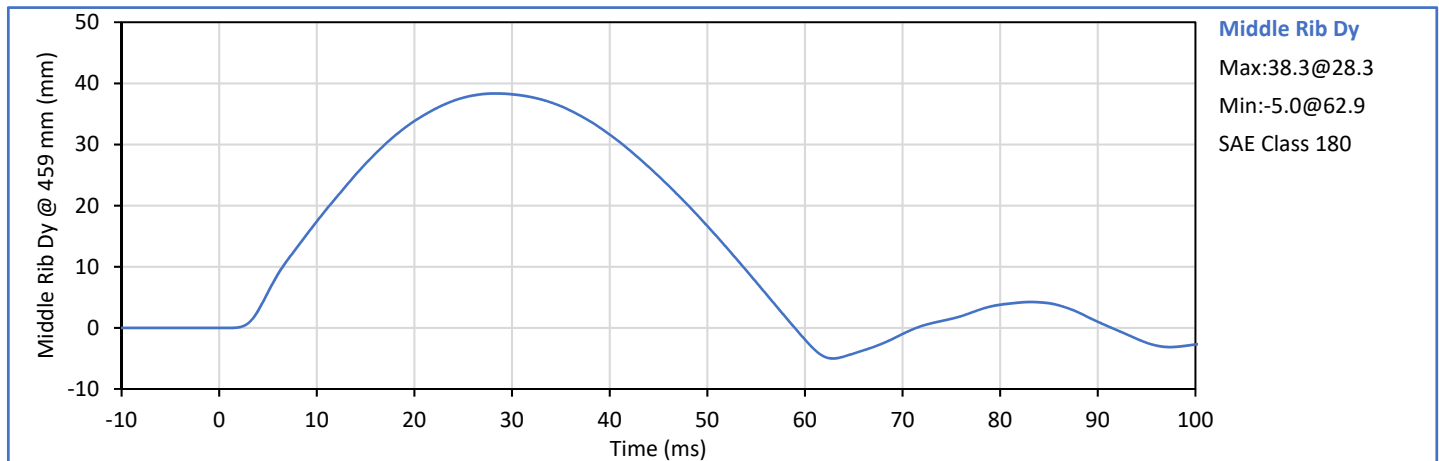
9270 Holly Road, Adelanto, CA 92301  
Tel: +1 760 246 1672 Fax: +1 760 246 8112  
Info@karco.com www.karco.com

## ES-2re 50th Male Side Impact ATD Middle Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-09-24

| Tested Parameter        | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|-------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature  | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity     | %     | 10        | 70         | 32     | Pass      |
| Middle Rib Dy @ (459mm) | mm    | 36.0      | 40.0       | 38.3   | Pass      |
| Middle Rib Dy @ (815mm) | mm    | 46.0      | 51.0       | 50.1   | Pass      |
| Overall Test Results    |       |           |            | Pass   | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto



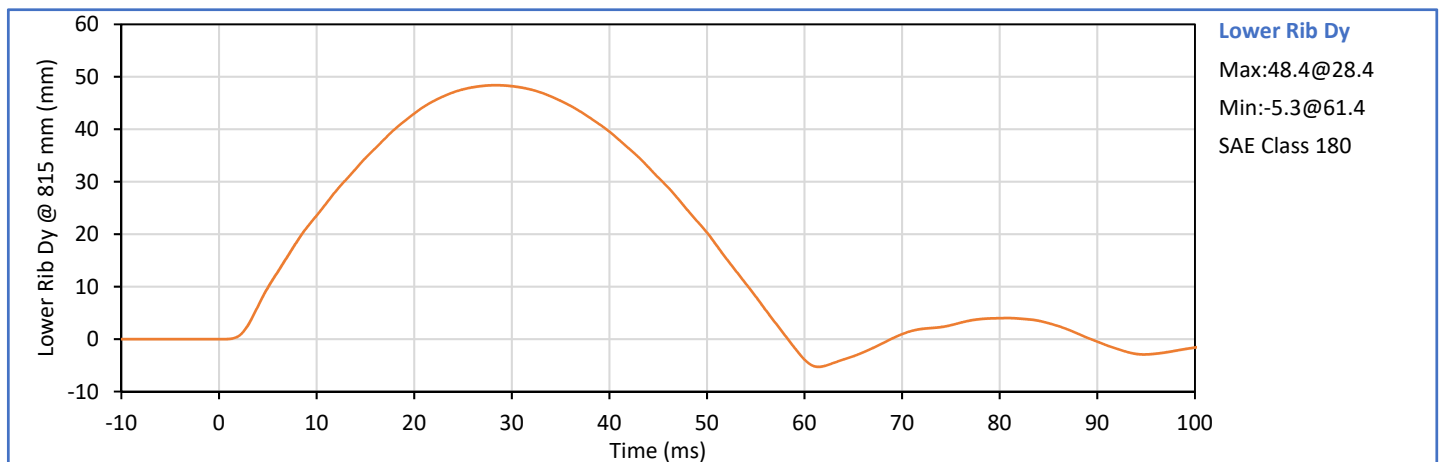
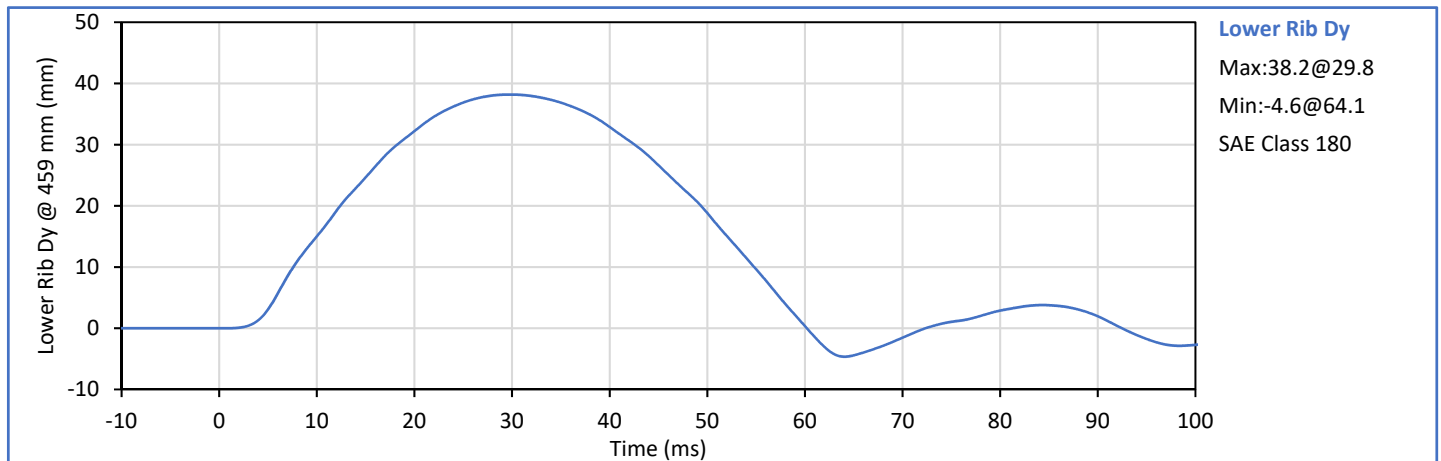
9270 Holly Road, Adelanto, CA 92301  
 Tel: +1 760 246 1672 Fax: +1 760 246 8112  
 Info@karco.com www.karco.com

## ES-2re 50th Male Side Impact ATD Lower Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-09-24

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 32     | Pass      |
| Lower Rib Dy @ (459mm) | mm    | 36.0      | 40.0       | 38.2   | Pass      |
| Lower Rib Dy @ (815mm) | mm    | 46.0      | 51.0       | 48.4   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

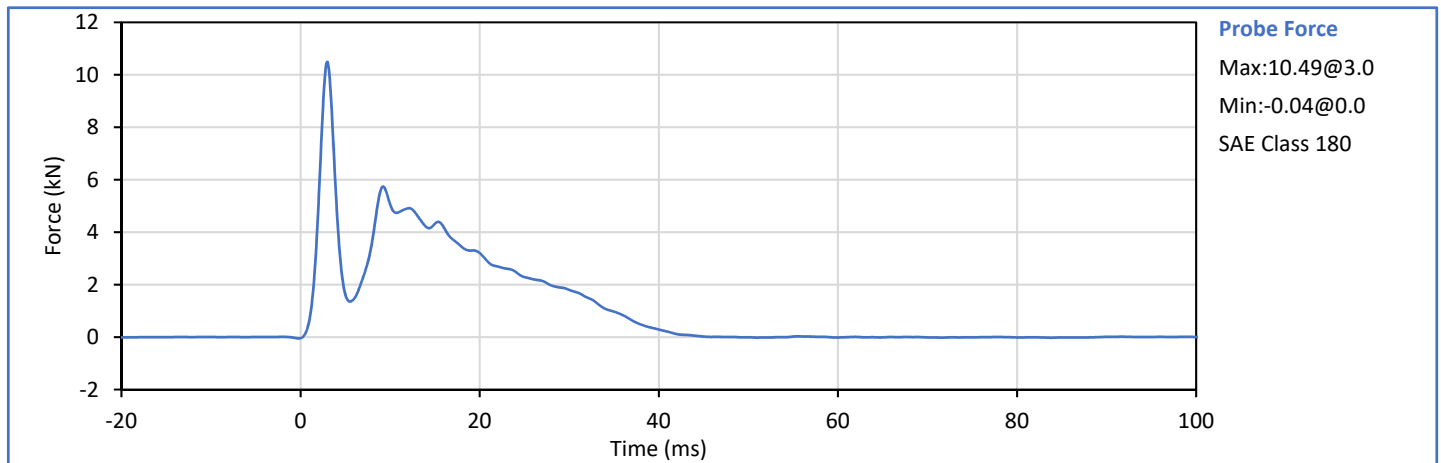
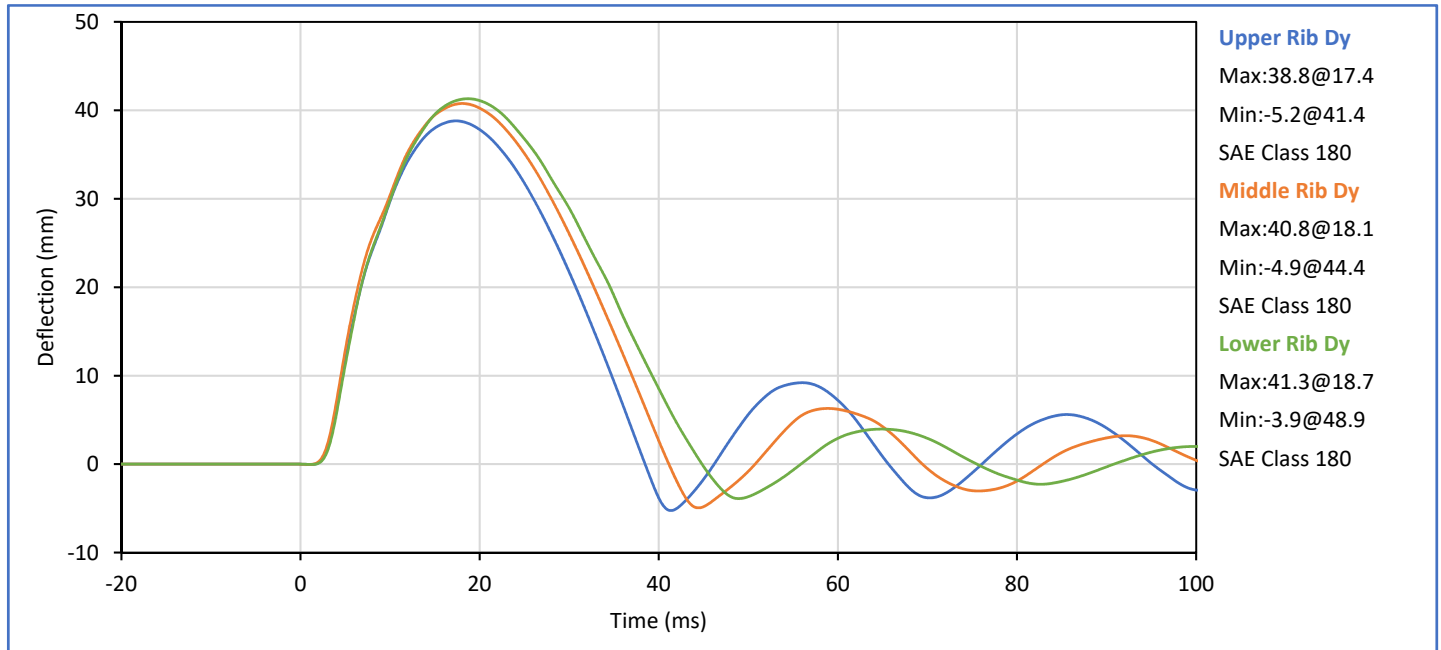


**ES-2re 50th Male Side Impact ATD**  
**Thorax Impact (Full Body)**

ATD Serial No.: F035

Test Date: 2018-09-24

| Tested Parameter               | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|--------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature         | °C    | 20.6      | 22.2       | 21.6   | Pass      |
| Laboratory Humidity            | %     | 10        | 70         | 32     | Pass      |
| Impactor Velocity              | m/s   | 5.40      | 5.60       | 5.58   | Pass      |
| Peak Upper Rib Dy              | mm    | 34.0      | 41.0       | 38.8   | Pass      |
| Peak Middle Rib Dy             | mm    | 37.0      | 45.0       | 40.8   | Pass      |
| Peak Lower Rib Dy              | mm    | 37.0      | 44.0       | 41.3   | Pass      |
| Peak Impactor Force After 6 ms | kN    | 5.10      | 6.20       | 5.74   | Pass      |
| Overall Test Results           |       |           |            | Pass   | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto

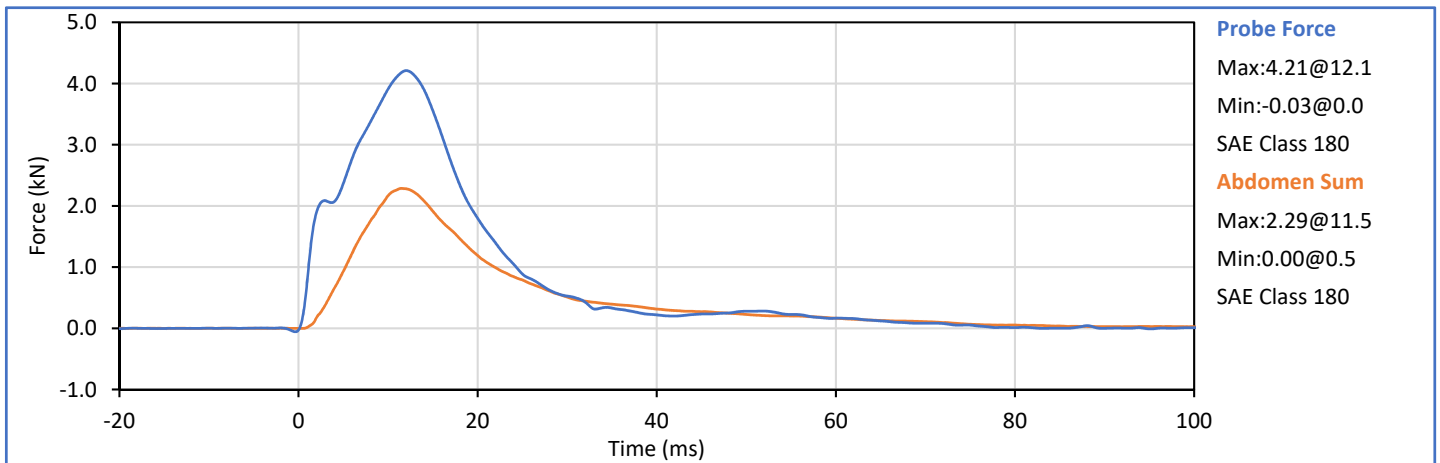
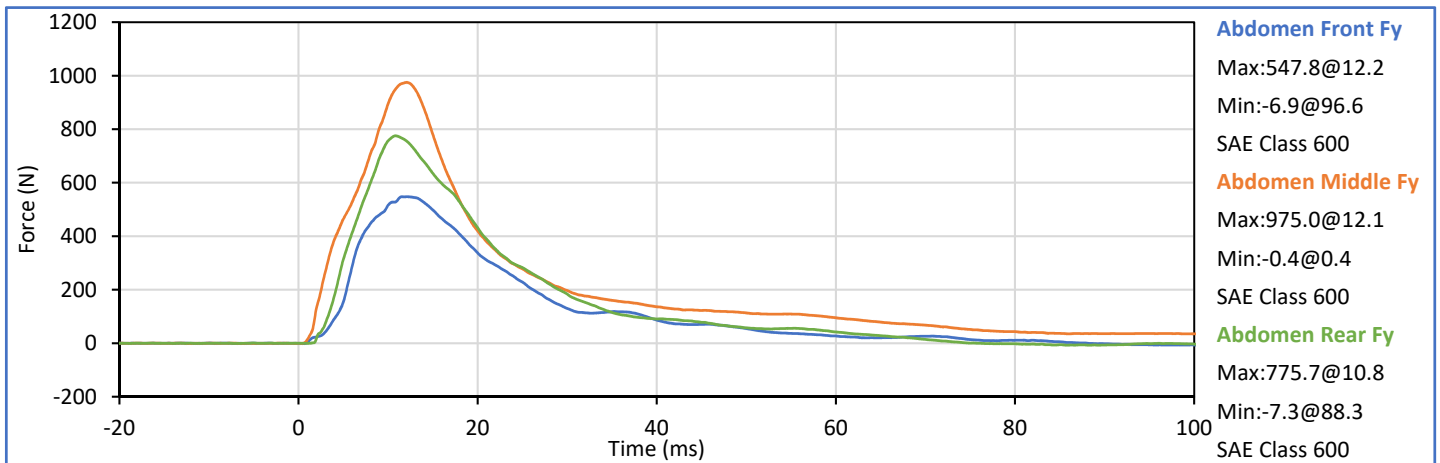


# ES-2re 50th Male Side Impact ATD Abdomen Impact

ATD Serial No.: F035

Test Date: 2018-09-24

| Tested Parameter               | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|--------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature         | °C    | 20.6      | 22.2       | 21.6   | Pass      |
| Laboratory Humidity            | %     | 10        | 70         | 32     | Pass      |
| Impactor Velocity              | m/s   | 3.90      | 4.10       | 4.02   | Pass      |
| Peak Impactor Force            | kN    | 4.00      | 4.80       | 4.21   | Pass      |
| Time of Peak Impactor Force    | ms    | 10.6      | 13.0       | 12.1   | Pass      |
| Sum of Abdomen Forces          | kN    | 2.20      | 2.70       | 2.29   | Pass      |
| Time of Peak Sum Abdomen Force | ms    | 10.0      | 12.3       | 11.5   | Pass      |
| Overall Test Results           |       |           |            | Pass   | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto

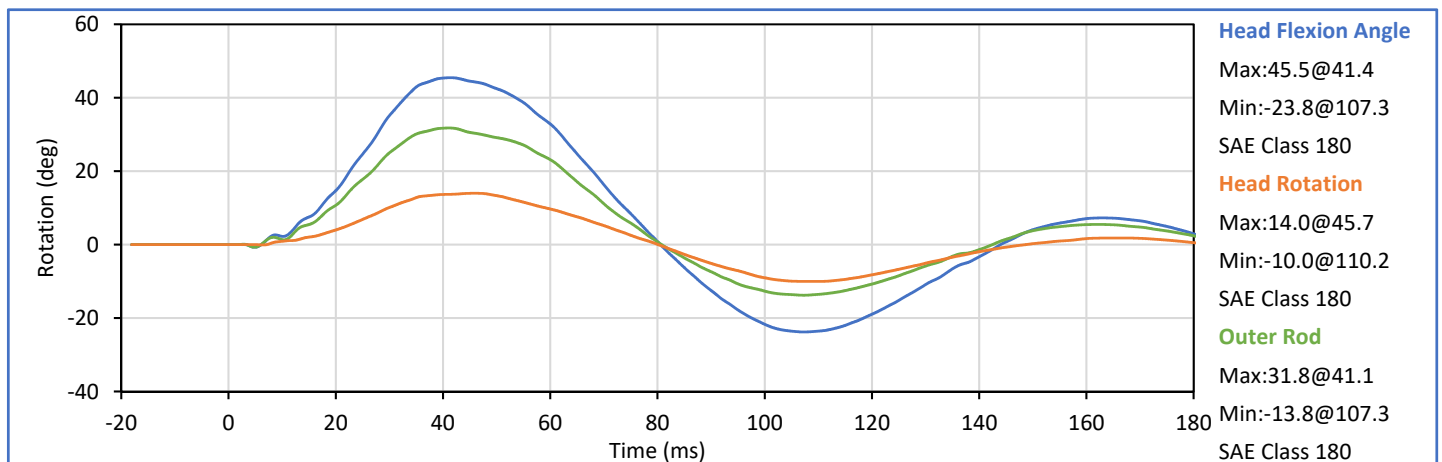
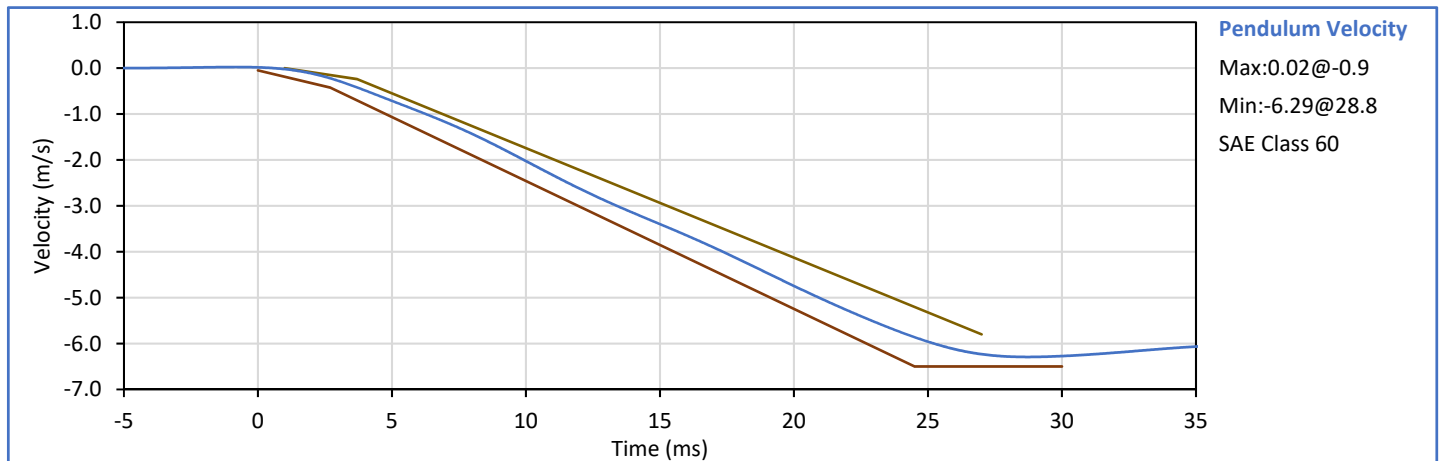


# ES-2re 50th Male Side Impact ATD Lumbar Spine Flexion

ATD Serial No.: F035

Test Date: 2018-09-21

| Tested Parameter              | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|-------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature        | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity           | %     | 10        | 70         | 25     | Pass      |
| Pendulum Velocity             | m/s   | 5.95      | 6.15       | 6.14   | Pass      |
| Peak Headform Flexion         | deg   | 45.0      | 55.0       | 45.5   | Pass      |
| Time of Peak Headform Flexion | ms    | 39.0      | 53.0       | 41.4   | Pass      |
| Flexion Decay (Peak to zero)  | ms    | 37.0      | 57.0       | 39.2   | Pass      |
| Overall Test Results          |       |           |            |        | Pass      |



Technician: J. Hernandez

J. Hernandez

Approved By: P. Puzzuto

P. Puzzuto

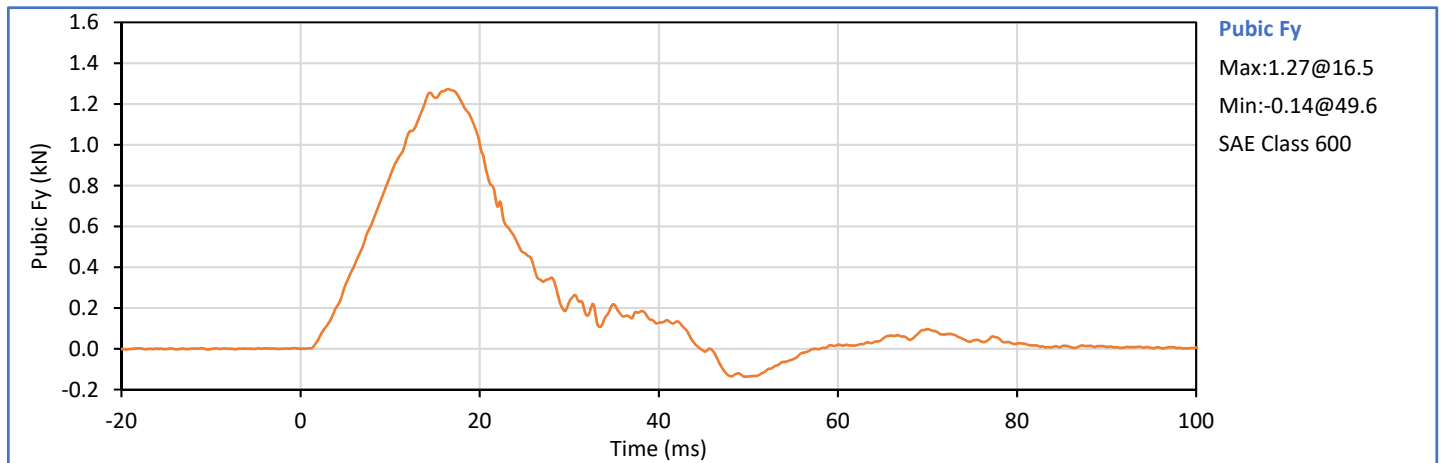
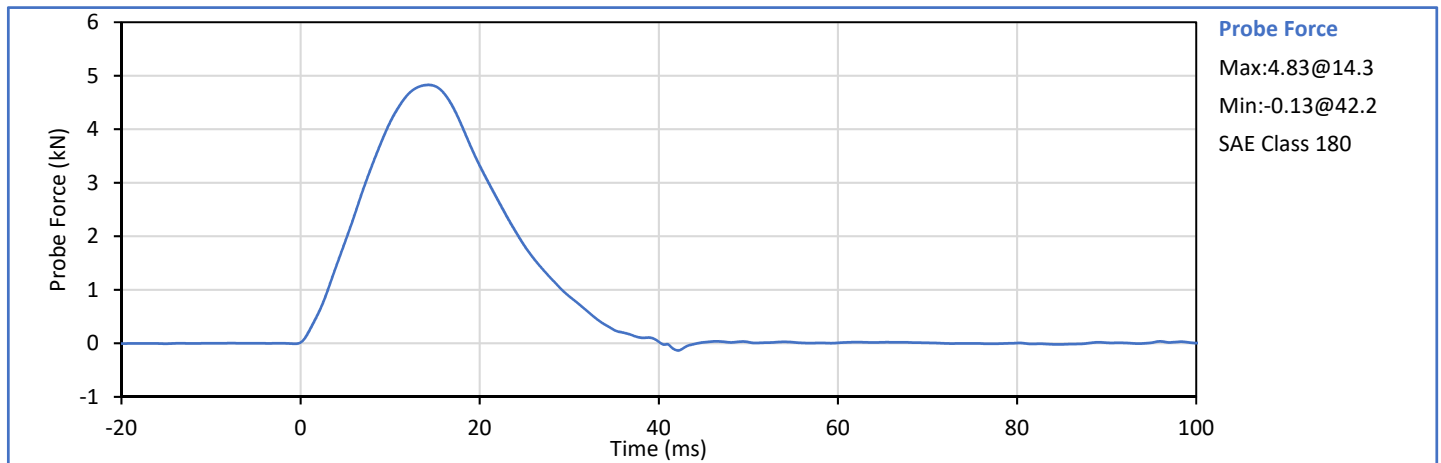


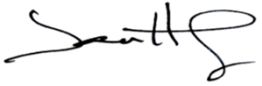
**ES-2re 50th Male Side Impact ATD**  
**Pelvis Impact**

ATD Serial No.: F035

Test Date: 2018-09-24

| Tested Parameter                | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity             | %     | 10        | 70         | 32     | Pass      |
| Impactor Velocity               | m/s   | 4.20      | 4.40       | 4.38   | Pass      |
| Peak Impactor Force             | kN    | 4.70      | 5.40       | 4.83   | Pass      |
| Time of Peak Impactor Force     | ms    | 11.8      | 16.1       | 14.3   | Pass      |
| Pubic Symphysis Fy              | kN    | 1.23      | 1.59       | 1.27   | Pass      |
| Time of Peak Pubic Symphysis Fy | ms    | 12.2      | 17.0       | 16.5   | Pass      |
| Overall Test Results            |       |           |            | Pass   |           |



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto



**SID-IIs Small Side Impact ATD**  
**External Measurements**

ATD Serial No.: 308

Test Date: 2018-09-20

| Tested Parameter                 | Units | Spec Low | Spec. High           | Result | Pass/Fail |
|----------------------------------|-------|----------|----------------------|--------|-----------|
| Laboratory Temperature           | °C    | 20.6     | 22.2                 | 21.2   | Pass      |
| Laboratory Relative Humidity     | %     | 10       | 70                   | 44     | Pass      |
| A - Sitting Height               | mm    | 772      | 788                  | 782    | Pass      |
| B - Shoulder Pivot Height        | mm    | 437      | 453                  | 450    | Pass      |
| C - Hpoint Height                | mm    | 79       | 89                   | 87     | Pass      |
| D - H Point From Seatback        | mm    | 141      | 151                  | 146    | Pass      |
| E - Shoulder Pivot From Backline | mm    | 97       | 107                  | 103    | Pass      |
| F - Thigh Clearance              | mm    | 119      | 135                  | 126    | Pass      |
| G - Head Breadth                 | mm    | 140      | 148                  | 145    | Pass      |
| H - Head Back From Backline      | mm    | 40       | 46                   | 42     | Pass      |
| I - Head Depth                   | mm    | 178      | 188                  | 185    | Pass      |
| J - Head Circumference           | mm    | 541      | 551                  | 547    | Pass      |
| K - Buttock To Knee Length       | mm    | 514      | 540                  | 520    | Pass      |
| L - Popliteal Height             | mm    | 343      | 369                  | 350    | Pass      |
| K - Knee Pivot To Floor Height   | mm    | 392      | 409                  | 401    | Pass      |
| N - Buttock Popliteal Length     | mm    | 416      | 442                  | 427    | Pass      |
| O - Chest Depth W/O Jacket       | mm    | 195      | 211                  | 206    | Pass      |
| P - Foot Length                  | mm    | 216      | 232                  | 227    | Pass      |
| Q - Hip Breadth (W/Pelvic Plugs) | mm    | 313      | 323                  | 321    | Pass      |
| R - Arm Length                   | mm    | 249      | 259                  | 256    | Pass      |
| S - Knee Joint To Seatback       | mm    | 477      | 493                  | 484    | Pass      |
| V - Shoulder Width               | mm    | 341      | 357                  | 348    | Pass      |
| W - Foot Width                   | mm    | 78       | 94                   | 84     | Pass      |
| Y - Chest Circumference W/Jacket | mm    | 851      | 881                  | 871    | Pass      |
| Z - Waist Circumference          | mm    | 761      | 791                  | 776    | Pass      |
|                                  |       |          | Overall Test Results |        | Pass      |

Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto

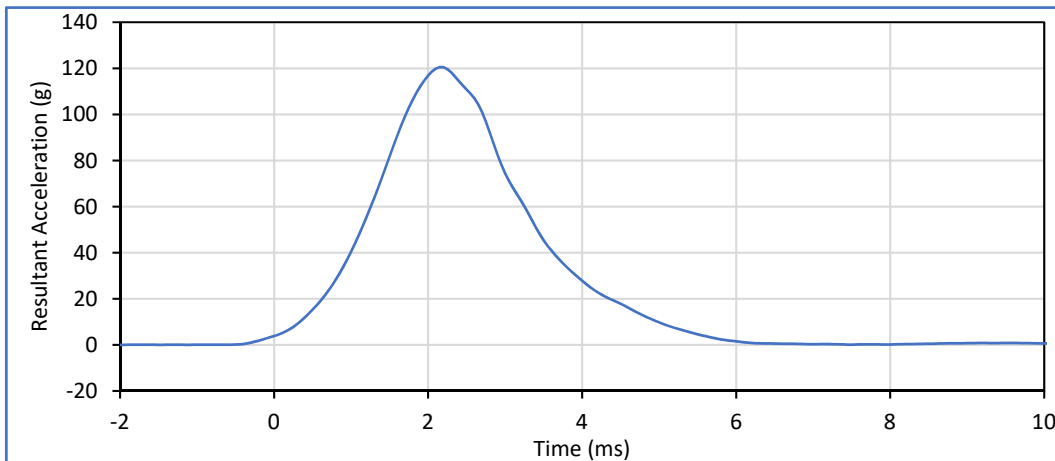


# SID-IIs Small Side Impact ATD Head Drop

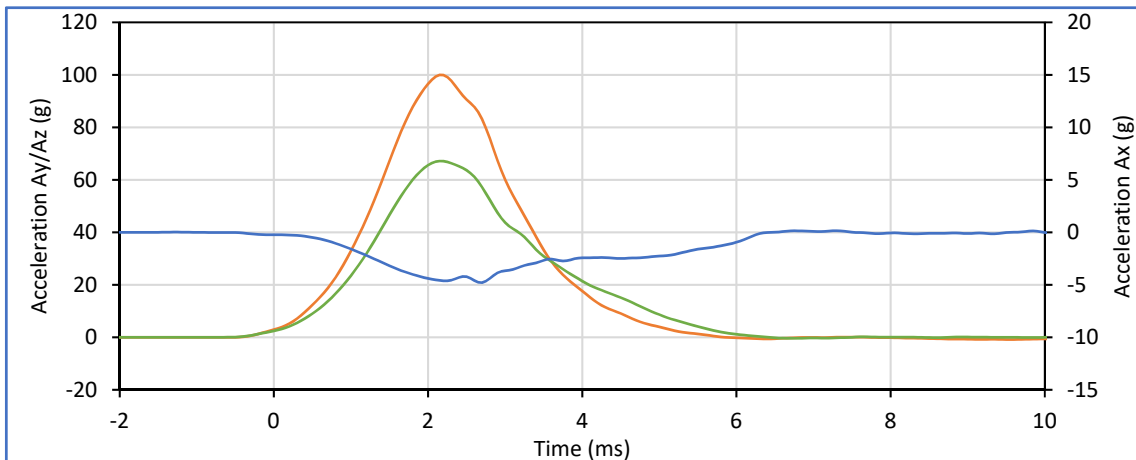
ATD Serial No.: 308

Test Date: 2018-09-21

| Tested Parameter              | Units  | Spec. Low | Spec. High           | Result | Pass/Fail |
|-------------------------------|--------|-----------|----------------------|--------|-----------|
| Laboratory Temperature        | °C     | 18.9      | 25.6                 | 21.2   | Pass      |
| Laboratory Humidity           | %      | 10        | 70                   | 28     | Pass      |
| Peak Resultant Acceleration   | g      | 115.0     | 137.0                | 120.5  | Pass      |
| Peak Head Ax                  | g      | -15.0     | 15.0                 | -4.8   | Pass      |
| Oscillations After Main Pulse | %      | 0.0       | 15.0                 | 0.8    | Pass      |
| Is Acceleration Unimodal?     | Yes/No | Yes       |                      | Yes    | Pass      |
|                               |        |           | Overall Test Results | Pass   |           |



**Head Resultant**  
 Max:120.5@2.2  
 Min:0.0@7.5  
 SAE Class 1000



**Head Ax**  
 Max:0.2@7.3  
 Min:-4.8@2.7  
 SAE Class 1000  
**Head Ay**  
 Max:100.0@2.2  
 Min:-0.8@9.6  
 SAE Class 1000  
**Head Az**  
 Max:67.2@2.2  
 Min:-0.4@6.8  
 SAE Class 1000

Technician: T. Lowman

Approved By: P. Puzzuto

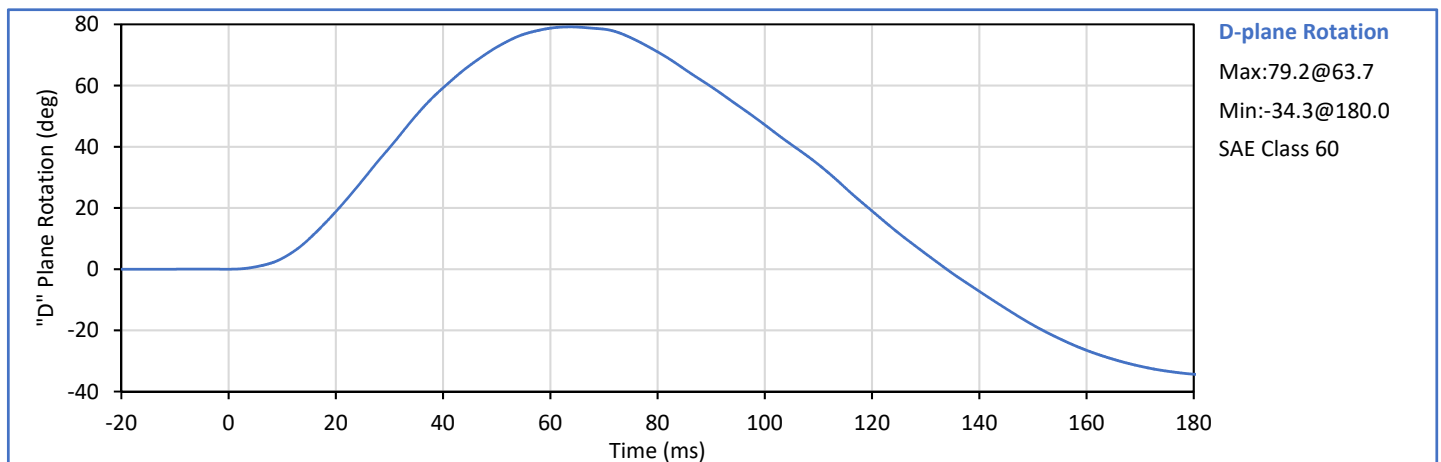
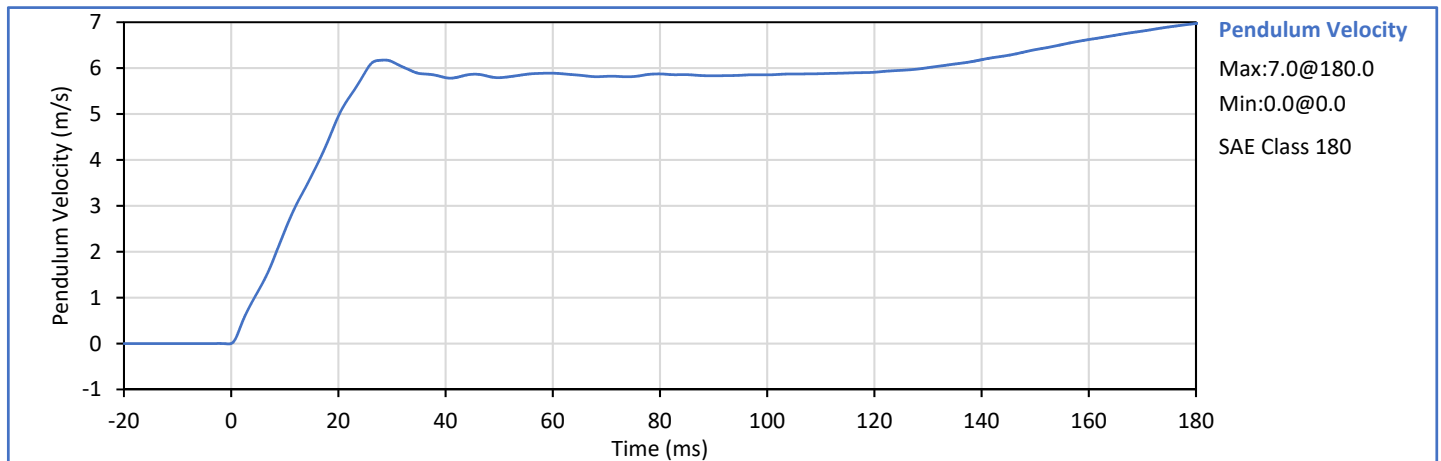


**SID-IIs Small Side Impact ATD  
Neck Flexion**

ATD Serial No.: 308

Test Date: 2018-09-20

| Tested Parameter                | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity             | %     | 10        | 70         | 26     | Pass      |
| Pendulum Velocity               | m/s   | 5.51      | 5.63       | 5.55   | Pass      |
| Pendulum Decel at 10 ms         | m/s   | 2.20      | 2.80       | 2.45   | Pass      |
| Pendulum Decel at 15 ms         | m/s   | 3.30      | 4.10       | 3.66   | Pass      |
| Pendulum Decel at 20 ms         | m/s   | 4.40      | 5.40       | 4.95   | Pass      |
| Pendulum Decel at 25 ms         | m/s   | 5.40      | 6.10       | 5.91   | Pass      |
| Pendulum Decel from 25-100 ms   | m/s   | 5.50      | 6.20       | 6.18   | Pass      |
| Peak "D" Plane Rotation         | deg   | 71.0      | 81.0       | 79.2   | Pass      |
| Time of Peak "D" Plane Rotation | ms    | 50.0      | 70.0       | 63.7   | Pass      |
| Peak Occ. Condyle Moment        | Nm    | -44.0     | -36.0      | -41.0  | Pass      |
| Time of Moment Decay to 0 Nm    | ms    | 102.0     | 126.0      | 118.3  | Pass      |
| Overall Test Results            |       |           |            | Pass   |           |

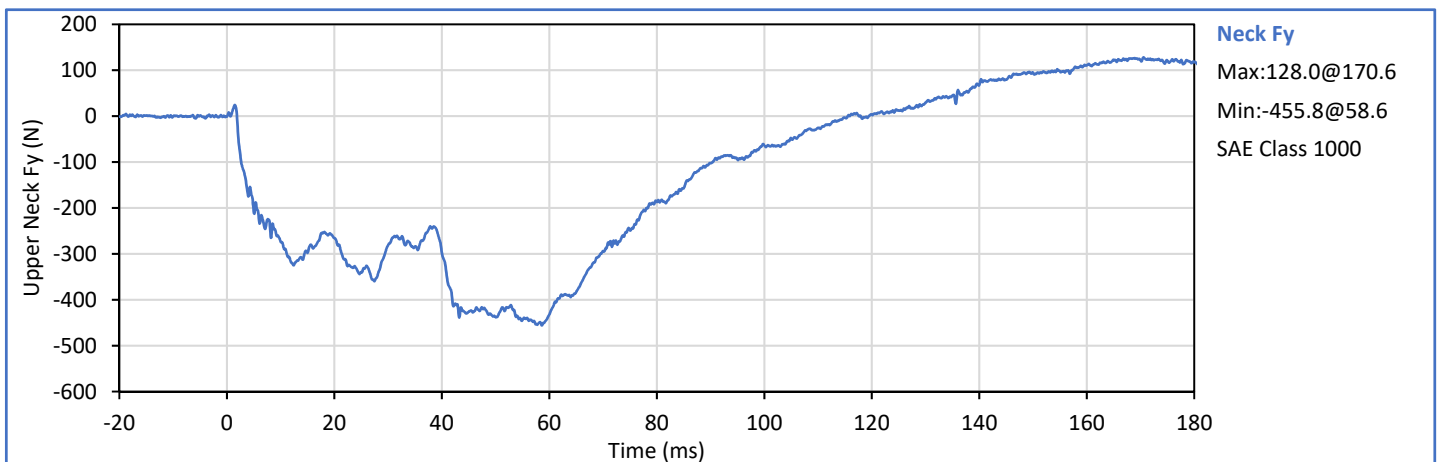
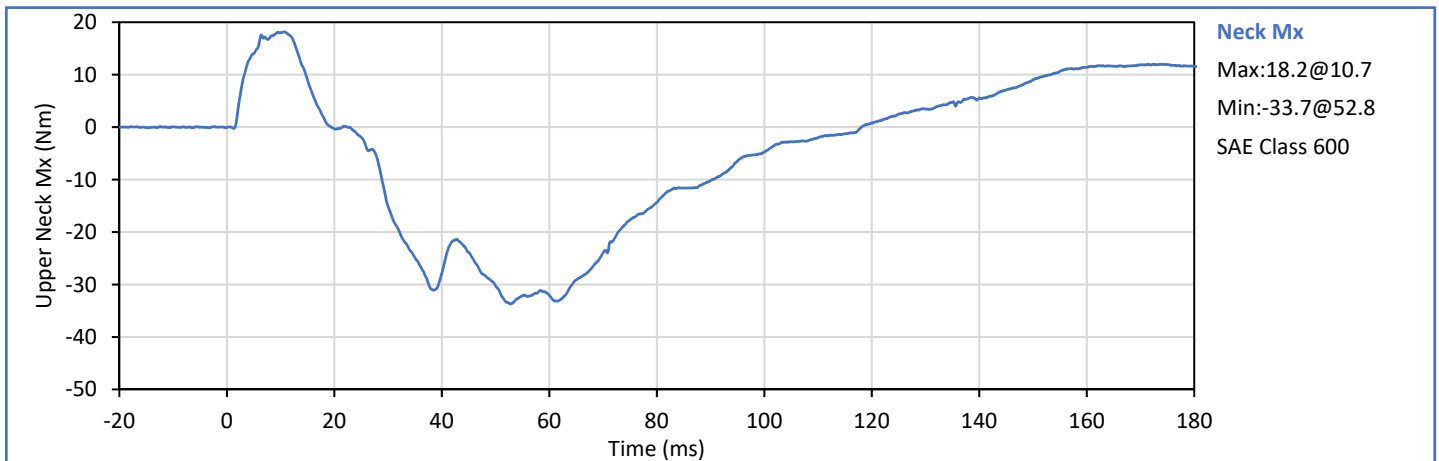
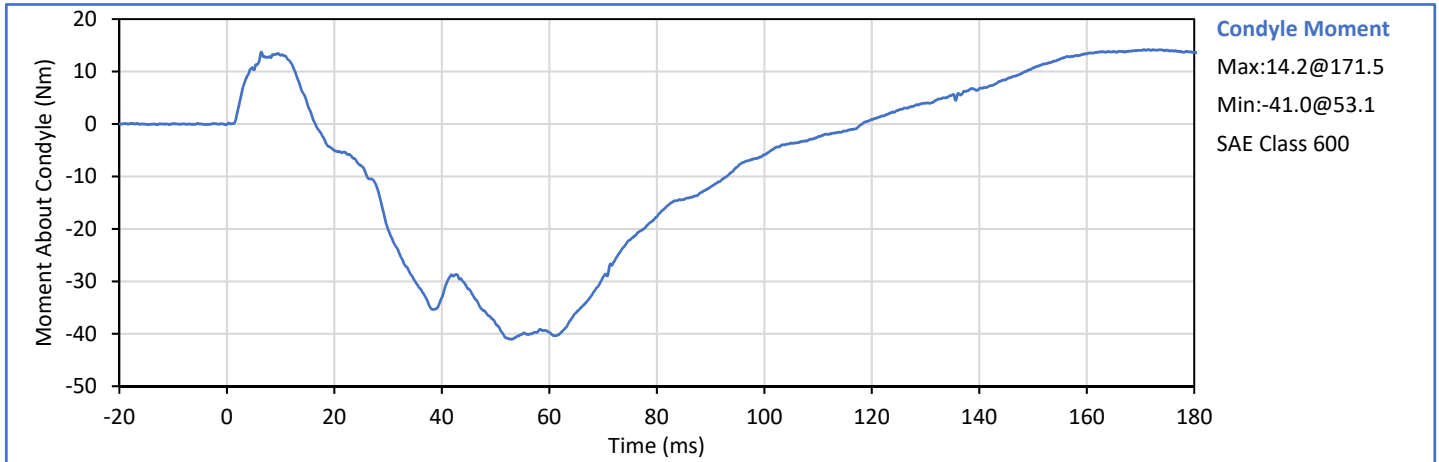


Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308

Test Date: 2018-09-20



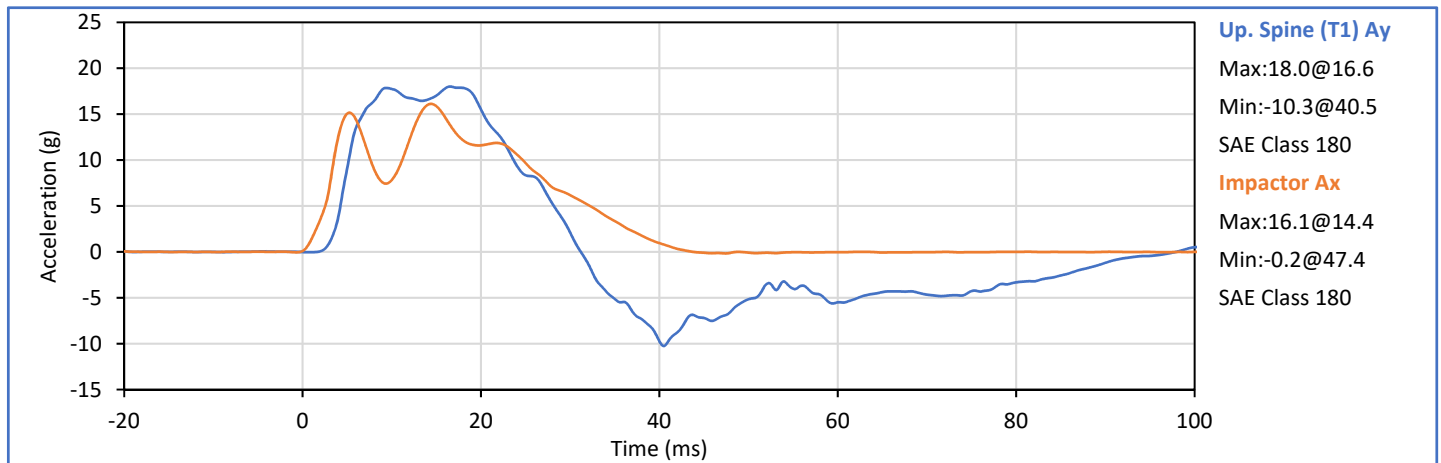
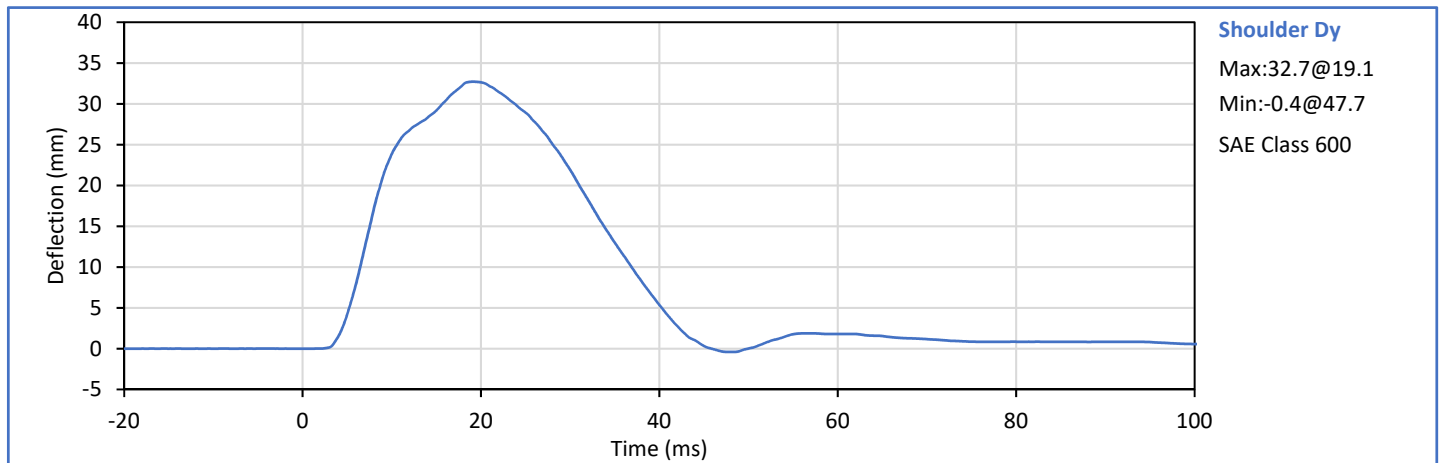


**SID-IIs Small Side Impact ATD**  
**Shoulder Impact Test**

ATD Serial No.: 308

Test Date: 2018-09-20

| Tested Parameter         | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|--------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature   | °C    | 20.6      | 22.2       | 21.8   | Pass      |
| Laboratory Humidity      | %     | 10        | 70         | 25     | Pass      |
| Impactor Velocity        | m/s   | 4.20      | 4.40       | 4.35   | Pass      |
| Peak Shoulder Dy         | mm    | 28.0      | 37.0       | 32.7   | Pass      |
| Peak Upper Spine (T1) Ay | g     | 17.0      | 22.0       | 18.0   | Pass      |
| Peak Impactor Ax         | g     | 13.0      | 18.0       | 16.1   | Pass      |
| Overall Test Results     |       |           |            |        | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto

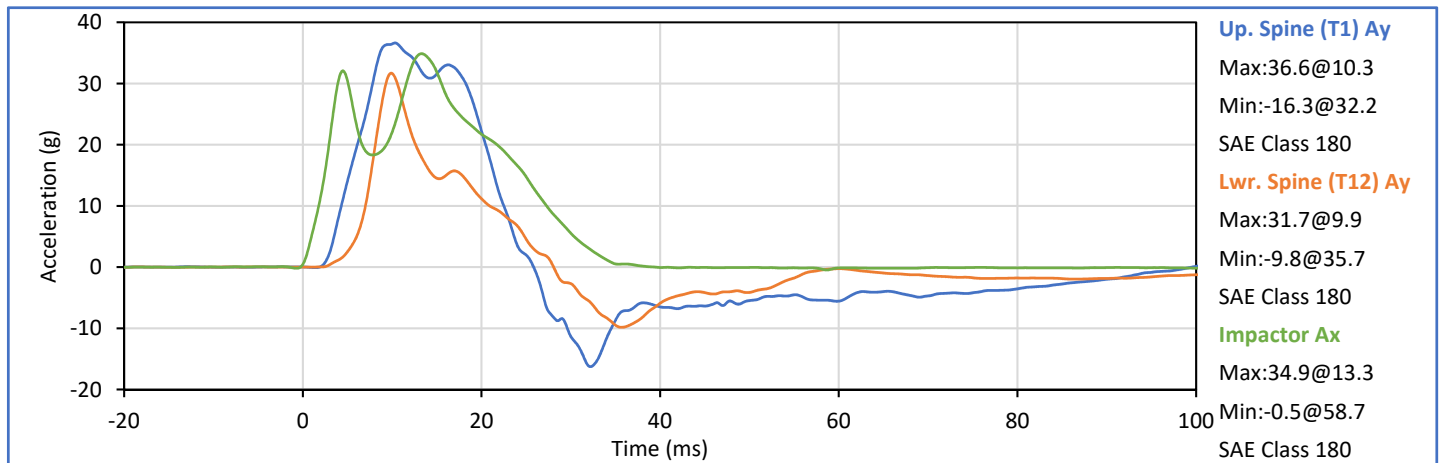
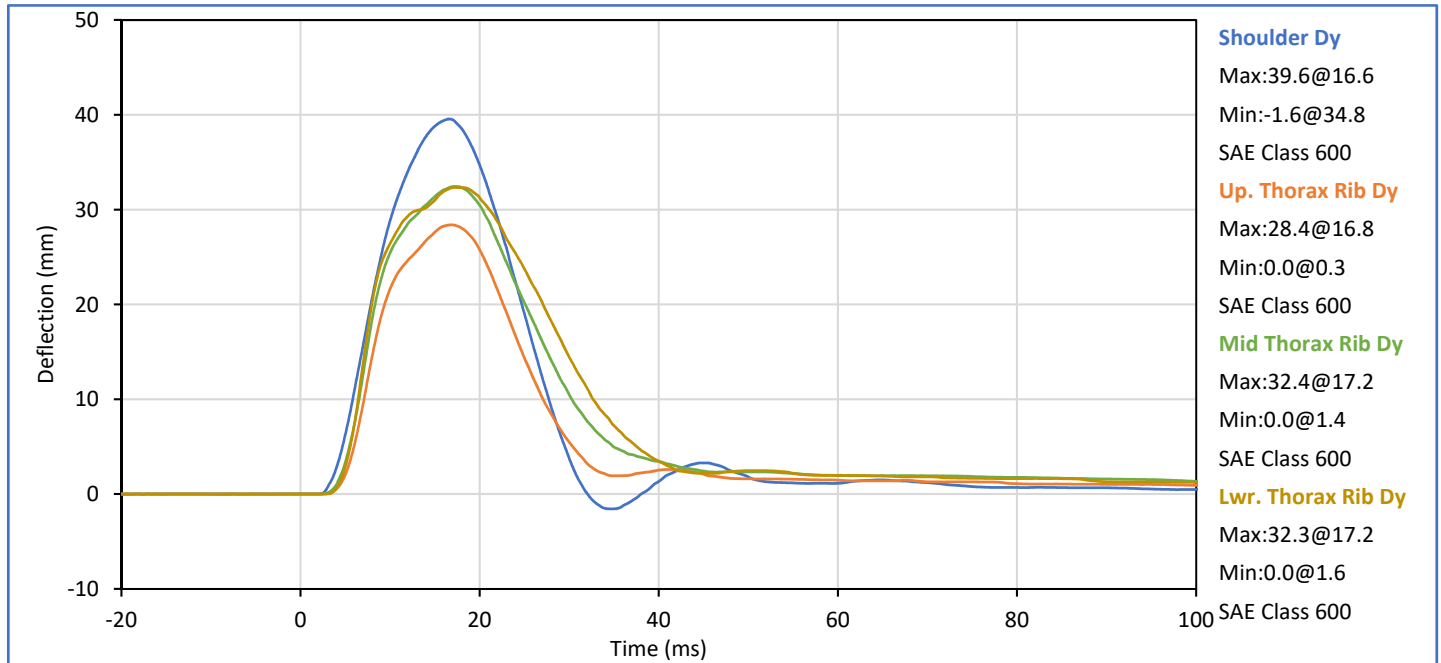


# SID-IIs Small Side Impact ATD Thorax (With Arm)

ATD Serial No.: 308

Test Date: 2018-09-20

| Tested Parameter          | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature    | °C    | 20.6      | 22.2       | 21.1   | Pass      |
| Laboratory Humidity       | %     | 10        | 70         | 25     | Pass      |
| Impactor Velocity         | m/s   | 6.60      | 6.80       | 6.68   | Pass      |
| Peak Shoulder Dy          | mm    | 31.0      | 40.0       | 39.6   | Pass      |
| Peak Upper Rib Dy         | mm    | 25.0      | 32.0       | 28.4   | Pass      |
| Peak Middle Rib Dy        | mm    | 30.0      | 36.0       | 32.4   | Pass      |
| Peak Lower Rib Dy         | mm    | 32.0      | 38.0       | 32.3   | Pass      |
| Peak Upper Spine (T1) Ay  | g     | 34.0      | 43.0       | 36.6   | Pass      |
| Peak Lower Spine (T12) Ay | g     | 29.0      | 37.0       | 31.7   | Pass      |
| Peak Impactor Ax          | g     | 30.0      | 36.0       | 34.9   | Pass      |
| Overall Test Results      |       |           |            | Pass   | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto

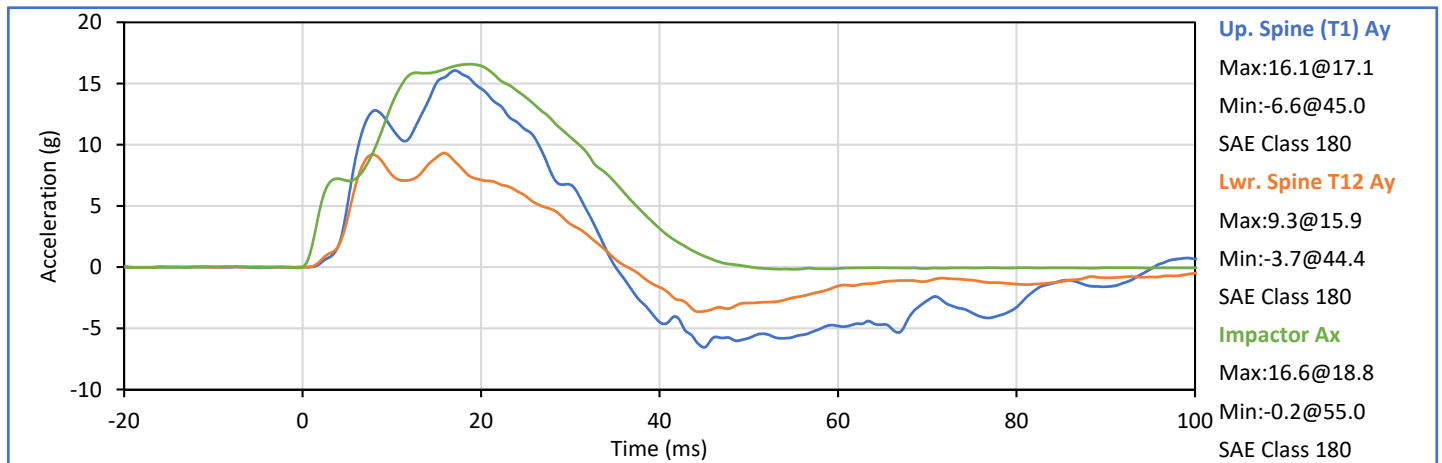
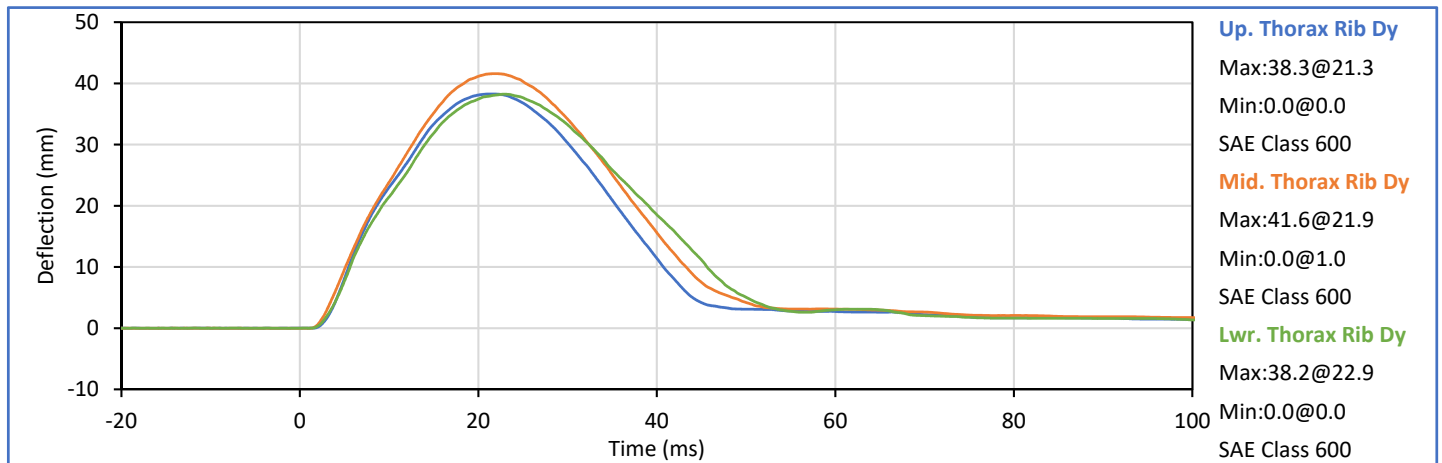


**SID-IIs Small Side Impact ATD  
 Thorax (No Arm)**

ATD Serial No.: 308

Test Date: 2018-09-20

| Tested Parameter          | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature    | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity       | %     | 10        | 70         | 25     | Pass      |
| Impactor Velocity         | m/s   | 4.20      | 4.40       | 4.35   | Pass      |
| Peak Upper Rib Dy         | mm    | 32.0      | 40.0       | 38.3   | Pass      |
| Peak Middle Rib Dy        | mm    | 39.0      | 45.0       | 41.6   | Pass      |
| Peak Lower Rib Dy         | mm    | 35.0      | 43.0       | 38.2   | Pass      |
| Peak Upper Spine (T1) Ay  | g     | 13.0      | 17.0       | 16.1   | Pass      |
| Peak Lower Spine (T12) Ay | g     | 7.0       | 11.0       | 9.3    | Pass      |
| Peak Impactor Ax          | g     | 14.0      | 18.0       | 16.6   | Pass      |
| Overall Test Results      |       |           |            | Pass   |           |



Technician: J. Hernandez

Approved By: P. Puzzuto

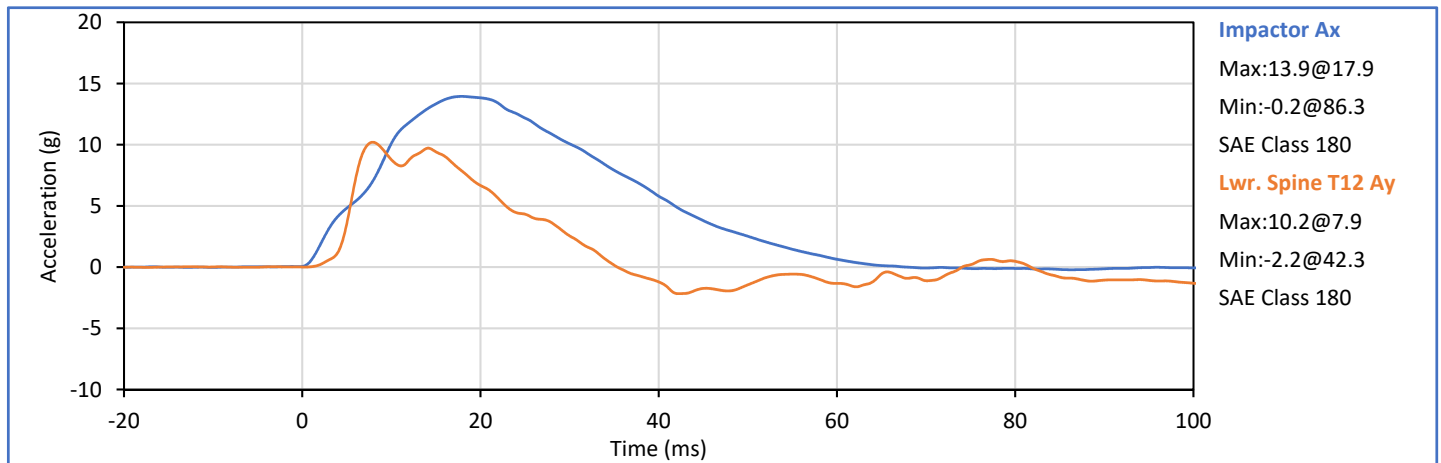
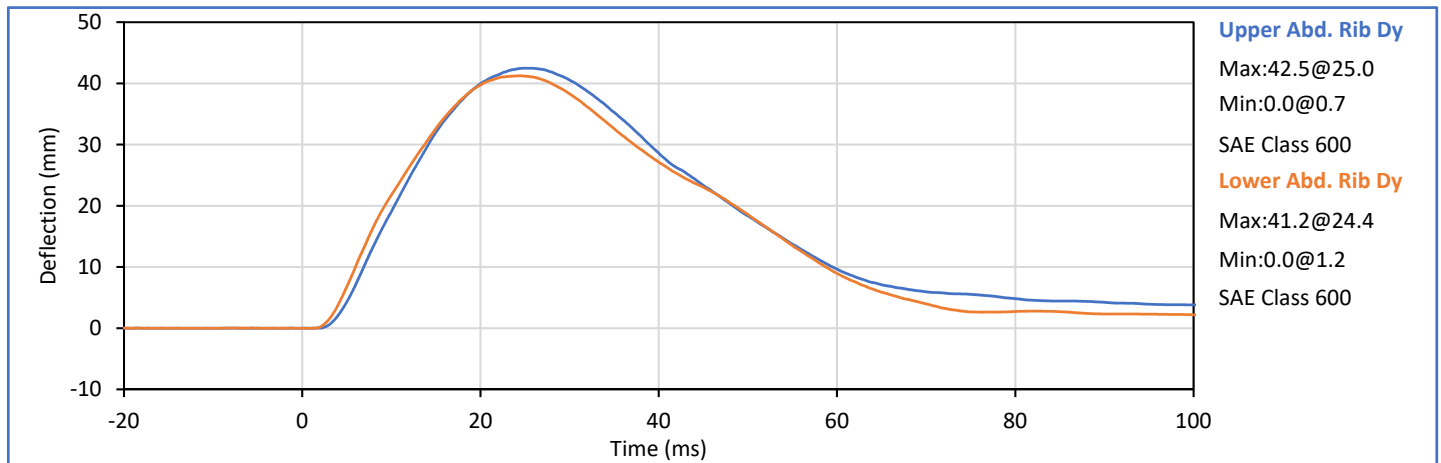


# SID-IIs Small Side Impact ATD Abdomen Impact

ATD Serial No.: 308

Test Date: 2018-09-20

| Tested Parameter          | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature    | °C    | 20.6      | 22.2       | 21.7   | Pass      |
| Laboratory Humidity       | %     | 10        | 70         | 24     | Pass      |
| Impactor Velocity         | m/s   | 4.20      | 4.40       | 4.35   | Pass      |
| Peak Upper Abdomen Rib Dy | mm    | 36.0      | 47.0       | 42.5   | Pass      |
| Peak Lower Abdomen Rib Dy | mm    | 33.0      | 44.0       | 41.2   | Pass      |
| Peak Lower Spine T12 Ay   | mm    | 9.0       | 14.0       | 10.2   | Pass      |
| Peak Impactor Ax          | g     | 12.0      | 16.0       | 13.9   | Pass      |
| Overall Test Results      |       |           |            |        | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto



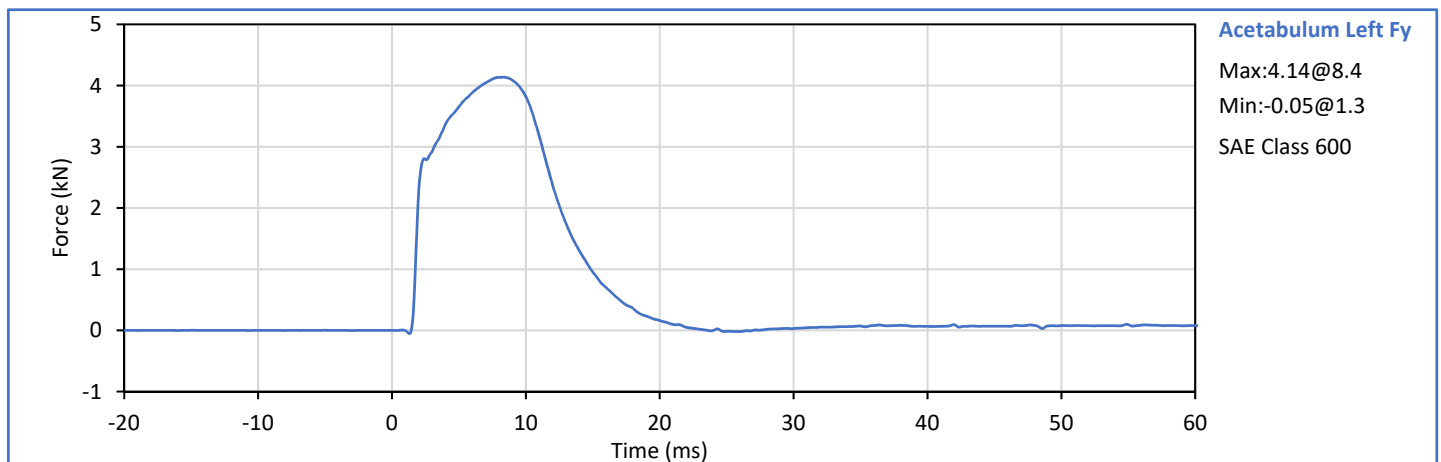
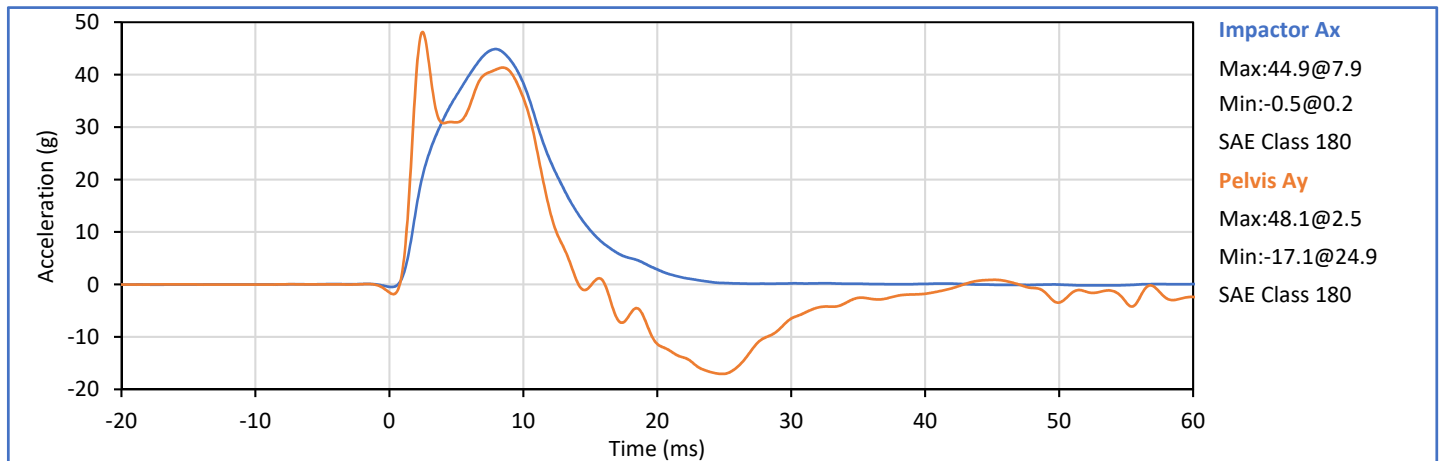
**SID-II Small Side Impact ATD**  
**Pelvis Acetabulum Impact**

ATD Serial No.: 308

Test Date: 2018-09-20

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.8   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 25     | Pass      |
| Impactor Velocity      | m/s   | 6.60      | 6.80       | 6.65   | Pass      |
| Peak Acetabulum Fy     | kN    | 3.60      | 4.30       | 4.14   | Pass      |
| Pelvis Ay after 6ms    | g     | 34.0      | 42.0       | 41.4   | Pass      |
| Peak Impactor Ax       | g     | 38.0      | 47.0       | 44.9   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |

Pelvis Plug S/N: 12241 (SACO)



Technician: J. Hernandez

Approved By: P. Puzzuto



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# SID-IIs Small Side Impact ATD Pelvis Acetabulum Impact

ATD Serial No.: 308

Test Date: 2018-09-20

Pelvis Plug S/N: 12241 (SACO)



## SID-IIs Pelvis Plug Certification Test

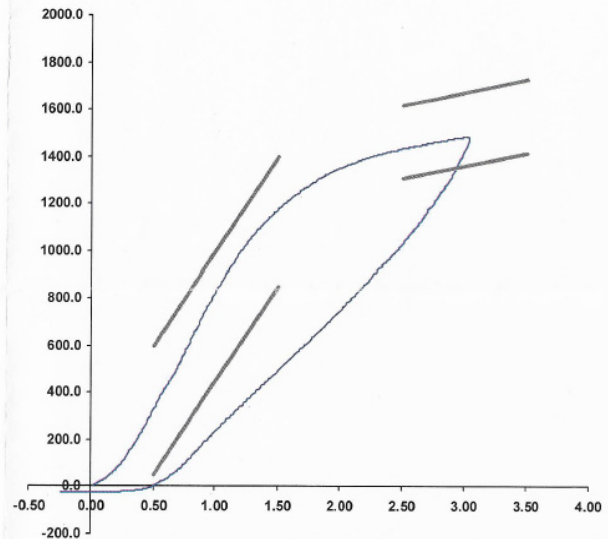
Plug S/N 12241  
Test Number 6627  
Report Number 6642  
Test Date 3/14/2018 1:07:40 PM

|                    | Test Results | Spec Min | Spec Max |
|--------------------|--------------|----------|----------|
| Force @ 0.5 mm (N) | 330.05       | 50.00    | 600.00   |
| Force @ 1.5 mm (N) | 1,177.90     | 850.00   | 1,400.00 |
| Force @ 2.5 mm (N) | 1,433.95     | 1,306.00 | 1,618.00 |
| Force @ 3.0 mm (N) | 1,482.69     | 1,361.00 | 1,673.00 |

Testing Machine STM-20 5965642  
Load Cell S/N (FI360947), Units (LBS ) 1000  
Crosshead Speed ( mm / min ) or Rate 12.7  
Extension or Position Measured by XHD\_100 ( XHD100 )

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 14-Mar-18  
SACO Research

By: DC Date: 3/14/18

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



**SID-IIs Small Side Impact ATD**  
**Pelvis Iliac Impact**

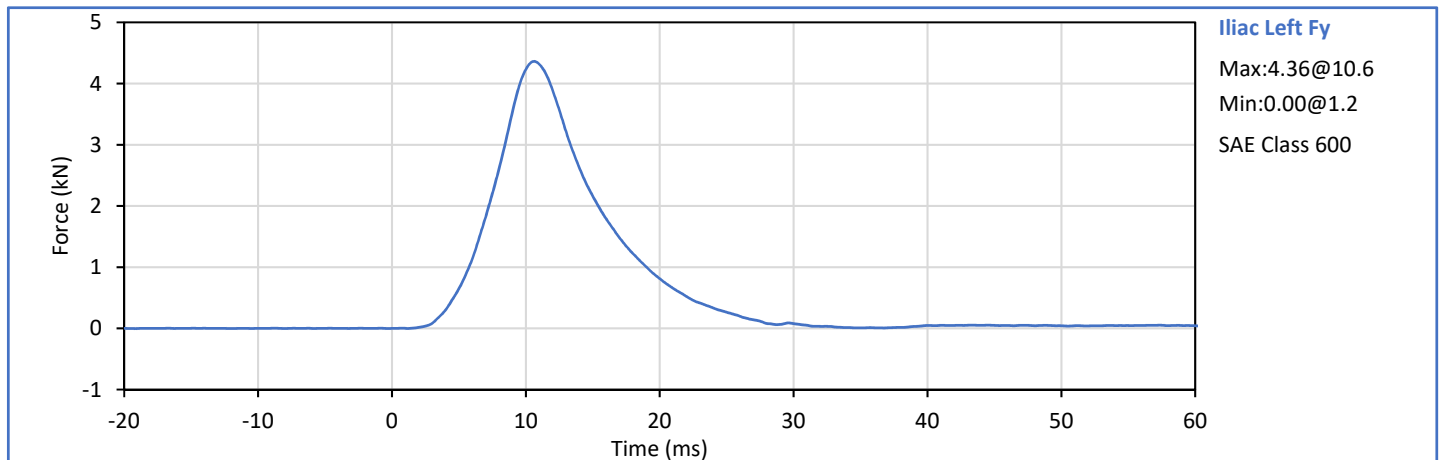
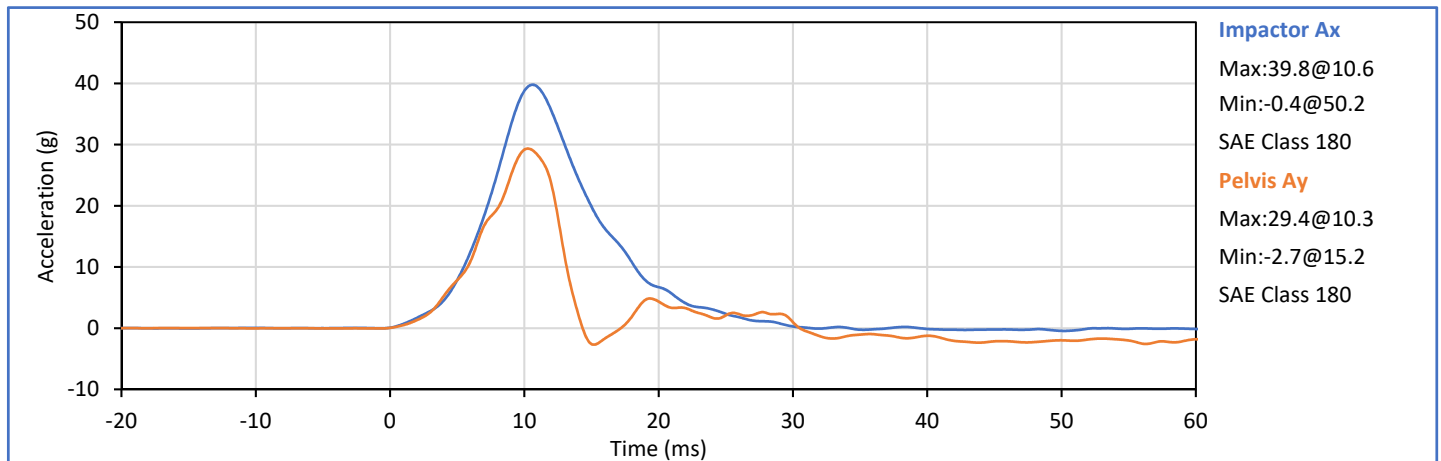
ATD Serial No.: 308

Test Date: 2018-09-22

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.8   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 25     | Pass      |
| Impactor Velocity      | m/s   | 4.20      | 4.40       | 4.32   | Pass      |
| Peak Iliac Fy          | kN    | 4.10      | 5.10       | 4.36   | Pass      |
| Pelvis Ay after 6ms    | g     | 28.0      | 39.0       | 29.4   | Pass      |
| Peak Impactor Ax       | g     | 36.0      | 45.0       | 39.8   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |

Pelvis Plug S/N: 12228 (SACO) \*

\* Plug is not impacted and remains certified



Technician: J. Hernandez

Approved By: P. Puzzuto

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



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Info@karco.com www.karco.com

**ES-2re 50th Male Side Impact ATD**  
**External Measurements**

ATD Serial No.: F035

Test Date: 2018-10-13

| Tested Parameter                                 | Units | Spec Low | Spec. High | Result               | Pass/Fail |
|--------------------------------------------------|-------|----------|------------|----------------------|-----------|
| Laboratory Temperature                           | °C    | 20.6     | 22.2       | 21.4                 | Pass      |
| Laboratory Relative Humidity                     | %     | 10       | 70         | 28                   | Pass      |
| 1 - Sitting Height                               | mm    | 900      | 918        | 909                  | Pass      |
| 2 - Seat to Shoulder Joint                       | mm    | 558      | 572        | 566                  | Pass      |
| 3 - Seat to Lower Face of Thoracic Spine Box     | mm    | 346      | 356        | 351                  | Pass      |
| 4 - Seat to Hip Joint (bolt center)              | mm    | 97       | 103        | 100                  | Pass      |
| 5 - Sole to Seat, Sitting                        | mm    | 433      | 451        | 444                  | Pass      |
| 6 - Head Width                                   | mm    | 152      | 158        | 156                  | Pass      |
| 7 - Shoulder/Arm Width                           | mm    | 461      | 479        | 470                  | Pass      |
| 8 - Thorax Width                                 | mm    | 322      | 332        | 329                  | Pass      |
| 9 - Abdomen Width                                | mm    | 273      | 287        | 282                  | Pass      |
| 10 - Pelvis Lap Width                            | mm    | 359      | 373        | 367                  | Pass      |
| 11 - Head Depth                                  | mm    | 196      | 206        | 202                  | Pass      |
| 12 - Thorax Depth                                | mm    | 262      | 272        | 269                  | Pass      |
| 13 - Abdomen Depth                               | mm    | 194      | 204        | 199                  | Pass      |
| 14 - Pelvis Depth                                | mm    | 235      | 245        | 243                  | Pass      |
| 15 - Back of Buttocks to Hip Joint (bolt Center) | mm    | 150      | 160        | 152                  | Pass      |
| 16 - Back of Buttocks to Front Knee              | mm    | 597      | 615        | 603                  | Pass      |
|                                                  |       |          |            | Overall Test Results | Pass      |

Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto



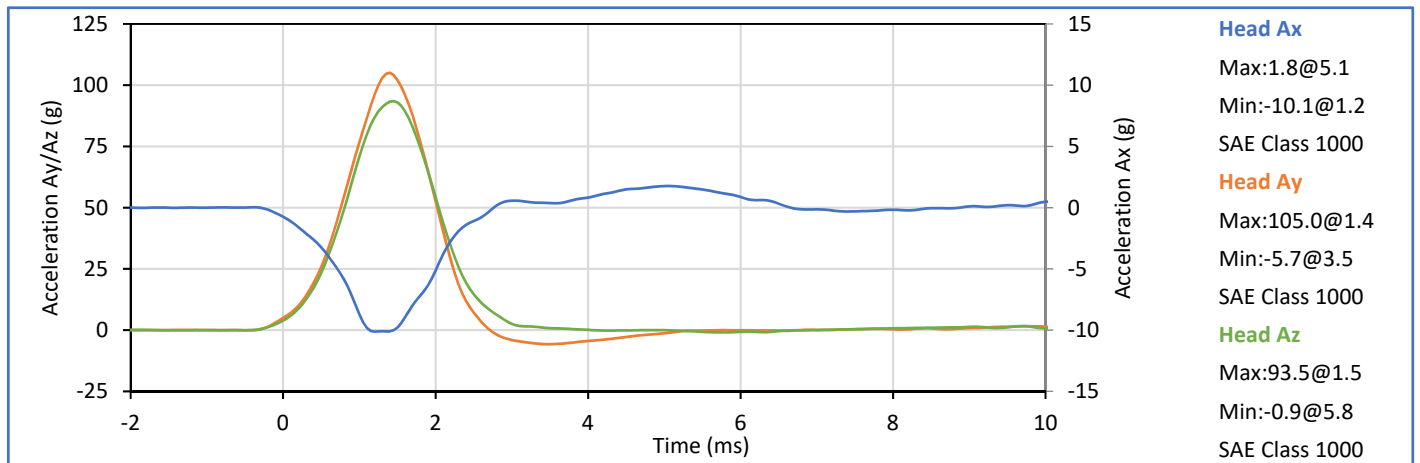
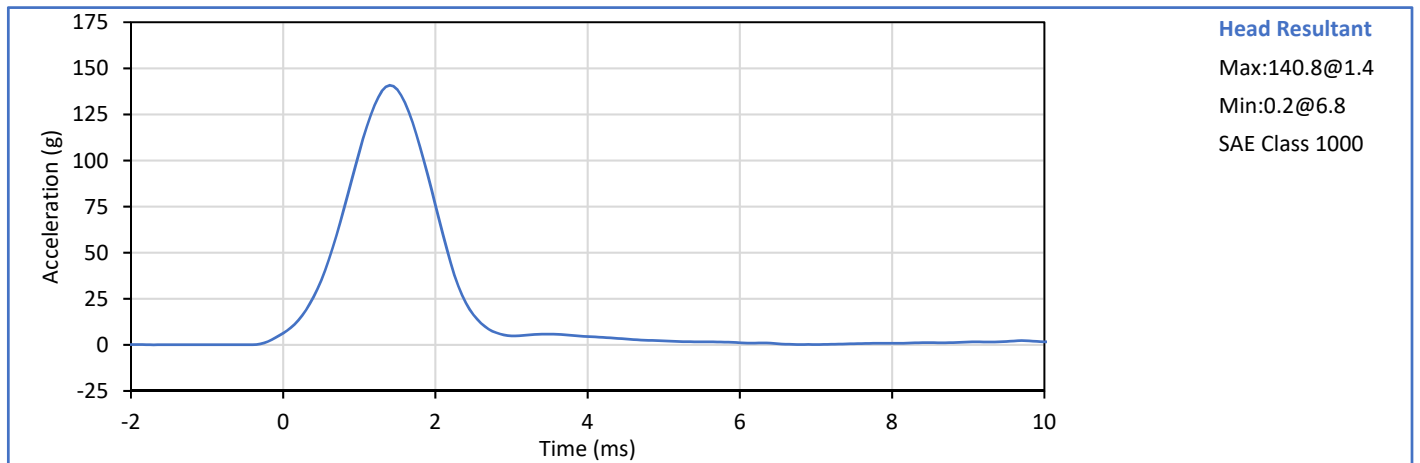
9270 Holly Road, Adelanto, CA 92301  
 Tel: +1 760 246 1672 Fax: +1 760 246 8112  
 Info@karco.com www.karco.com

## ES-2re 50th Male Side Impact ATD Head Drop

ATD Serial No.: F035

Test Date: 2018-10-15

| Tested Parameter              | Units  | Spec. Low | Spec. High           | Result | Pass/Fail |
|-------------------------------|--------|-----------|----------------------|--------|-----------|
| Laboratory Temperature        | °C     | 18.9      | 25.6                 | 20.9   | Pass      |
| Laboratory Humidity           | %      | 10        | 70                   | 35     | Pass      |
| Peak Resultant Acceleration   | g      | 125.0     | 155.0                | 140.8  | Pass      |
| Peak Head Ax                  | g      | -15.0     | 15.0                 | 1.8    | Pass      |
| Oscillations After Main Pulse | %      | 0.0       | 15.0                 | 1.6    | Pass      |
| Is Acceleration Unimodal?     | Yes/No | Yes       |                      | Yes    | Pass      |
|                               |        |           | Overall Test Results | Pass   |           |



Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto



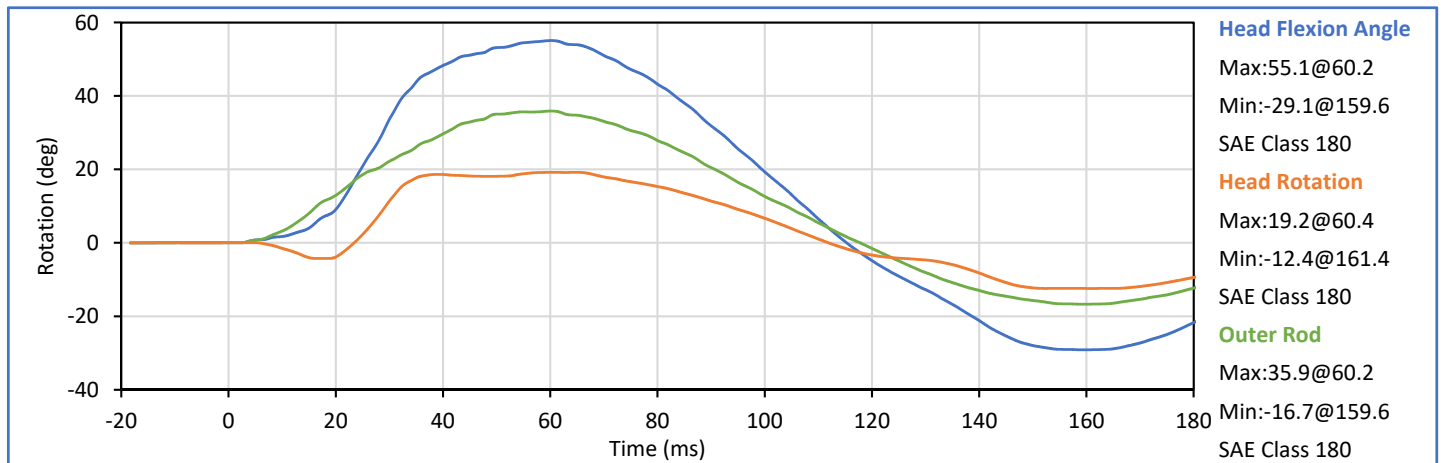
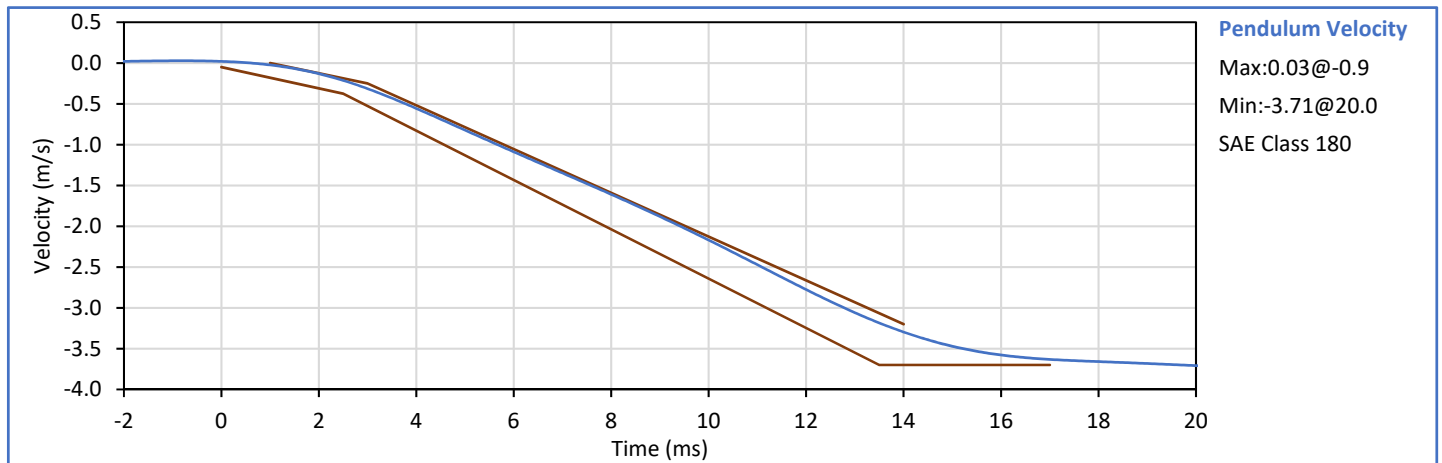
9270 Holly Road, Adelanto, CA 92301  
 Tel: +1 760 246 1672 Fax: +1 760 246 8112  
 Info@karco.com www.karco.com

## ES-2re 50th Male Side Impact ATD Neck Flexion

ATD Serial No.: F035

Test Date: 2018-10-16

| Tested Parameter              | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|-------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature        | °C    | 20.6      | 22.2       | 20.9   | Pass      |
| Laboratory Humidity           | %     | 10        | 70         | 27     | Pass      |
| Pendulum Velocity             | m/s   | 3.30      | 3.50       | 3.45   | Pass      |
| Peak Headform Flexion         | deg   | 49.0      | 59.0       | 55.1   | Pass      |
| Time of Peak Headform Flexion | ms    | 54.0      | 66.0       | 60.2   | Pass      |
| Flexion Decay (Peak to zero)  | ms    | 53.0      | 88.0       | 55.1   | Pass      |
| Overall Test Results          |       |           |            |        | Pass      |



Technician: J. Hernandez

J. Hernandez

Approved By: P. Puzzuto

P. Puzzuto



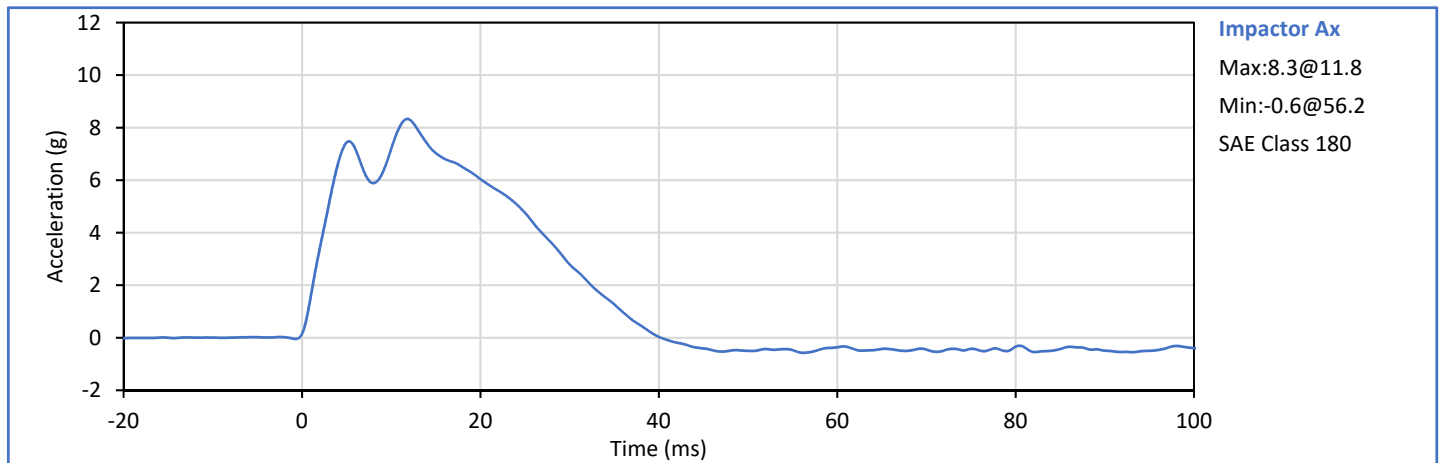
9270 Holly Road, Adelanto, CA 92301  
Tel: +1 760 246 1672 Fax: +1 760 246 8112  
Info@karco.com www.karco.com

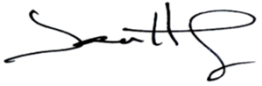
## ES-2re 50th Male Side Impact ATD Shoulder Impact Test

ATD Serial No.: F035

Test Date: 2018-10-13

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 41     | Pass      |
| Impactor Velocity      | m/s   | 4.20      | 4.40       | 4.24   | Pass      |
| Peak Impactor Ax       | g     | 7.5       | 10.5       | 8.3    | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto



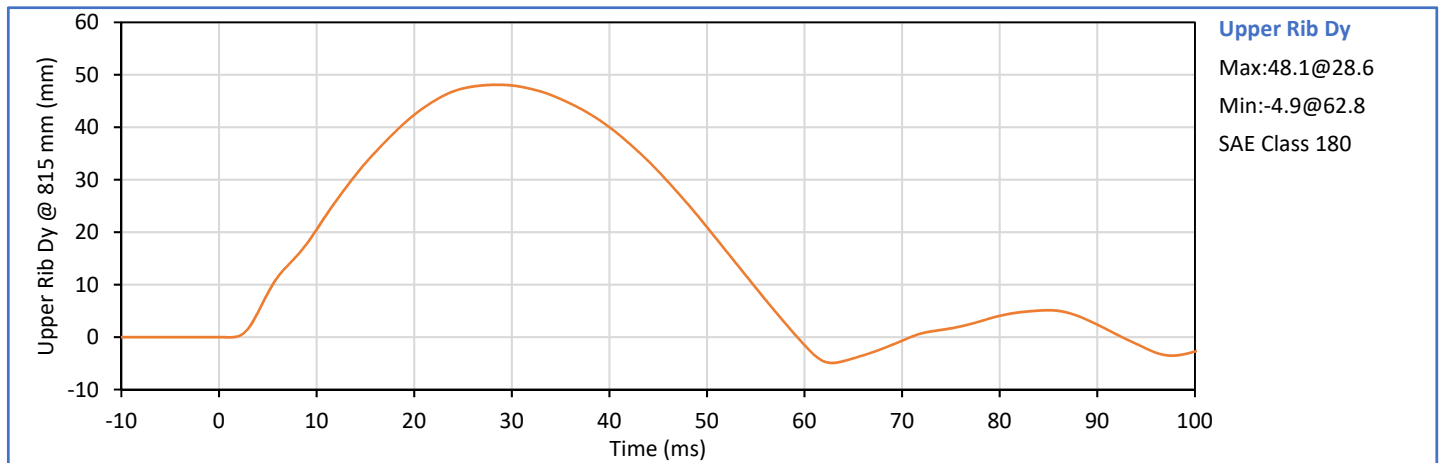
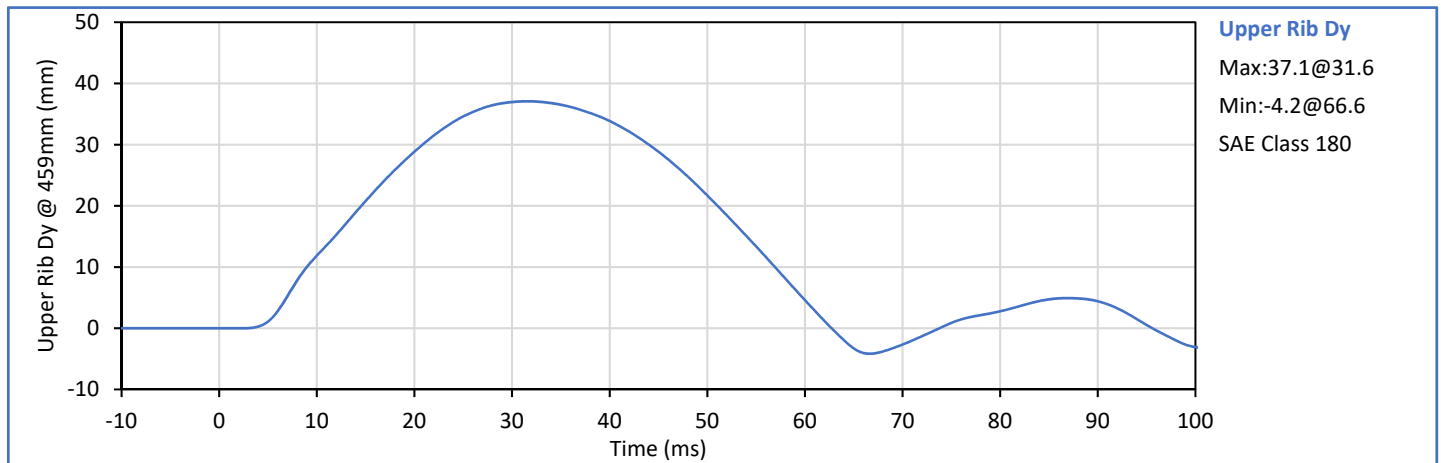
9270 Holly Road, Adelanto, CA 92301  
Tel: +1 760 246 1672 Fax: +1 760 246 8112  
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## ES-2re 50th Male Side Impact ATD Upper Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-10-15

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 20.7   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 35     | Pass      |
| Upper Rib Dy @ 459mm   | mm    | 36.0      | 40.0       | 37.1   | Pass      |
| Upper Rib Dy @ 815mm   | mm    | 46.0      | 51.0       | 48.1   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto



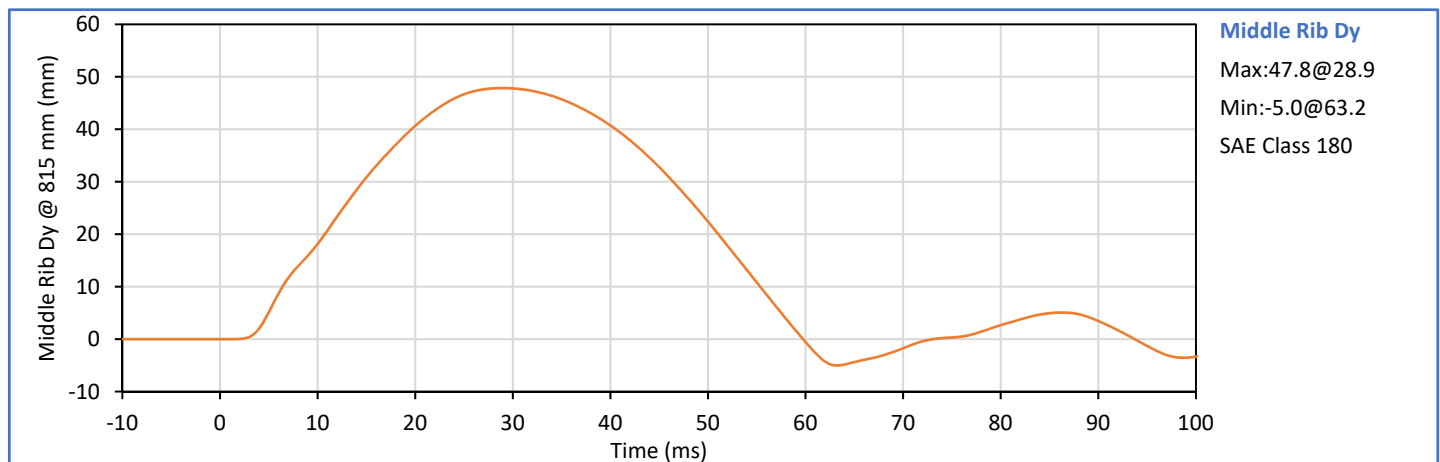
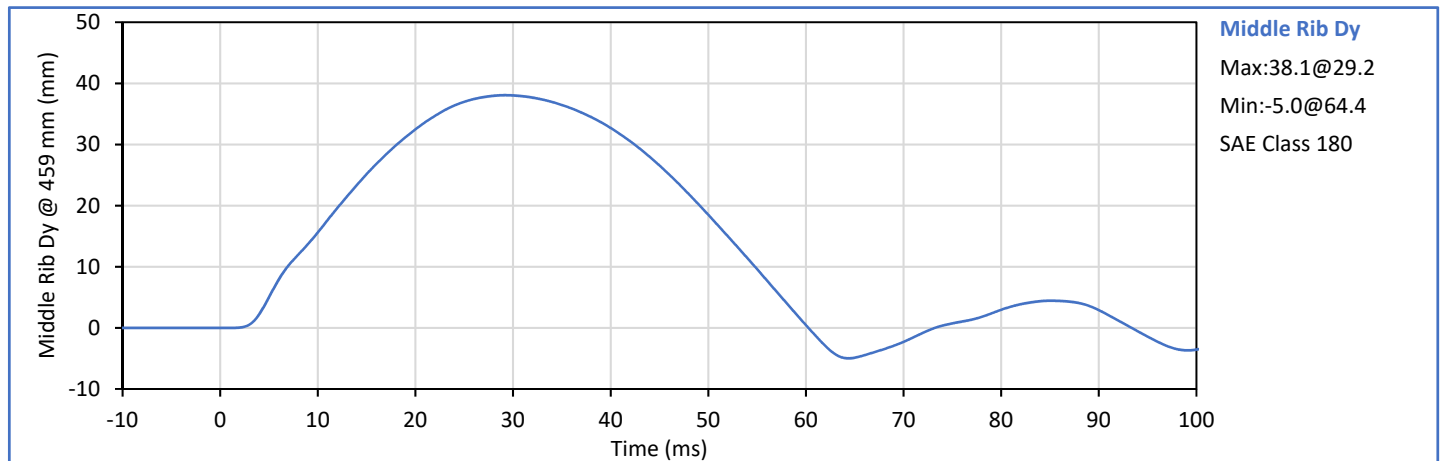
9270 Holly Road, Adelanto, CA 92301  
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Info@karco.com www.karco.com

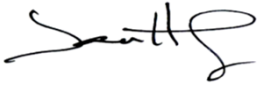
## ES-2re 50th Male Side Impact ATD Middle Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-10-15

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 20.7   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 35     | Pass      |
| Middle Rib Dy @ 459mm  | mm    | 36.0      | 40.0       | 38.1   | Pass      |
| Middle Rib Dy @ 815mm  | mm    | 46.0      | 51.0       | 47.8   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto



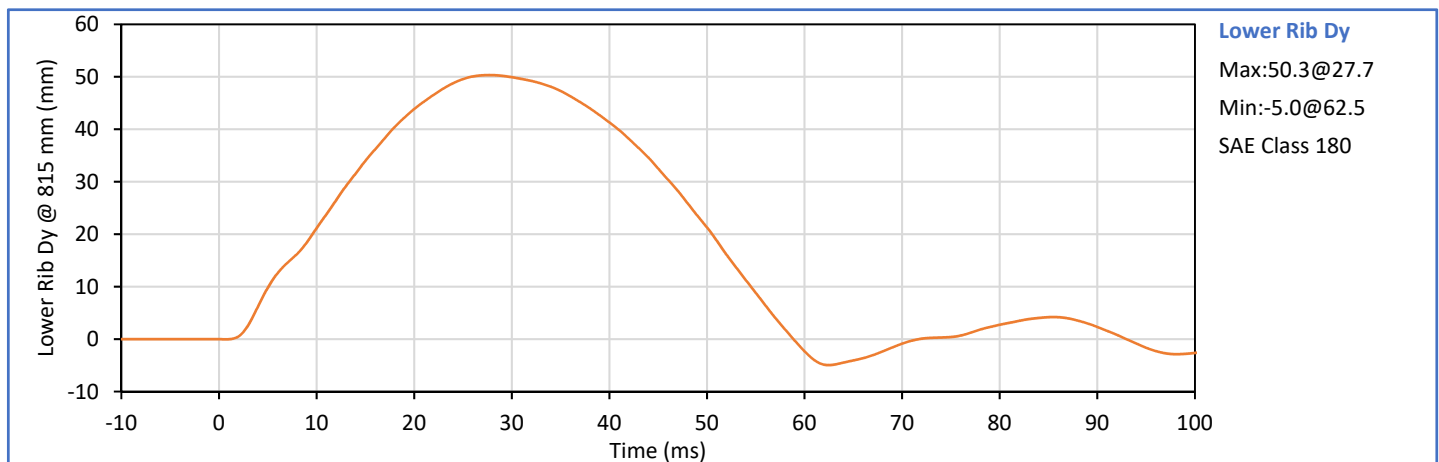
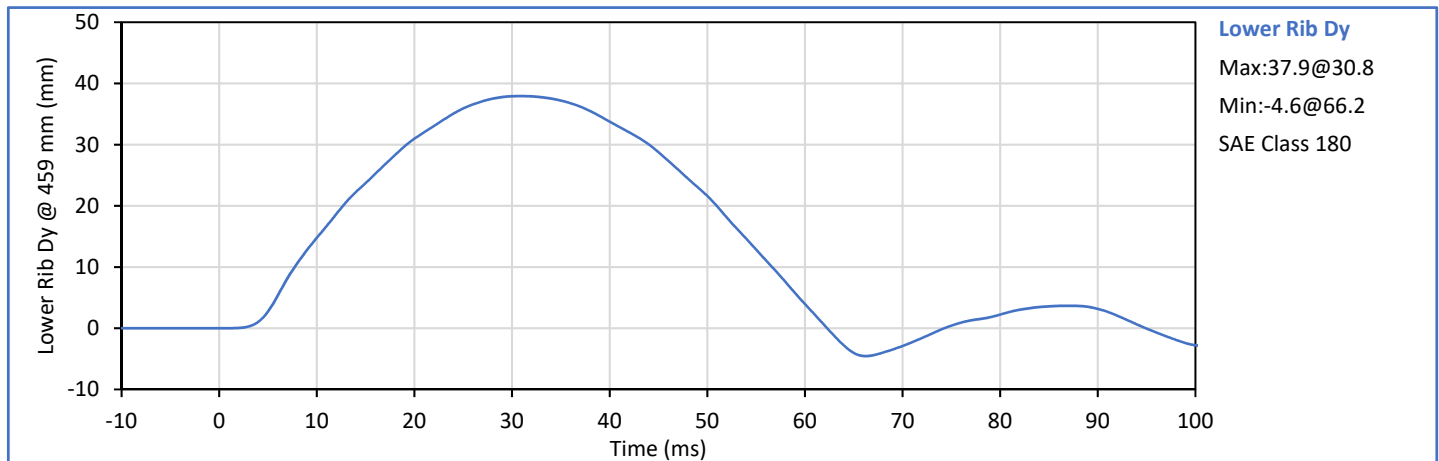
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Tel: +1 760 246 1672 Fax: +1 760 246 8112  
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## ES-2re 50th Male Side Impact ATD Lower Rib Drop Test

ATD Serial No.: F035

Test Date: 2018-10-15

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 20.8   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 35     | Pass      |
| Lower Rib Dy @ 459mm   | mm    | 36.0      | 40.0       | 37.9   | Pass      |
| Lower Rib Dy @ 815mm   | mm    | 46.0      | 51.0       | 50.3   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto

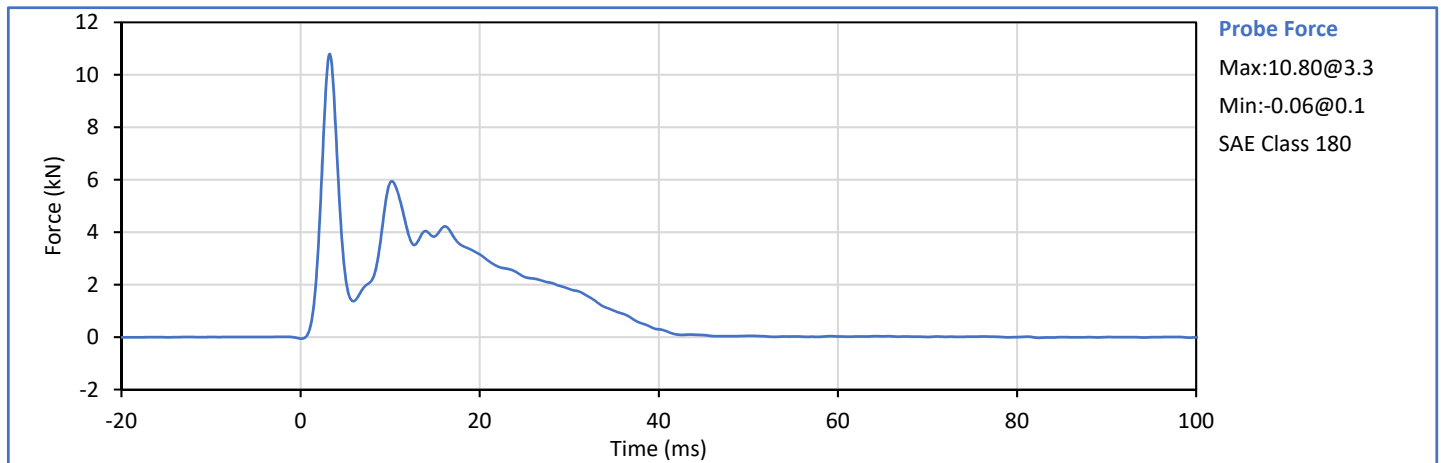
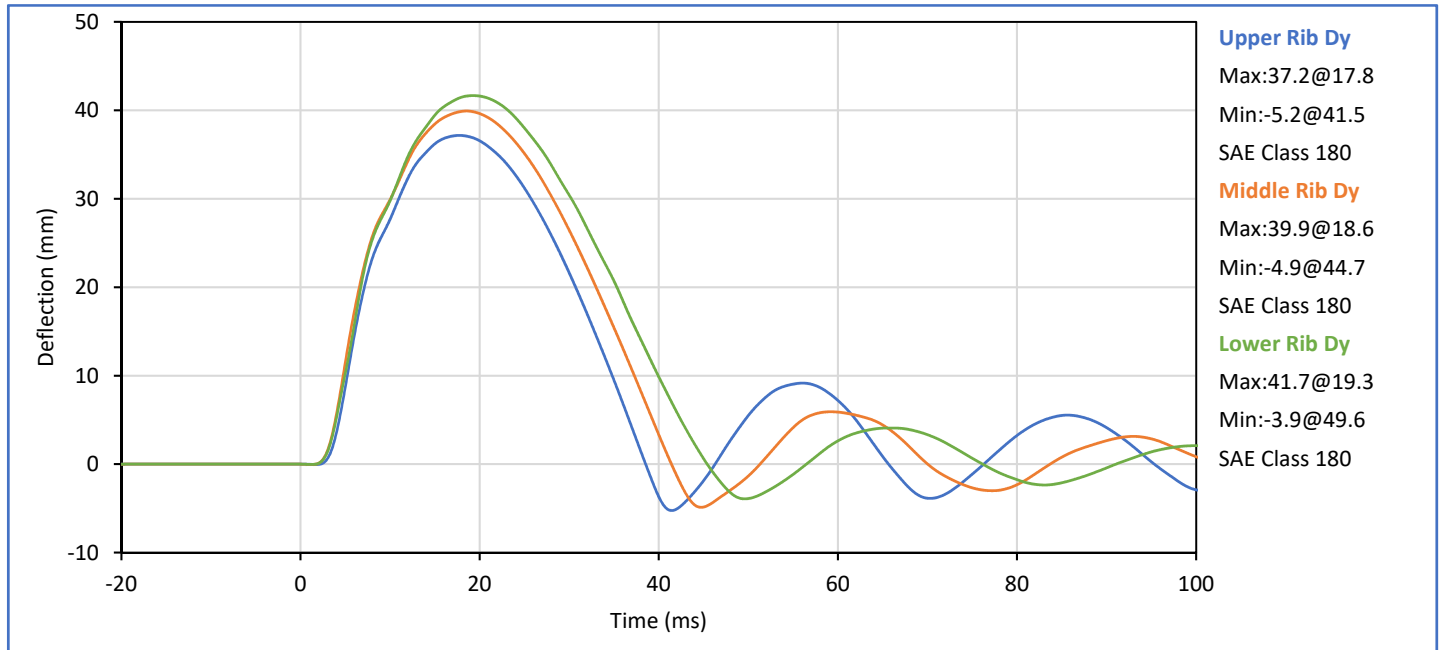


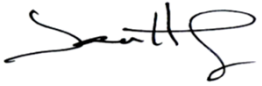
**ES-2re 50th Male Side Impact ATD**  
**Thorax Impact (Full Body)**

ATD Serial No.: F035

Test Date: 2018-10-13

| Tested Parameter               | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|--------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature         | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity            | %     | 10        | 70         | 41     | Pass      |
| Impactor Velocity              | m/s   | 5.40      | 5.60       | 5.56   | Pass      |
| Peak Upper Rib Dy              | mm    | 34.0      | 41.0       | 37.2   | Pass      |
| Peak Middle Rib Dy             | mm    | 37.0      | 45.0       | 39.9   | Pass      |
| Peak Lower Rib Dy              | mm    | 37.0      | 44.0       | 41.7   | Pass      |
| Peak Impactor Force After 6 ms | kN    | 5.10      | 6.20       | 5.94   | Pass      |
| Overall Test Results           |       |           |            | Pass   | Pass      |



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto

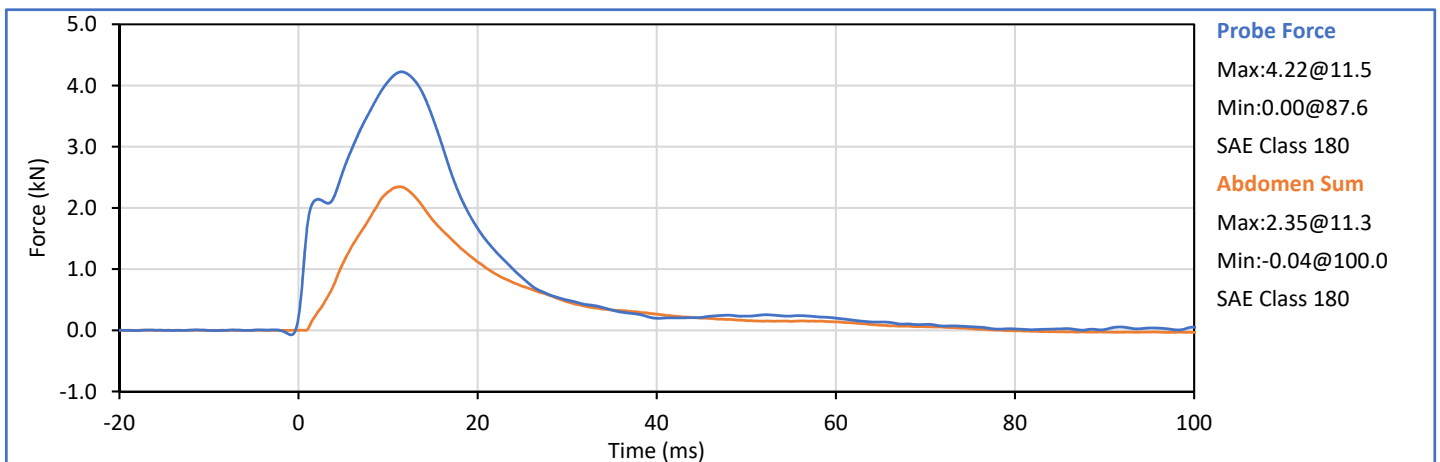
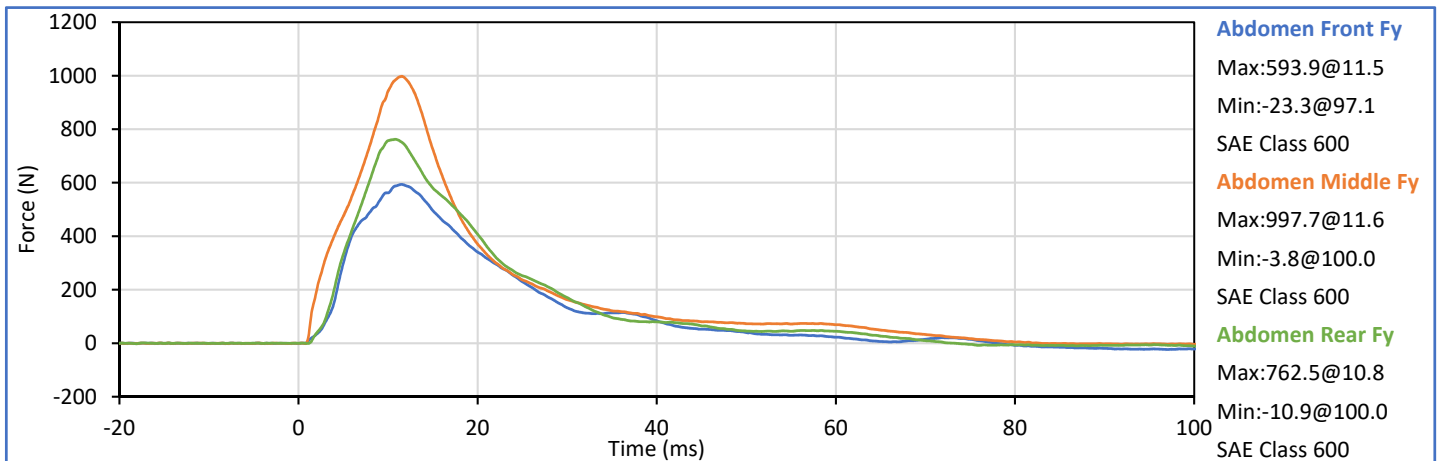


# ES-2re 50th Male Side Impact ATD Abdomen Impact

ATD Serial No.: F035

Test Date: 2018-10-13

| Tested Parameter               | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|--------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature         | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity            | %     | 10        | 70         | 41     | Pass      |
| Impactor Velocity              | m/s   | 3.90      | 4.10       | 4.08   | Pass      |
| Peak Impactor Force            | kN    | 4.00      | 4.80       | 4.22   | Pass      |
| Time of Peak Impactor Force    | ms    | 10.6      | 13.0       | 11.5   | Pass      |
| Sum of Abdomen Forces          | kN    | 2.20      | 2.70       | 2.35   | Pass      |
| Time of Peak Sum Abdomen Force | ms    | 10.0      | 12.3       | 11.3   | Pass      |
| Overall Test Results           |       |           |            | Pass   | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto



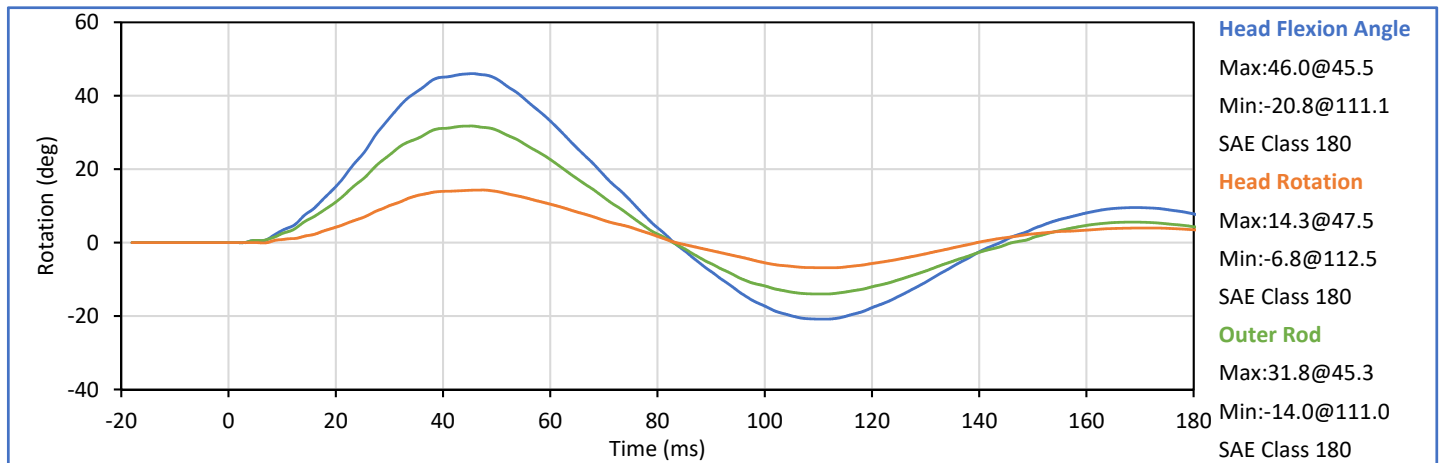
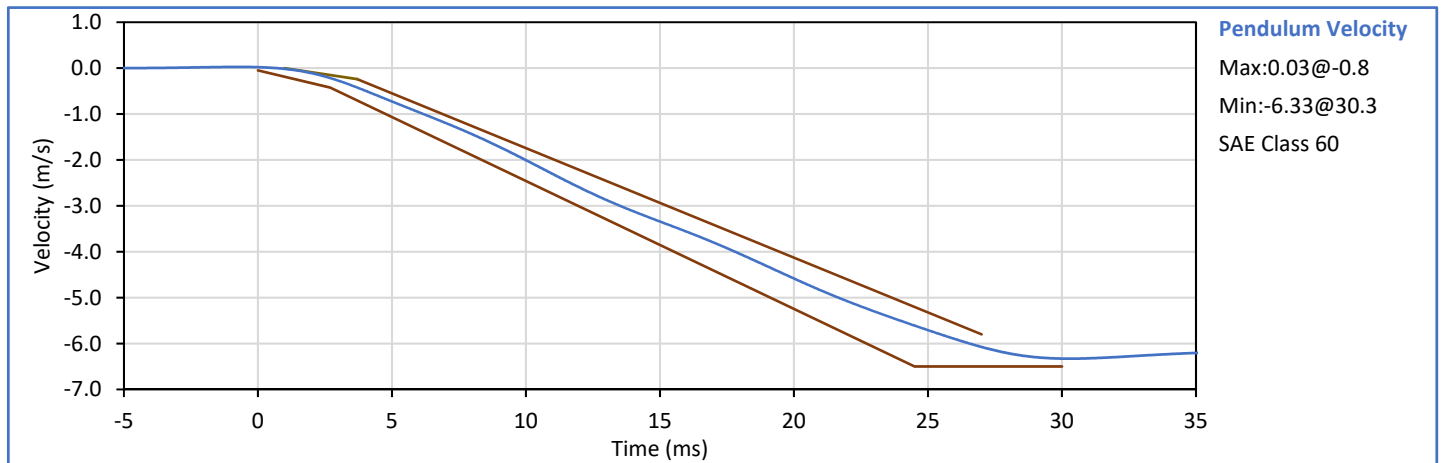
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 Info@karco.com www.karco.com

## ES-2re 50th Male Side Impact ATD Lumbar Spine Flexion

ATD Serial No.: F035

Test Date: 2018-10-16

| Tested Parameter              | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|-------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature        | °C    | 20.6      | 22.2       | 20.7   | Pass      |
| Laboratory Humidity           | %     | 10        | 70         | 35     | Pass      |
| Pendulum Velocity             | m/s   | 5.95      | 6.15       | 6.15   | Pass      |
| Peak Headform Flexion         | deg   | 45.0      | 55.0       | 46.0   | Pass      |
| Time of Peak Headform Flexion | ms    | 39.0      | 53.0       | 45.5   | Pass      |
| Flexion Decay (Peak to zero)  | ms    | 37.0      | 57.0       | 37.7   | Pass      |
| Overall Test Results          |       |           |            |        | Pass      |



Technician: J. Hernandez

J. Hernandez

Approved By: P. Puzzuto

P. Puzzuto

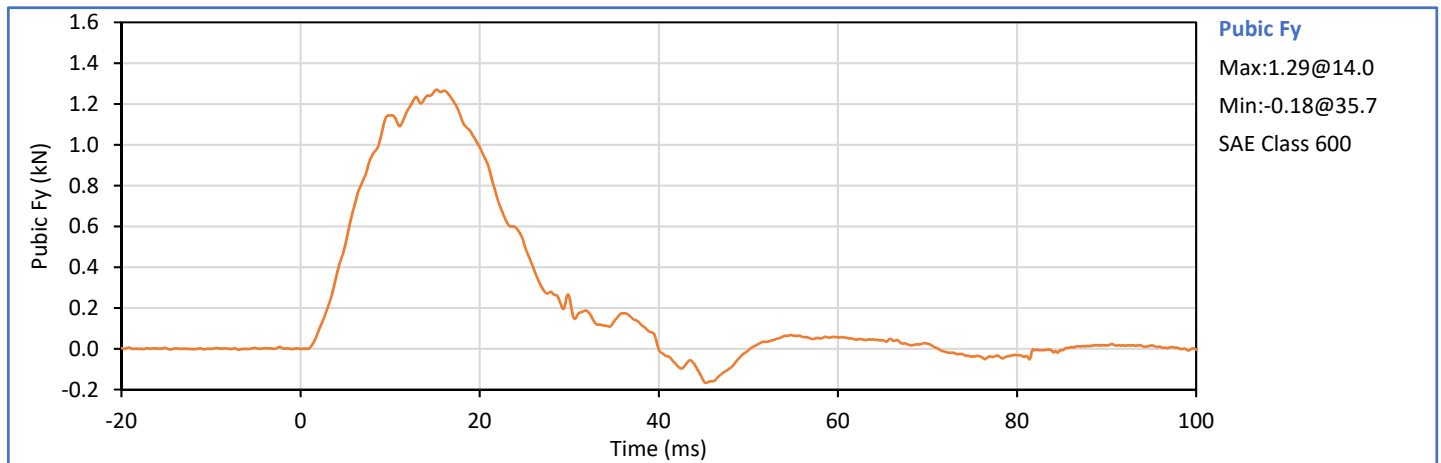
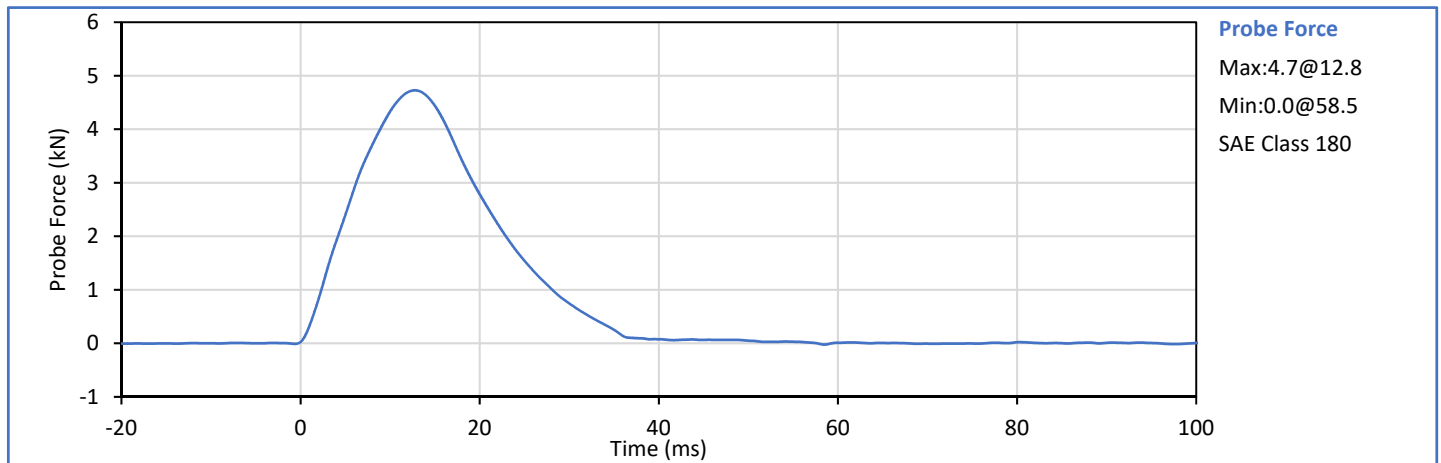


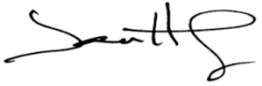
**ES-2re 50th Male Side Impact ATD**  
**Pelvis Impact**

ATD Serial No.: F035

Test Date: 2018-10-13

| Tested Parameter                | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6      | 22.2       | 21.4   | Pass      |
| Laboratory Humidity             | %     | 10        | 70         | 41     | Pass      |
| Impactor Velocity               | m/s   | 4.20      | 4.40       | 4.38   | Pass      |
| Peak Impactor Force             | kN    | 4.70      | 5.40       | 4.73   | Pass      |
| Time of Peak Impactor Force     | ms    | 11.8      | 16.1       | 12.8   | Pass      |
| Pubic Symphysis Fy              | kN    | 1.23      | 1.59       | 1.27   | Pass      |
| Time of Peak Pubic Symphysis Fy | ms    | 12.2      | 17.0       | 15.2   | Pass      |
| Overall Test Results            |       |           |            | Pass   |           |



Technician:   
J. Hernandez

Approved By:   
P. Puzzuto



**SID-IIs Small Side Impact ATD**  
**External Measurements**

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter                 | Units | Spec Low | Spec. High           | Result | Pass/Fail |
|----------------------------------|-------|----------|----------------------|--------|-----------|
| Laboratory Temperature           | °C    | 20.6     | 22.2                 | 21.2   | Pass      |
| Laboratory Relative Humidity     | %     | 10       | 70                   | 35     | Pass      |
| A - Sitting Height               | mm    | 772      | 788                  | 777    | Pass      |
| B - Shoulder Pivot Height        | mm    | 437      | 453                  | 450    | Pass      |
| C - Hpoint Height                | mm    | 79       | 89                   | 87     | Pass      |
| D - H Point From Seatback        | mm    | 141      | 151                  | 144    | Pass      |
| E - Shoulder Pivot From Backline | mm    | 97       | 107                  | 101    | Pass      |
| F - Thigh Clearance              | mm    | 119      | 135                  | 122    | Pass      |
| G - Head Breadth                 | mm    | 140      | 148                  | 143    | Pass      |
| H - Head Back From Backline      | mm    | 40       | 46                   | 44     | Pass      |
| I - Head Depth                   | mm    | 178      | 188                  | 183    | Pass      |
| J - Head Circumference           | mm    | 541      | 551                  | 543    | Pass      |
| K - Buttock To Knee Length       | mm    | 514      | 540                  | 529    | Pass      |
| L - Popliteal Height             | mm    | 343      | 369                  | 354    | Pass      |
| K - Knee Pivot To Floor Height   | mm    | 392      | 409                  | 400    | Pass      |
| N - Buttock Popliteal Length     | mm    | 416      | 442                  | 432    | Pass      |
| O - Chest Depth W/O Jacket       | mm    | 195      | 211                  | 204    | Pass      |
| P - Foot Length                  | mm    | 216      | 232                  | 221    | Pass      |
| Q - Hip Breadth (W/Pelvic Plugs) | mm    | 313      | 323                  | 318    | Pass      |
| R - Arm Length                   | mm    | 249      | 259                  | 257    | Pass      |
| S - Knee Joint To Seatback       | mm    | 477      | 493                  | 490    | Pass      |
| V - Shoulder Width               | mm    | 341      | 357                  | 353    | Pass      |
| W - Foot Width                   | mm    | 78       | 94                   | 86     | Pass      |
| Y - Chest Circumference W/Jacket | mm    | 851      | 881                  | 865    | Pass      |
| Z - Waist Circumference          | mm    | 761      | 791                  | 774    | Pass      |
|                                  |       |          | Overall Test Results |        | Pass      |

Technician: \_\_\_\_\_

J. Hernandez

Approved By: \_\_\_\_\_

P. Puzzuto

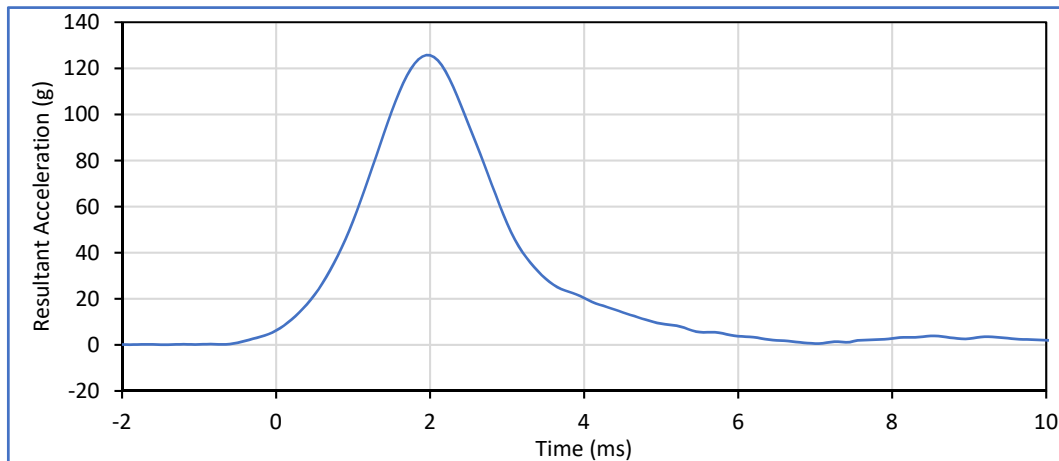


# SID-IIs Small Side Impact ATD Head Drop

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter              | Units  | Spec. Low | Spec. High           | Result | Pass/Fail |
|-------------------------------|--------|-----------|----------------------|--------|-----------|
| Laboratory Temperature        | °C     | 18.9      | 25.6                 | 20.8   | Pass      |
| Laboratory Humidity           | %      | 10        | 70                   | 35     | Pass      |
| Peak Resultant Acceleration   | g      | 115.0     | 137.0                | 125.7  | Pass      |
| Peak Head Ax                  | g      | -15.0     | 15.0                 | -4.1   | Pass      |
| Oscillations After Main Pulse | %      | 0.0       | 15.0                 | 3.1    | Pass      |
| Is Acceleration Unimodal?     | Yes/No | Yes       |                      | Yes    | Pass      |
|                               |        |           | Overall Test Results | Pass   |           |

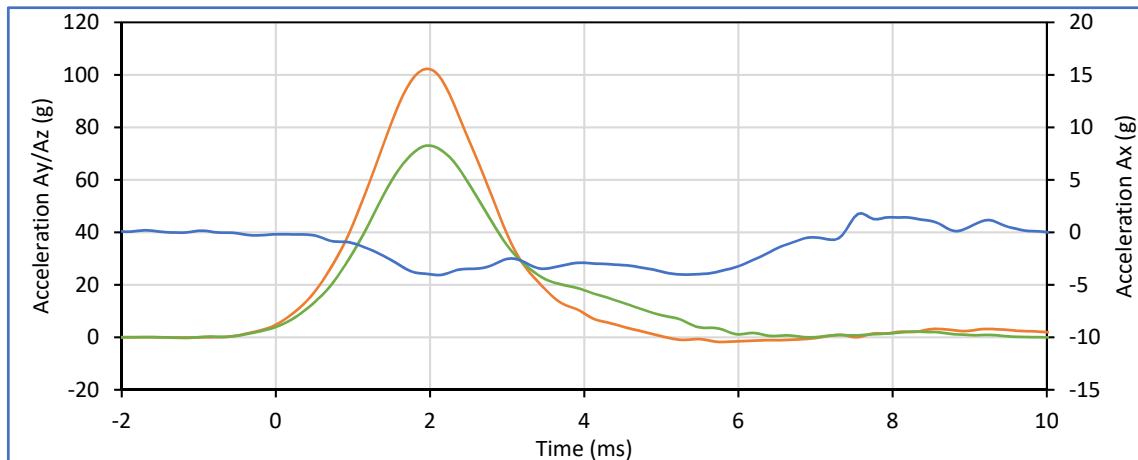


## Head Resultant

Max:125.7@2.0

Min:0.6@7.1

SAE Class 1000



## Head Ax

Max:1.8@7.6

Min:-4.1@2.1

SAE Class 1000

## Head Ay

Max:102.3@2.0

Min:-1.8@5.8

SAE Class 1000

## Head Az

Max:73.0@2.0

Min:0.0@6.9

SAE Class 1000

Technician:

J. Hernandez

Approved By:

P. Puzzuto

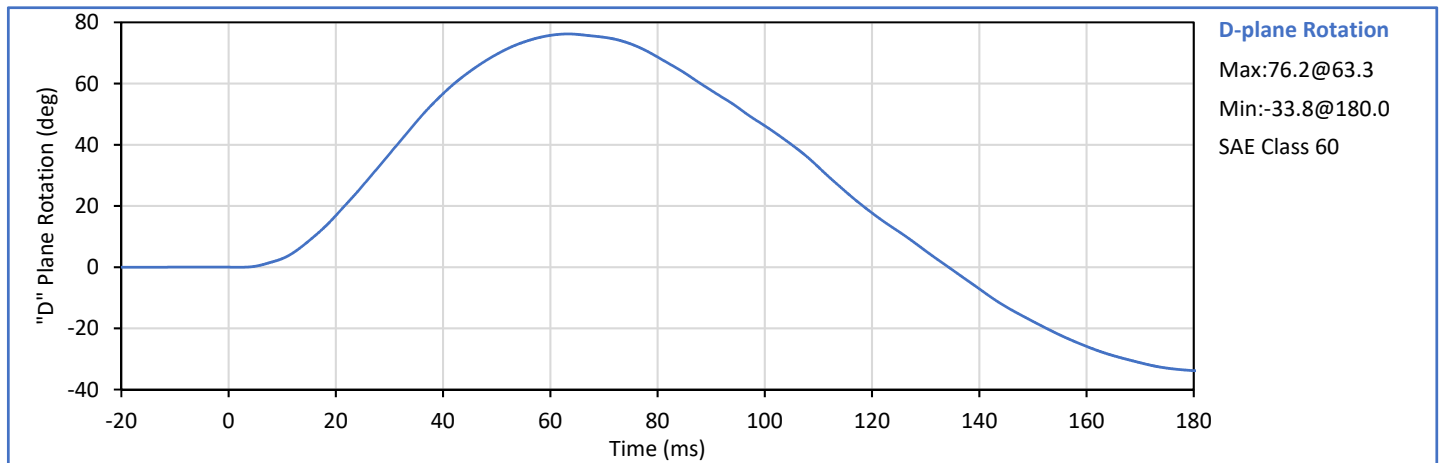
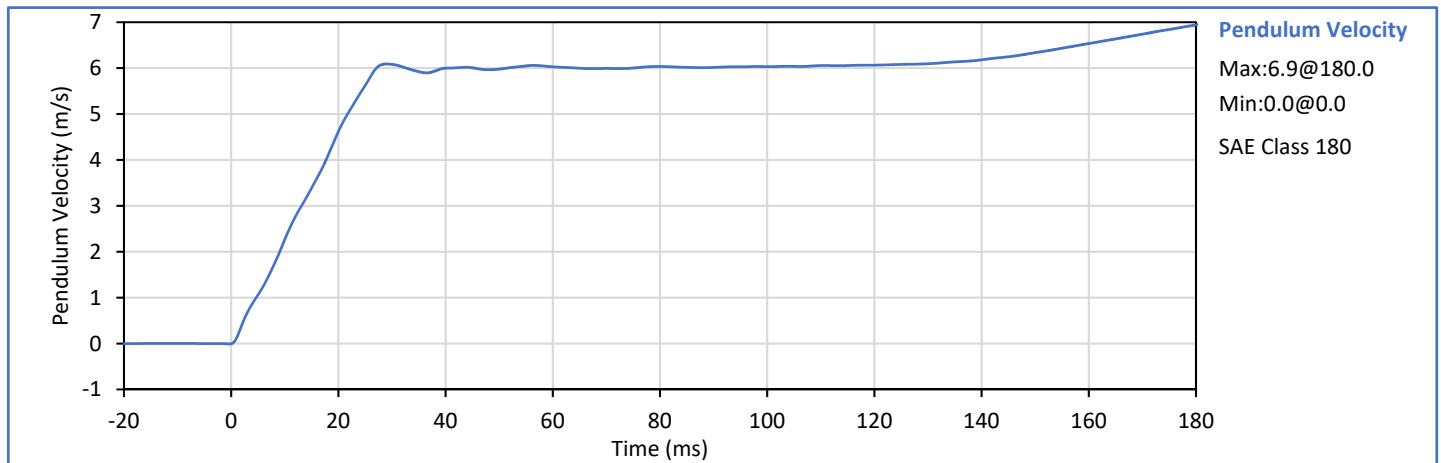


**SID-IIs Small Side Impact ATD**  
**Neck Flexion**

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter                | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature          | °C    | 20.6      | 22.2       | 20.8   | Pass      |
| Laboratory Humidity             | %     | 10        | 70         | 36     | Pass      |
| Pendulum Velocity               | m/s   | 5.51      | 5.63       | 5.61   | Pass      |
| Pendulum Decel at 10 ms         | m/s   | 2.20      | 2.80       | 2.27   | Pass      |
| Pendulum Decel at 15 ms         | m/s   | 3.30      | 4.10       | 3.39   | Pass      |
| Pendulum Decel at 20 ms         | m/s   | 4.40      | 5.40       | 4.62   | Pass      |
| Pendulum Decel at 25 ms         | m/s   | 5.40      | 6.10       | 5.62   | Pass      |
| Pendulum Decel from 25-100 ms   | m/s   | 5.50      | 6.20       | 6.09   | Pass      |
| Peak "D" Plane Rotation         | deg   | 71.0      | 81.0       | 76.2   | Pass      |
| Time of Peak "D" Plane Rotation | ms    | 50.0      | 70.0       | 63.3   | Pass      |
| Peak Occ. Condyle Moment        | Nm    | -44.0     | -36.0      | -40.1  | Pass      |
| Time of Moment Decay to 0 Nm    | ms    | 102.0     | 126.0      | 118.4  | Pass      |
| Overall Test Results            |       |           |            | Pass   |           |

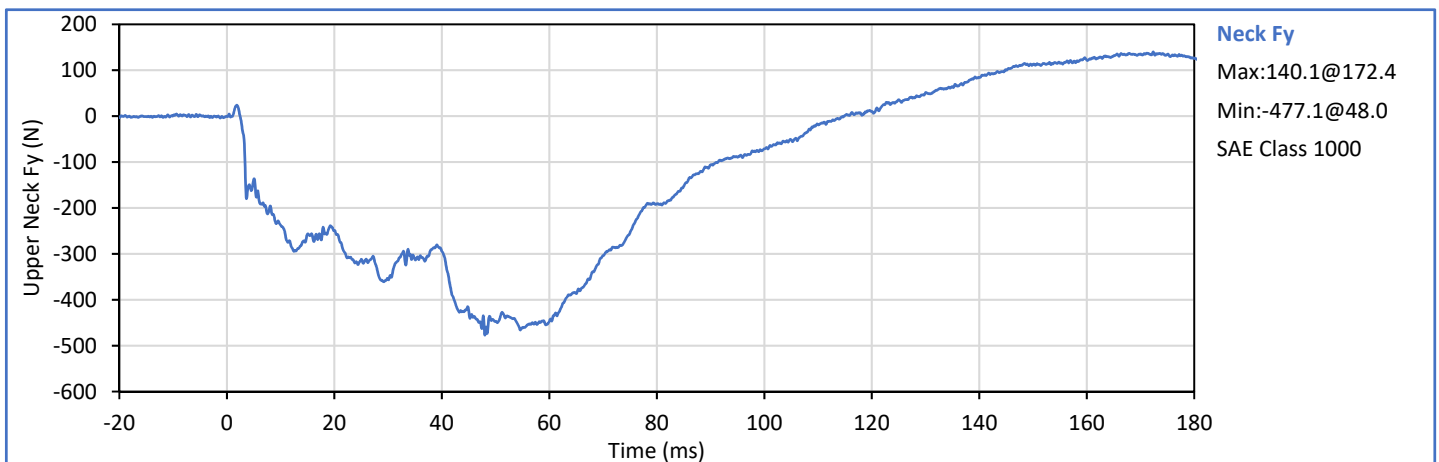
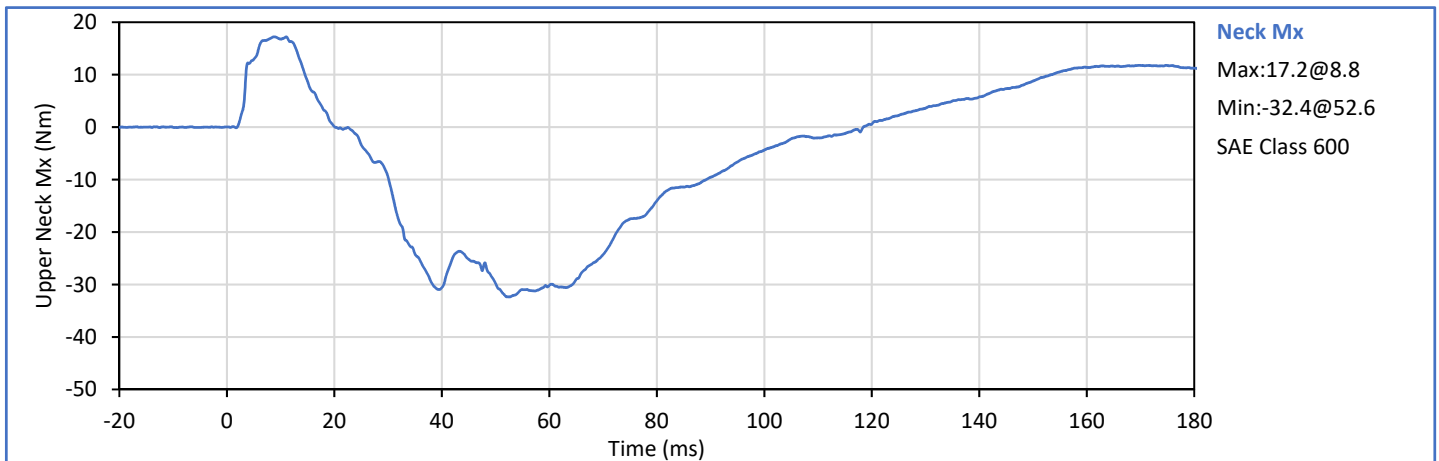
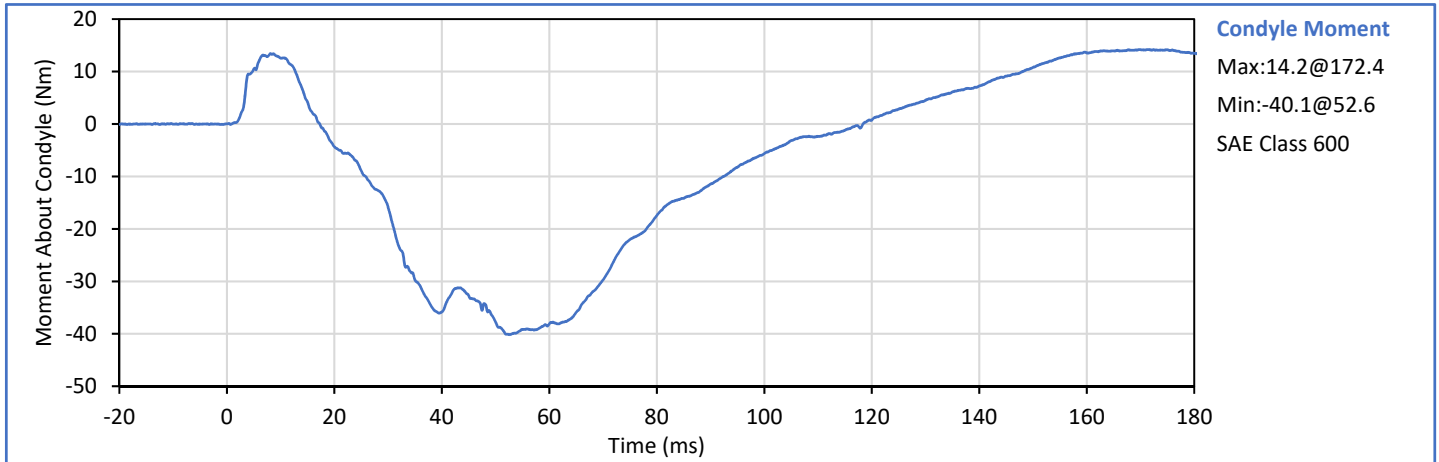


Technician: J. Hernandez

Approved By: P. Puzzuto

ATD Serial No.: 308

Test Date: 2018-10-12



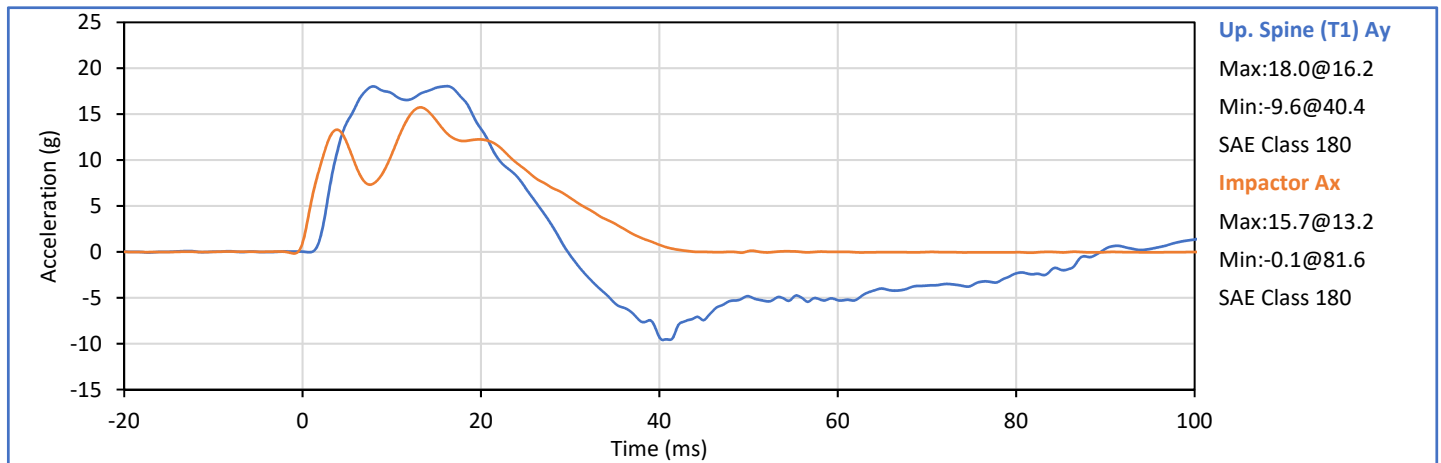
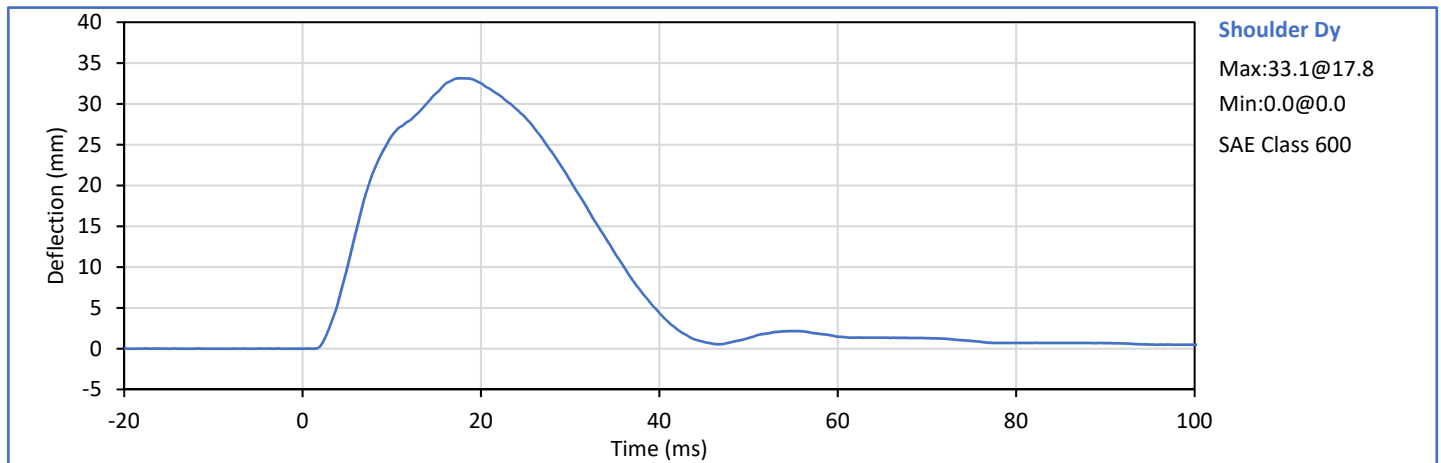


# SID-IIs Small Side Impact ATD Shoulder Impact Test

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter         | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|--------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature   | °C    | 20.6      | 22.2       | 20.8   | Pass      |
| Laboratory Humidity      | %     | 10        | 70         | 38     | Pass      |
| Impactor Velocity        | m/s   | 4.20      | 4.40       | 4.30   | Pass      |
| Peak Shoulder Dy         | mm    | 28.0      | 37.0       | 33.1   | Pass      |
| Peak Upper Spine (T1) Ay | g     | 17.0      | 22.0       | 18.0   | Pass      |
| Peak Impactor Ax         | g     | 13.0      | 18.0       | 15.7   | Pass      |
| Overall Test Results     |       |           |            |        | Pass      |



Technician:   
 J. Hernandez

Approved By:   
 P. Puzzuto

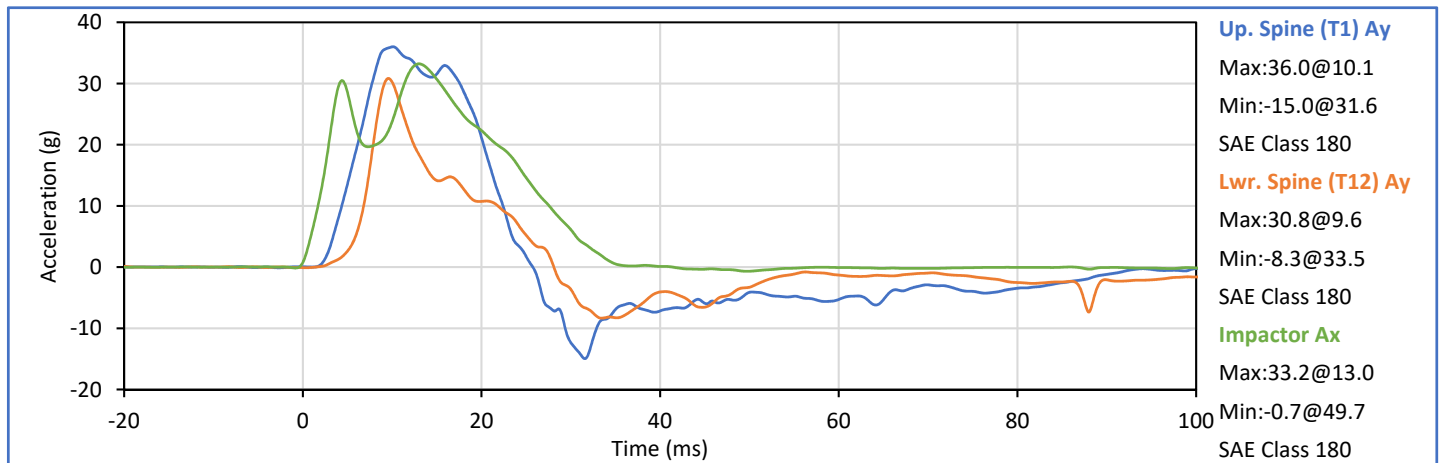
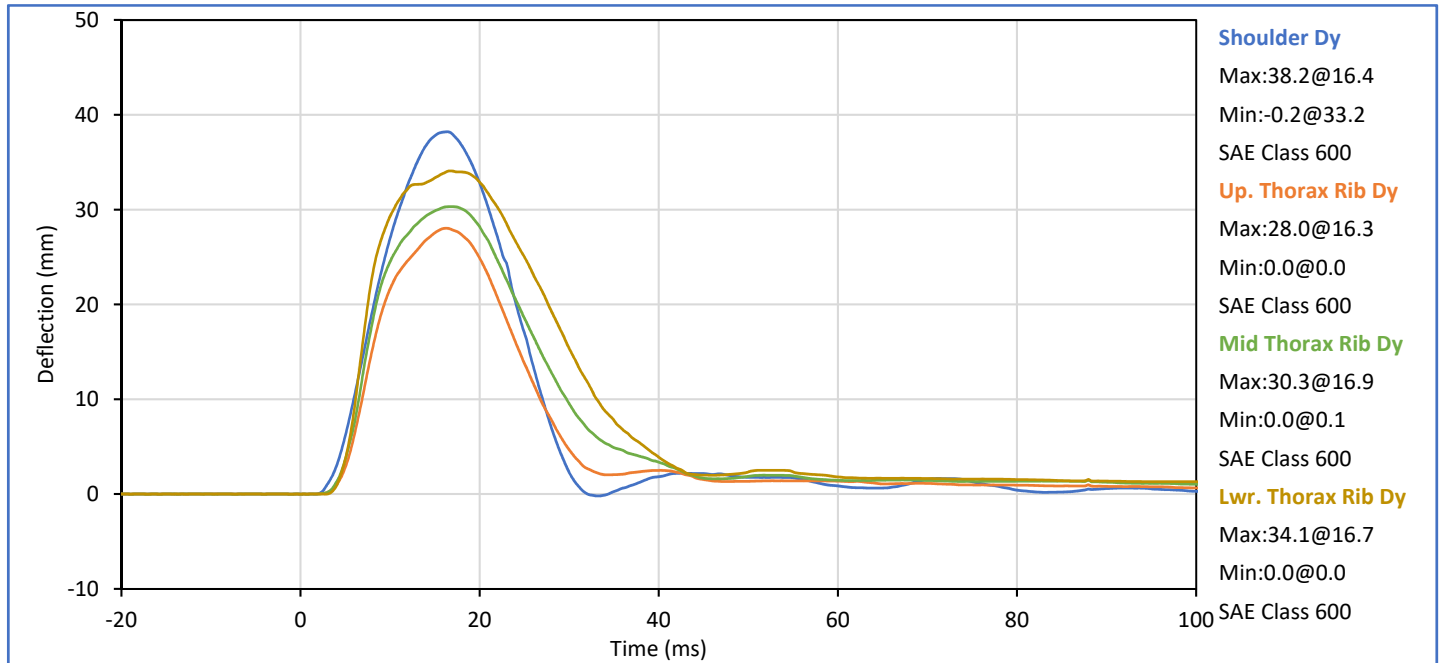


# SID-IIs Small Side Impact ATD Thorax (With Arm)

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter          | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature    | °C    | 20.6      | 22.2       | 20.9   | Pass      |
| Laboratory Humidity       | %     | 10        | 70         | 38     | Pass      |
| Impactor Velocity         | m/s   | 6.60      | 6.80       | 6.67   | Pass      |
| Peak Shoulder Dy          | mm    | 31.0      | 40.0       | 38.2   | Pass      |
| Peak Upper Rib Dy         | mm    | 25.0      | 32.0       | 28.0   | Pass      |
| Peak Middle Rib Dy        | mm    | 30.0      | 36.0       | 30.3   | Pass      |
| Peak Lower Rib Dy         | mm    | 32.0      | 38.0       | 34.1   | Pass      |
| Peak Upper Spine (T1) Ay  | g     | 34.0      | 43.0       | 36.0   | Pass      |
| Peak Lower Spine (T12) Ay | g     | 29.0      | 37.0       | 30.8   | Pass      |
| Peak Impactor Ax          | g     | 30.0      | 36.0       | 33.2   | Pass      |
| Overall Test Results      |       |           |            | Pass   | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto

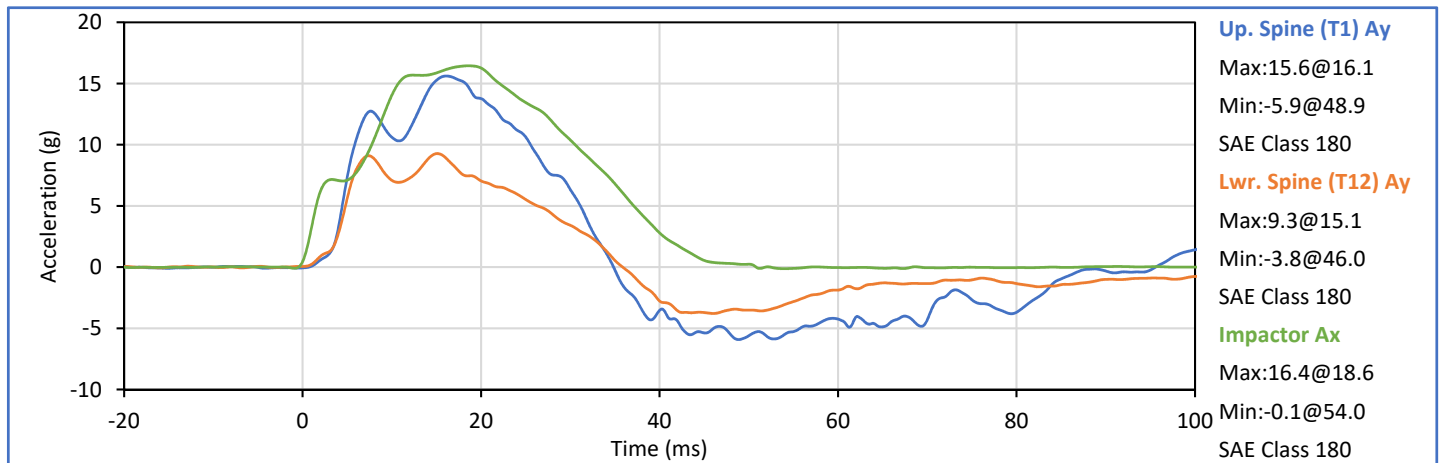
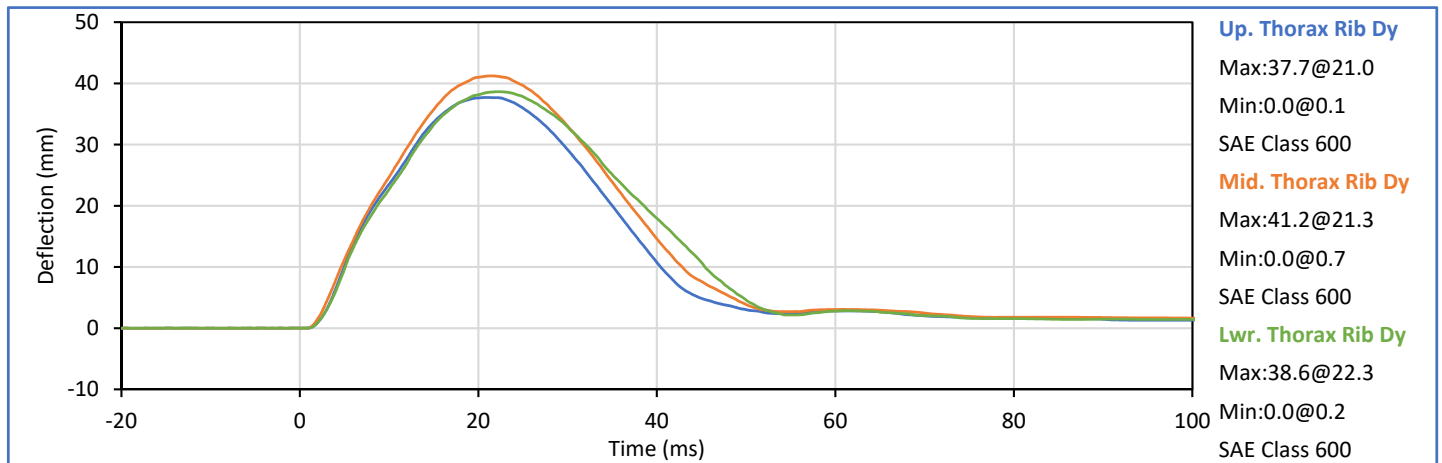


**SID-IIs Small Side Impact ATD  
 Thorax (No Arm)**

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter          | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature    | °C    | 20.6      | 22.2       | 20.8   | Pass      |
| Laboratory Humidity       | %     | 10        | 70         | 38     | Pass      |
| Impactor Velocity         | m/s   | 4.20      | 4.40       | 4.30   | Pass      |
| Peak Upper Rib Dy         | mm    | 32.0      | 40.0       | 37.7   | Pass      |
| Peak Middle Rib Dy        | mm    | 39.0      | 45.0       | 41.2   | Pass      |
| Peak Lower Rib Dy         | mm    | 35.0      | 43.0       | 38.6   | Pass      |
| Peak Upper Spine (T1) Ay  | g     | 13.0      | 17.0       | 15.6   | Pass      |
| Peak Lower Spine (T12) Ay | g     | 7.0       | 11.0       | 9.3    | Pass      |
| Peak Impactor Ax          | g     | 14.0      | 18.0       | 16.4   | Pass      |
| Overall Test Results      |       |           |            |        | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto

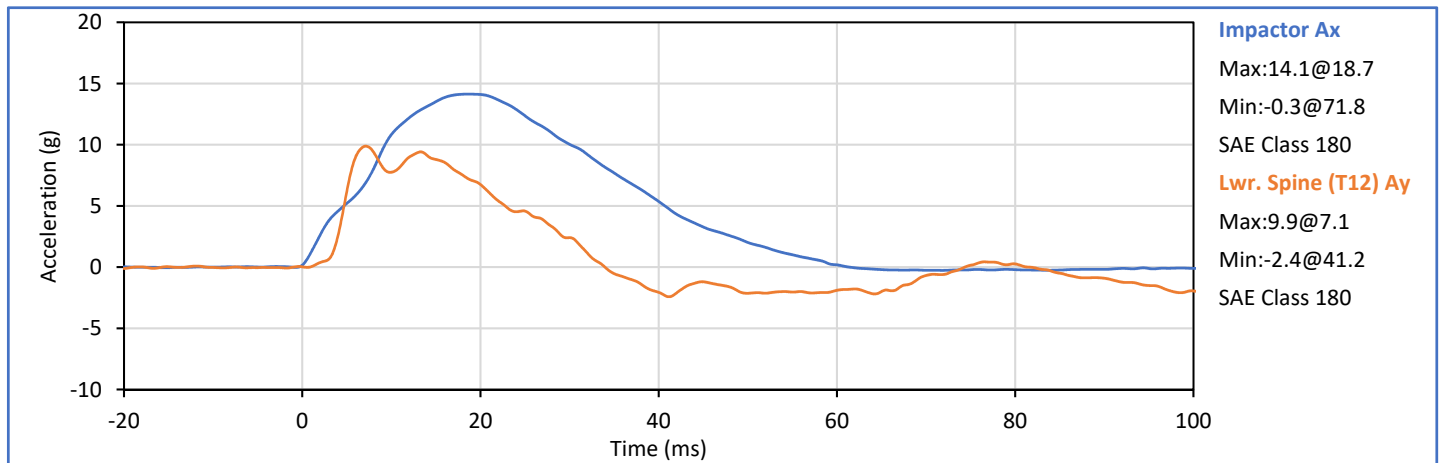
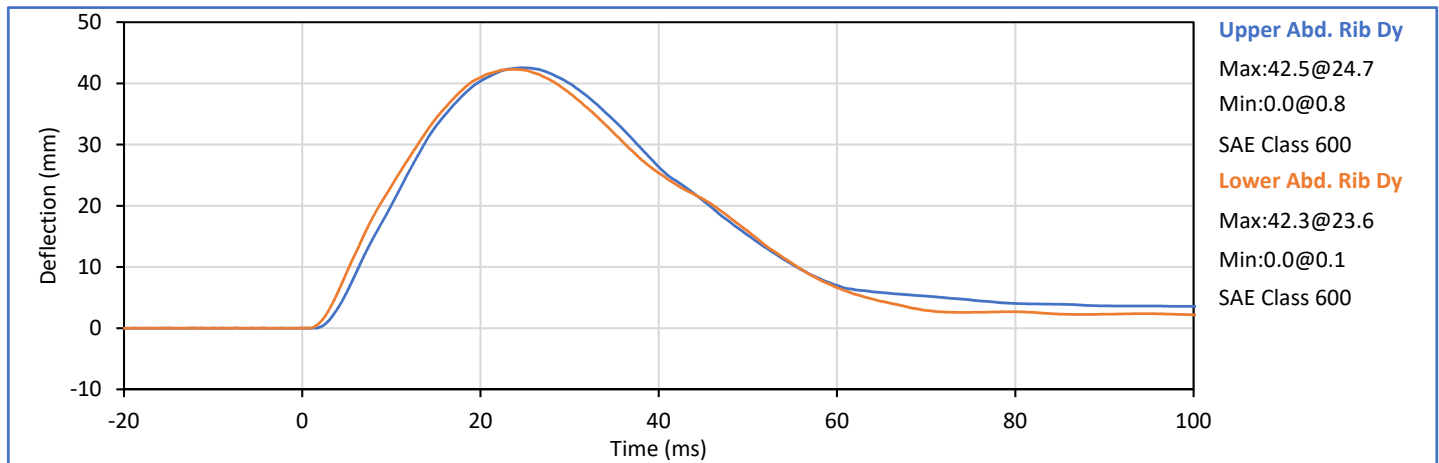


**SID-IIs Small Side Impact ATD**  
**Abdomen Impact**

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter          | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature    | °C    | 20.6      | 22.2       | 20.7   | Pass      |
| Laboratory Humidity       | %     | 10        | 70         | 38     | Pass      |
| Impactor Velocity         | m/s   | 4.20      | 4.40       | 4.31   | Pass      |
| Peak Upper Abdomen Rib Dy | mm    | 36.0      | 47.0       | 42.5   | Pass      |
| Peak Lower Abdomen Rib Dy | mm    | 33.0      | 44.0       | 42.3   | Pass      |
| Peak Lower Spine T12 Ay   | mm    | 9.0       | 14.0       | 9.9    | Pass      |
| Peak Impactor Ax          | g     | 12.0      | 16.0       | 14.1   | Pass      |
| Overall Test Results      |       |           |            | Pass   | Pass      |



Technician: J. Hernandez

Approved By: P. Puzzuto



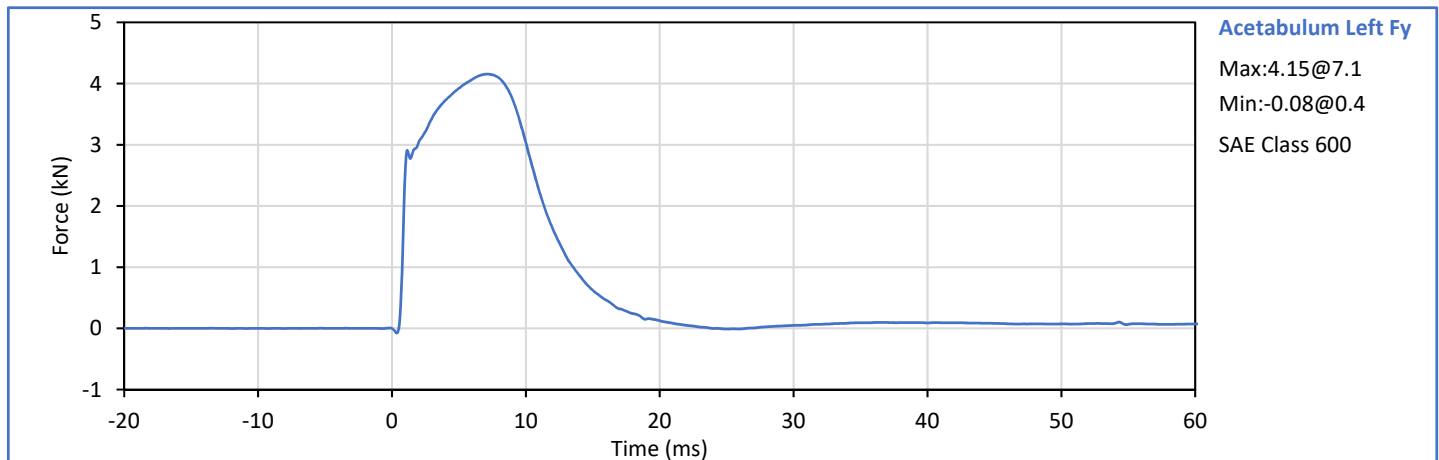
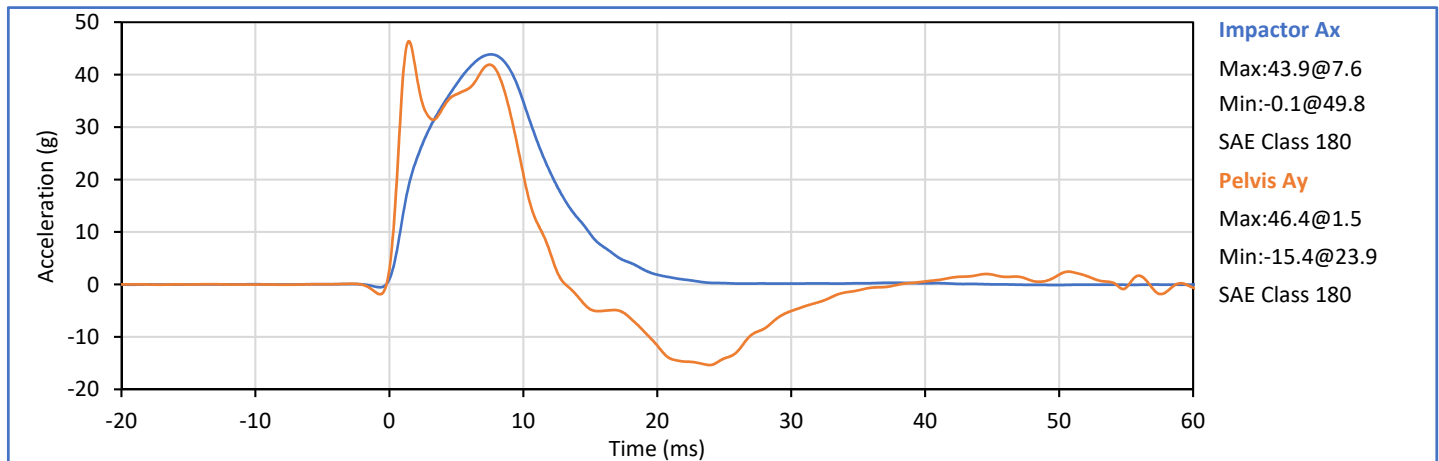
**SID-IIs Small Side Impact ATD**  
**Pelvis Acetabulum Impact**

ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.0   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 38     | Pass      |
| Impactor Velocity      | m/s   | 6.60      | 6.80       | 6.61   | Pass      |
| Peak Acetabulum Fy     | kN    | 3.60      | 4.30       | 4.15   | Pass      |
| Pelvis Ay after 6ms    | g     | 34.0      | 42.0       | 41.9   | Pass      |
| Peak Impactor Ax       | g     | 38.0      | 47.0       | 43.9   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |

Pelvis Plug S/N: 12246 (SACO)



Technician: J. Hernandez

Approved By: P. Puzzuto



9270 Holly Road, Adelanto, CA 92301  
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**SID-IIs Small Side Impact ATD**  
**Pelvis Acetabulum Impact**

ATD Serial No.: 308

Test Date: 2018-10-12

Pelvis Plug S/N: 12246 (SACO)



**SID-IIs Pelvis Plug Certification Test**

Plug S/N 12246

Test Number 6632

Report Number 6647

Test Date 3/14/2018 1:18:36 PM

|                    | Test Results | Spec Min | Spec Max |
|--------------------|--------------|----------|----------|
| Force @ 0.5 mm (N) | 302.29       | 50.00    | 600.00   |
| Force @ 1.5 mm (N) | 1,185.71     | 850.00   | 1,400.00 |
| Force @ 2.5 mm (N) | 1,438.87     | 1,306.00 | 1,618.00 |
| Force @ 3.0 mm (N) | 1,491.94     | 1,361.00 | 1,673.00 |

Testing Machine STM-20 5965542

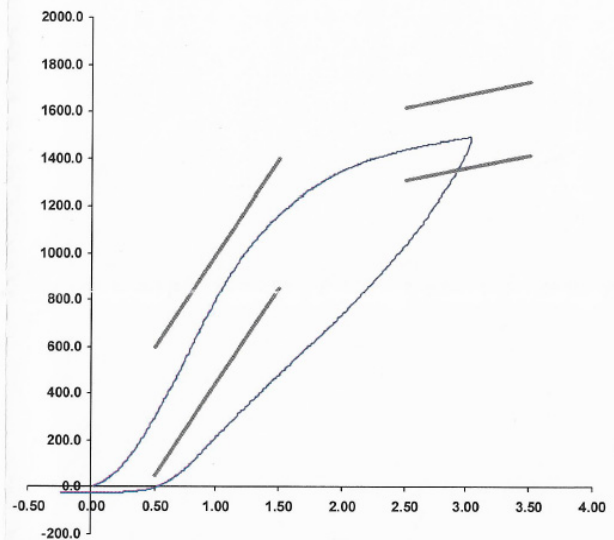
Load Cell S/N (FI360947), Units (LBS) 1000

Crosshead Speed (mm / min) or Rate 12.7

Extension or Position Measured by XHD\_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator

Part Number 180-4450

Template No 107 14-Mar-18  
SACO Research

By: DC Date: 3/14/18

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



**SID-IIs Small Side Impact ATD**  
**Pelvis Iliac Impact**

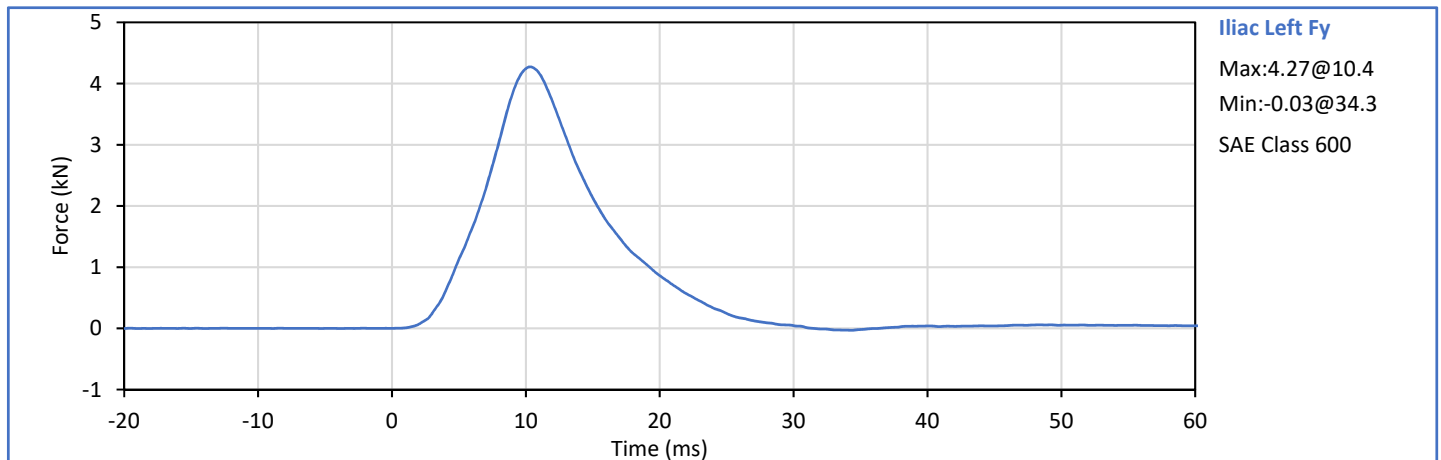
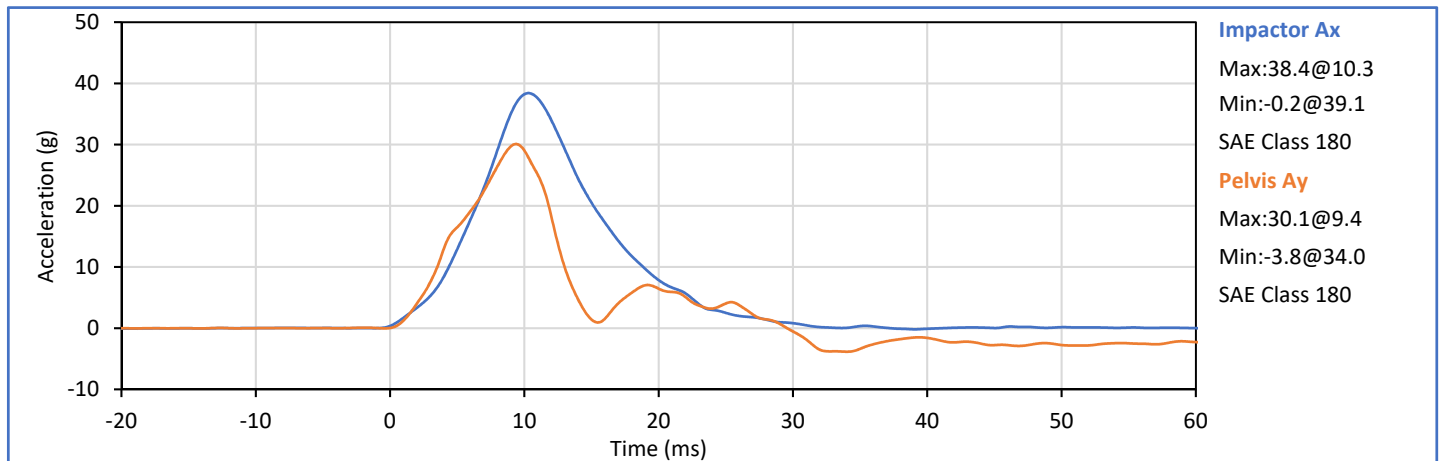
ATD Serial No.: 308

Test Date: 2018-10-12

| Tested Parameter       | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|------------------------|-------|-----------|------------|--------|-----------|
| Laboratory Temperature | °C    | 20.6      | 22.2       | 21.1   | Pass      |
| Laboratory Humidity    | %     | 10        | 70         | 38     | Pass      |
| Impactor Velocity      | m/s   | 4.20      | 4.40       | 4.27   | Pass      |
| Peak Iliac Fy          | kN    | 4.10      | 5.10       | 4.27   | Pass      |
| Pelvis Ay after 6ms    | g     | 28.0      | 39.0       | 30.1   | Pass      |
| Peak Impactor Ax       | g     | 36.0      | 45.0       | 38.4   | Pass      |
| Overall Test Results   |       |           |            |        | Pass      |

Pelvis Plug S/N: 12228 (SACO) \*

\* Plug is not impacted and remains certified



Technician: J. Hernandez

Approved By: P. Puzzuto

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

Position: Driver  
 ATD Type: ES-2re  
 ATD S/N: F035

**Table 1 - Driver ATD Instrumentation**

| Sensor Location                | Sensor S/N     | Mfr         | Model     | Last Cal   |
|--------------------------------|----------------|-------------|-----------|------------|
| Head Acceleration X Primary    | P58760         | Endevco     | 7264C-2k  | 2018-07-25 |
| Head Acceleration Y Primary    | P58763         | Endevco     | 7264C-2k  | 2018-07-25 |
| Head Acceleration Z Primary    | P52093         | Endevco     | 7264C-2k  | 2018-07-25 |
| Head Acceleration X Redundant  | P52072         | Endevco     | 7264C-2k  | 2018-07-25 |
| Head Acceleration Y Redundant  | P58768         | Endevco     | 7264C-2k  | 2018-07-25 |
| Head Acceleration Z Redundant  | P52074         | Endevco     | 7264C-2k  | 2018-07-25 |
| Upper Thorax Rib Deflection Y  | 180 (ES-2 Rib) | Honeywell   | F38000203 | 2018-07-24 |
| Middle Thorax Rib Deflection Y | 177 (ES-2 Rib) | Honeywell   | F38000203 | 2018-07-24 |
| Lower Thorax Rib Deflection Y  | 186 (ES-2 Rib) | Honeywell   | F38000203 | 2018-07-24 |
| Anterior Abdominal Force Y     | 1514 Fy        | R.A. Denton | 2631      | 2018-06-25 |
| Middle Abdominal Force Y       | 1510 Fy        | R.A. Denton | 2631      | 2018-06-25 |
| Posterior Abdominal Force Y    | 1515 Fy        | R.A. Denton | 2631      | 2018-06-25 |
| Lower Spine T12 Acceleration X | P45011         | Endevco     | 7264C-2k  | 2018-07-25 |
| Lower Spine T12 Acceleration Y | P58992         | Endevco     | 7264C-2k  | 2018-07-25 |
| Lower Spine T12 Acceleration Z | P51700         | Endevco     | 7264C-2k  | 2018-07-25 |
| Pubic Symphysis Force Y        | 506 Fy         | R.A. Denton | 3096 JFL  | 2018-06-25 |

Position: Rear Pass.  
 ATD Type: SID-IIs  
 ATD S/N: 308

**Table 2a - Passenger ATD Instrumentation**

| Sensor Location                | Sensor S/N          | Mfr         | Model      | Last Cal   |
|--------------------------------|---------------------|-------------|------------|------------|
| Head Acceleration X Primary    | P63980              | Endevco     | 7264C-2k   | 2018-09-14 |
| Head Acceleration Y Primary    | P58861              | Endevco     | 7264C-2k   | 2018-09-14 |
| Head Acceleration Z Primary    | P51261              | Endevco     | 7264C-2k   | 2018-09-14 |
| Head Acceleration X Redundant  | P58808              | Endevco     | 7264C-2k   | 2018-09-14 |
| Head Acceleration Y Redundant  | P63310              | Endevco     | 7264C-2k   | 2018-09-14 |
| Head Acceleration Z Redundant  | P49189              | Endevco     | 7264C-2k   | 2018-09-14 |
| Upper Thorax Rib Deflection Y  | 1172                | Servo       | 08TCI-3725 | 2018-09-13 |
| Middle Thorax Rib Deflection Y | 1219                | Servo       | 08TCI-3725 | 2018-09-13 |
| Lower Thorax Rib Deflection Y  | 1221                | Servo       | 08TCI-3725 | 2018-09-13 |
| Upper Abdomen Rib Deflection Y | 1252                | Servo       | 08TCI-3725 | 2018-09-13 |
| Lower Abdomen Rib Deflection Y | 1283                | Servo       | 08TCI-3725 | 2018-09-13 |
| Lower Spine T12 Acceleration X | P52108              | Endevco     | 7264C-2k   | 2018-09-14 |
| Lower Spine T12 Acceleration Y | P63970              | Endevco     | 7264C-2k   | 2018-09-14 |
| Lower Spine T12 Acceleration Z | P51712              | Endevco     | 7264C-2k   | 2018-09-14 |
| Iliac Wing Impact Side Force Y | 278 Fy (Iliac)      | R.A. Denton | 3228J      | 2017-11-08 |
| Acetabulum Impact Side Force Y | 272 Fy (Acetabulum) | R.A. Denton | 3249J      | 2018-06-21 |

**Table 1b - Passenger ATD Optional Instrumentation (Research Data Only)**

| Sensor Location      | Sensor S/N | Mfr | Model               | Last Cal   |
|----------------------|------------|-----|---------------------|------------|
| Head Rotation Rate X | ARS7498    | DTS | ARS PRO-8k (2000Hz) | 2017-08-10 |
| Head Rotation Rate Y | ARS7367    | DTS | ARS PRO-8k (2000Hz) | 2017-08-10 |
| Head Rotation Rate Z | ARS7377    | DTS | ARS PRO-8k (2000Hz) | 2017-08-10 |

**Table 3 - Vehicle Instrumentation**

| Sensor Location                  | Sensor S/N | Mfr | Model    | Last Cal   |
|----------------------------------|------------|-----|----------|------------|
| Vehicle CG Ax                    | A185693    | MSI | 52F-2000 | 2018-09-17 |
| Vehicle CG Ay                    | A145925    | MSI | 52F-2000 | 2018-09-17 |
| Vehicle CG Az                    | A224577    | MSI | 52F-2000 | 2018-09-17 |
| Right Side Sill at Front Seat Ax | A224575    | MSI | 52F-2000 | 2018-09-17 |
| Right Side Sill at Front Seat Ay | A227288    | MSI | 52F-2000 | 2018-09-17 |
| Right Side Sill at Front Seat Az | A224565    | MSI | 52F-2000 | 2018-09-17 |
| Right Side Sill at Rear Seat Ax  | A247063    | MSI | 52F-2000 | 2018-09-17 |
| Right Side Sill at Rear Seat Ay  | A208760    | MSI | 52F-2000 | 2018-09-17 |
| Right Side Sill at Rear Seat Az  | A227262    | MSI | 52F-2000 | 2018-09-17 |
| Left Side Sill at Front Seat Ay  | A248840    | MSI | 52F-2000 | 2018-09-15 |
| Left Side Sill at Rear Seat Ay   | A224510    | MSI | 52F-2000 | 2018-09-17 |
| Left Lower A-Pillar Ay           | A227280    | MSI | 52F-2000 | 2018-09-17 |
| Left Middle A-Pillar Ay          | A224560    | MSI | 52F-2000 | 2018-09-15 |
| Left Lower B-Pillar Ay           | A147385    | MSI | 52F-2000 | 2018-09-17 |
| Left Middle B-Pillar Ay          | A227260    | MSI | 52F-2000 | 2018-09-17 |
| Driver Seat Track at H-Point Ay  | A224524    | MSI | 52F-2000 | 2018-09-17 |
| Rear Seat Structure Ay           | A224581    | MSI | 52F-2000 | 2018-09-17 |
| Right Rear Occupant Comp. Ay     | A217449    | MSI | 52F-2000 | 2018-09-17 |
| Engine Block Top Ax              | A224490    | MSI | 52F-2000 | 2018-09-17 |
| Engine Block Top Ay              | A248863    | MSI | 52F-2000 | 2018-09-17 |
| Rear Floopan Above Axle Ax       | A209101    | MSI | 52F-2000 | 2018-09-17 |
| Rear Floopan Above Axle Ay       | A226925    | MSI | 52F-2000 | 2018-09-17 |
| Rear Floopan Above Axle Az       | A248837    | MSI | 52F-2000 | 2018-09-17 |

**Table 4 - Moving Deformable Barrier (MDB) Instrumentation**

| Sensor Location               | Sensor S/N | Mfr | Model    | Last Cal   |
|-------------------------------|------------|-----|----------|------------|
| MDB CG Ax                     | A201199    | MSI | 64C-2000 | 2018-04-12 |
| MDB CG Ay                     | A200246    | MSI | 64C-2000 | 2018-04-12 |
| MDB CG Az                     | A199889    | MSI | 64C-2000 | 2018-04-12 |
| MDB Left Side at Rear Axle Ax | A203298    | MSI | 64C-2000 | 2018-04-12 |
| MDB Left Side at Rear Axle Ay | A200229    | MSI | 64C-2000 | 2018-04-12 |