

**REPORT NUMBER: SideNCAPPole-MGA-23-011**

**NEW CAR ASSESSMENT PROGRAM (NCAP)  
Side Impact Pole Test**

**KIA CORPORATION  
2023 Kia Niro EX Touring 5-Door SUV  
NHTSA No.: M20234212**

**MGA RESEARCH CORPORATION  
5000 Warren Road  
Burlington, WI 53105**



**Test Date: March 3, 2023**

**Final Report Date: January 3, 2024**

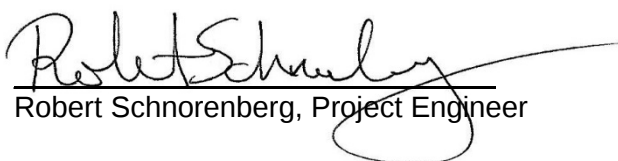
**FINAL REPORT**

**U.S. DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration  
Office of Crashworthiness Standards  
Mail Code: NRM-100  
1200 New Jersey Ave, SE  
Washington, DC 20590**

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Approval Date: January 3, 2024

FINAL REPORT ACCEPTANCE BY OCWS:

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

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

# TECHNICAL REPORT DOCUMENTATION PAGE

| <b>1. Report No.</b><br>SideNCAPPole-MGA-23-011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       | <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 Side Impact Pole Testing and FMVSS No. 305 Indicant Testing of a 2023 Kia Niro EX Touring 5-Door SUV, NHTSA No.: M20234212                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                                            |                                                                                                                                                                                                                                | <b>5. Report Date</b><br>January 3, 2024                                                               |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
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| <b>7. Author(s)</b><br>Ben Fischer, Program Manager                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                                            |                                                                                                                                                                                                                                | <b>8. Performing Organization Report No.</b><br>SideNCAPPole-MGA-23-011                                |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| <b>9. Performing Organization Name and Address</b><br>MGA Research Corporation<br>5000 Warren Road<br>Burlington, WI 53105                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                            |                                                                                                                                                                                                                                | <b>10. Work Unit No.</b>                                                                               |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
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| <b>12. Sponsoring Agency Name and Address</b><br>United States Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Crashworthiness Standards<br>Mail Code: NRM-100<br>1200 New Jersey Ave, SE<br>Washington, DC 20590                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |                                                            |                                                                                                                                                                                                                                | <b>13. Type of Report and Period Covered:</b><br>Final Test Report<br>March 3, 2023 to January 3, 2024 |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
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| <b>15. Supplementary Notes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |                                                            |                                                                                                                                                                                                                                |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| <b>16. Abstract</b><br><p>A 32.20 km/h, 75° oblique impact Side NCAP Test was conducted on the subject 2023 Kia Niro EX Touring 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. The test was conducted at the MGA Research Corporation facility in Burlington, Wisconsin on March 3, 2023.</p> <p>The impact velocity was 32.13 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.1°C. The test vehicle post-test maximum crush was 320 mm at level 3. The test vehicle's performance was as follows:</p> <table border="1" data-bbox="175 1121 1443 1411"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD (SID-IIs)</th> </tr> <tr> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>36</sub>)</td> <td></td> <td>1000</td> <td>473.780</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>g</td> <td>82</td> <td>43.289</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>3076.165</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38*</td> <td>22.263</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45*</td> <td>20.807</td> </tr> </tbody> </table> <p style="text-align: center;">*Proposed IARV</p> <p>The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite door(s) did not open during the side impact event.</p> |       |                                                            |                                                                                                                                                                                                                                |                                                                                                        |                  | Measurement Description | Units | Driver ATD (SID-IIs) |  | Threshold | Result | Head Injury Criteria (HIC <sub>36</sub> ) |  | 1000 | 473.780 | Resultant Lower Spine Acceleration | g | 82 | 43.289 | Total Pelvic Force (sum of acetabular and iliac forces) | N | 5525 | 3076.165 | Maximum Thoracic Rib Deflection | mm | 38* | 22.263 | Maximum Abdomen Rib Deflection | mm | 45* | 20.807 |
| Measurement Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Units | Driver ATD (SID-IIs)                                       |                                                                                                                                                                                                                                |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
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| Head Injury Criteria (HIC <sub>36</sub> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       | 1000                                                       | 473.780                                                                                                                                                                                                                        |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| Resultant Lower Spine Acceleration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | g     | 82                                                         | 43.289                                                                                                                                                                                                                         |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| Total Pelvic Force (sum of acetabular and iliac forces)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N     | 5525                                                       | 3076.165                                                                                                                                                                                                                       |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| Maximum Thoracic Rib Deflection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | mm    | 38*                                                        | 22.263                                                                                                                                                                                                                         |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| Maximum Abdomen Rib Deflection                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | mm    | 45*                                                        | 20.807                                                                                                                                                                                                                         |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| <b>17. Key Words</b><br>New Car Assessment Program (NCAP)<br>Side Impact<br>Pole<br>Part 572V<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<br>1200 New Jersey Ave, SE<br>Washington, DC 20590 |                                                                                                        |                  |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |
| <b>19. Security Classification of Report</b><br>Unclassified                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       | <b>20. Security Classification of Page</b><br>Unclassified |                                                                                                                                                                                                                                | <b>21. No. of Pages</b><br>169                                                                         | <b>22. Price</b> |                         |       |                      |  |           |        |                                           |  |      |         |                                    |   |    |        |                                                         |   |      |          |                                 |    |     |        |                                |    |     |        |

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## SECTION 1 PURPOSE AND SUMMARY OF TEST

### PURPOSE

This side pole impact test is part of the MY 2023 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. 693JJ920D000017. The purpose of this test is to generate comparative side impact performance in a 2023 Kia Niro EX Touring 5-Door SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

### SUMMARY

A rigid pole side impact test was conducted on a 2023 Kia Niro EX Touring 5-Door SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.13 km/h. The test was conducted by MGA Research Corporation in Burlington, Wisconsin on March 3, 2023. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure dated March 2020. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

- Primary and Redundant Head CG Triaxial Accelerometers
- Head Triaxial Angular Rate Sensors
- Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
- Abdomen Upper Rib and Lower Rib Displacement Potentiometers
- Lower Spine (T12) Triaxial Accelerometers
- Iliac Load Cell
- Acetabulum Load Cell

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 contains the test equipment and instrumentation calibration data.

Injury readings for the SID-IIs dummy were recorded as follows:

| Measurement Description                                 | Units | Driver ATD (SID-IIs) |          |
|---------------------------------------------------------|-------|----------------------|----------|
|                                                         |       | Threshold            | Result   |
| Head Injury Criteria (HIC <sub>36</sub> )               |       | 1000                 | 473.780  |
| Resultant Lower Spine Acceleration                      | g     | 82                   | 43.289   |
| Total Pelvic Force (sum of acetabular and iliac forces) | N     | 5525                 | 3076.165 |
| Maximum Thoracic Rib Deflection                         | mm    | 38*                  | 22.263   |
| Maximum Abdomen Rib Deflection                          | mm    | 45*                  | 20.807   |

\*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       |                                              |          |
| Knee Airbag              | Yes                                        | No       |                                              |          |
| Side Curtain Airbag      | Yes                                        | Yes      | Yes                                          | Yes      |
| Side Torso/Pelvis Airbag | Yes                                        | Yes      | No                                           |          |
| Side Airbag (Other)      |                                            |          |                                              |          |
| Seat Belt Pretensioner   | Yes                                        | Yes      | No                                           |          |
| Seat Belt Load Limiter   | Yes                                        |          | No                                           |          |
| Other:                   | No                                         |          | No                                           |          |

The test data can be found on the NHTSA website at [www.nhtsa.gov](http://www.nhtsa.gov)

#### GENERAL COMMENTS

Vehicle CG Y recorded questionable valid data.

Left Lower A-Post Y recorded no valid data after 25 ms.

Driver Seat Track Y recorded no valid data after 48 ms.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

**SECTION 2**  
**OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS**

**DATA SHEET NO. 1**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023

**TEST VEHICLE INFORMATION AND OPTIONS**

|                          |                   |                                   |     |
|--------------------------|-------------------|-----------------------------------|-----|
| NHTSA No.                | M20234212         | Traction Control System (TCS)     | Yes |
| Model Year               | 2023              | Auto-Leveling System              | No  |
| Make                     | Kia               | Automatic Door Locks (ADL)        | Yes |
| Model                    | Niro EX Touring   | Power Window Auto-Reverse         | Yes |
| Body Style               | 5-Door SUV        | Other Optional Feature            | No  |
| VIN                      | KNDCR3LE9P5052378 | Driver Front Airbag               | Yes |
| Body Color               | Steel Gray        | Driver Curtain Airbag             | Yes |
| Odometer Reading (km/mi) | 85 km / 53 mi     | Driver Head/Torso Airbag          | No  |
| Engine Displacement (L)  | 1.6 L             | Driver Torso Airbag               | No  |
| Type/No. Cylinders       | Inline 4          | Driver Torso/Pelvis Airbag        | Yes |
| Engine Placement         | Lateral           | Driver Pelvis Airbag              | No  |
| Transmission Type        | Automatic         | Driver Knee Airbag                | Yes |
| Transmission Speeds      | 6                 | Rear Pass. Curtain Airbag         | Yes |
| Overdrive                | Yes               | Rear Pass. Head/Torso Airbag      | No  |
| Final Drive              | FWD               | Rear Pass. Torso Airbag           | No  |
| Roof Rack                | No                | Rear Pass. Torso/Pelvis Airbag    | No  |
| Sunroof/T-Top            | Yes               | Rear Pass. Pelvis Airbag          | No  |
| Running Boards           | No                | Driver Seat Belt Pretensioner     | Yes |
| Tilt Steering Wheel      | Yes               | Rear Pass. Seat Belt Pretensioner | No  |
| Power Seats              | Yes               | Driver Load Limiter               | Yes |
| Anti-Lock Brakes (ABS)   | Yes               | Rear Pass. Load Limiter           | No  |
|                          |                   | Other Safety Restraint            | N/A |

|                                                                           |    |
|---------------------------------------------------------------------------|----|
| Does owner's manual provide instruction to turn off automatic door locks? | No |
|---------------------------------------------------------------------------|----|

**DATA FROM CERTIFICATION LABEL**

|                     |                 |                 |      |
|---------------------|-----------------|-----------------|------|
| Manufactured By     | KIA CORPORATION | GVWR (kg)       | 1910 |
| Date of Manufacture | 09/22           | GAWR Front (kg) | 1065 |
| Vehicle Type        | MPV             | GAWR Rear (kg)  | 1050 |

**VEHICLE SEATING AND WEIGHT CAPACITY DATA**

| Measured Parameter                         | Front | Rear | Third | Total |       |
|--------------------------------------------|-------|------|-------|-------|-------|
| Designated Seating Capacity (DSC)          | 2     | 3    |       | 5     |       |
| Capacity Weight (VCW) (kg)                 |       |      |       | 390   | (A)   |
| DSC x 68 kg                                |       |      |       | 340   | (B)   |
| Rated Cargo and Luggage Weight (RCLW) (kg) |       |      |       | 50    | (A-B) |

**VEHICLE SEAT TYPE**

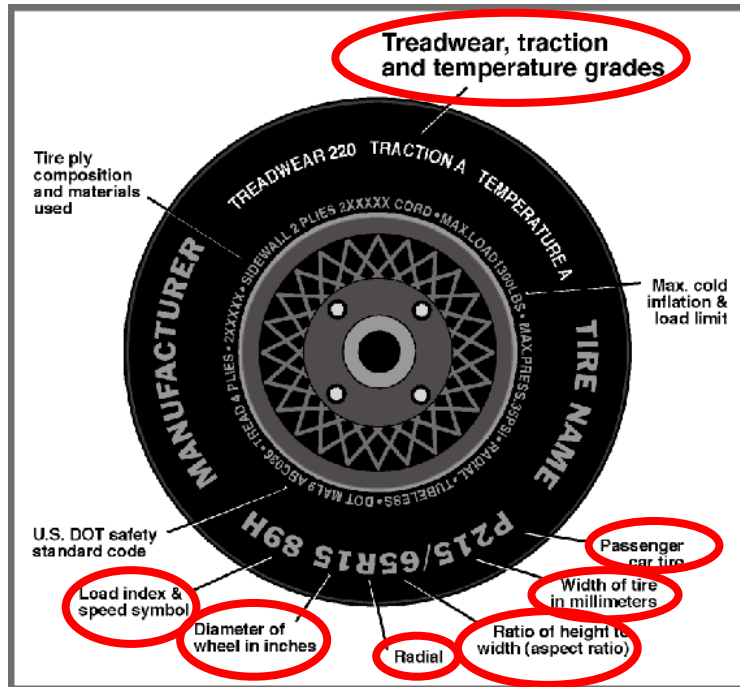
| Seating Location   | Type of Seat Pan |       |             |           | Type of Seat Back |            |         |
|--------------------|------------------|-------|-------------|-----------|-------------------|------------|---------|
|                    | Bucket           | Bench | Split Bench |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

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

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**VEHICLE TIRE INFORMATION**



| Measured Parameter       | Front                             | Rear                              |
|--------------------------|-----------------------------------|-----------------------------------|
| Max. Tire Pressure (kPa) | 350                               | 350                               |
| Cold Pressure (kPa)      | 250                               | 250                               |
| Recommended Tire Size    | 225/45R18                         | 225/45R18                         |
| Tire Size on Vehicle     | 225/45R18                         | 225/45R18                         |
| Tire Manufacturer        | Continental                       | Continental                       |
| Tire Model               | ProContact RX                     | ProContact RX                     |
| Treadwear                | 400                               | 400                               |
| Traction                 | A                                 | A                                 |
| Temperature Grade        | A                                 | A                                 |
| Tire Plies Sidewall      | 2 Polyester                       | 2 Polyester                       |
| Tire Plies Body          | 1 Polyester, 2 Steel, 1 Polyamide | 1 Polyester, 2 Steel, 1 Polyamide |
| Load Index/Speed Symbol  | 95V                               | 95V                               |
| Tire Material            | Rubber                            | Rubber                            |
| DOT Safety Code Left     | 0360 FBERX 2722                   | 0360 FBERX 2722                   |
| DOT Safety Code Right    | 0360 FBERX 2722                   | 0360 FBERX 2722                   |

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

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**TEST PRESSURES**

|                | Units | LF  | RF  | LR  | RR  |
|----------------|-------|-----|-----|-----|-----|
| As Delivered   | kPa   | 250 | 250 | 250 | 240 |
| Tire Placard   | kPa   | 250 | 250 | 250 | 250 |
| Owner's Manual | kPa   | 250 | 250 | 250 | 250 |
| As Tested      | kPa   | 250 | 250 | 250 | 250 |

**TEST AXLE VEHICLE WEIGHTS**

|        | Units | As Delivered (UVW) |       |        | As Tested (ATW) |       |        | Fully Loaded |       |        |
|--------|-------|--------------------|-------|--------|-----------------|-------|--------|--------------|-------|--------|
|        |       | Front              | Rear  | Total  | Front           | Rear  | Total  | Front        | Rear  | Total  |
| Left   | kg    | 449.5              | 283.0 |        | 469.0           | 318.0 |        | 467.0        | 328.0 |        |
| Right  | kg    | 425.5              | 294.5 |        | 435.5           | 325.0 |        | 430.5        | 329.0 |        |
| Ratio  | %     | 60.2%              | 39.8% |        | 58.4%           | 41.6% |        | 57.7%        | 42.3% |        |
| Totals | kg    | 875.0              | 577.5 | 1452.5 | 904.5           | 643.0 | 1547.5 | 897.5        | 657.0 | 1554.5 |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter                           | Units | Value  |         |
|----------------------------------------------|-------|--------|---------|
| Total Delivered Weight (UVW)                 | kg    | 1452.5 | (A)     |
| Actual Weight of 1 P572 ATD (SID-IIs) Used   | kg    | 52     | (B)     |
| Rated Cargo/Luggage Weight (RCLW)            | kg    | 50     | (C)     |
| Calculated Test Vehicle Target Weight (TVTW) | kg    | 1554.5 | (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 kg)? **YES**

**TEST VEHICLE ATTITUDES AND CG**

|                                                                | Units | As Delivered | As Tested | Fully Loaded | Meets Requirement |
|----------------------------------------------------------------|-------|--------------|-----------|--------------|-------------------|
| Driver Door Sill Angle (front-to-back)*                        | deg   | -0.2         | 0.0       | 0.1          | Yes               |
| Front Pass. Door Sill Angle (front-to-back)*                   | deg   | -0.2         | 0.1       | 0.2          | Yes               |
| Front Bumper Angle (left-to-right)**                           | deg   | -0.1         | 0.0       | 0.0          | Yes               |
| Rear Bumper Angle (left-to-right)**                            | deg   | -0.1         | 0.1       | 0.1          | Yes               |
| Vehicle CG (Aft of Front Axle)                                 | mm    | 1083         | 1132      | 1152         |                   |
| Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline) | mm    | 7            | 14        | 18           |                   |

\* ND=Nose Down (-), NU=Nose Up (+)    \*\* LD=Left Down (-), LU=Left Up (+)

\*\*\* The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements.

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

| Component Description            | Units | Weight |
|----------------------------------|-------|--------|
| Weight of Ballast Added          | kg    | 0      |
| Components Removed: RR taillight | kg    | 2      |

|                                                           |                |
|-----------------------------------------------------------|----------------|
| Test height adjustable suspension setting, if applicable: | Not Applicable |
|-----------------------------------------------------------|----------------|

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

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023

**TEST SURFACE MARKINGS**

|                   | Distance from 75° Impact Location Line (mm) |
|-------------------|---------------------------------------------|
| Fore 25 mm Target | 890                                         |
| Aft 25 mm Target  | 896                                         |

**DATA SHEET NO. 2**  
**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEM DATA**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**SEAT POSITIONING**

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

**SCRL ANGLE RANGE**

| Seat                      | SCRL (°) |       |       |
|---------------------------|----------|-------|-------|
|                           | Max      | Min   | Mid   |
| Driver Seat               | 23.3     | 13.7  | 18.5  |
| Front Passenger Seat      | 17.4     | 13.8  | 15.6  |
| 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<br>SCRL Angle<br>(Mid)<br>(°) | As-Tested<br>SCRIP Height<br>(mm) | SCRIP<br>Height<br>Position | SCRIP Height (mm) |       |              |
|---------------------------|-----------------------------------------|-----------------------------------|-----------------------------|-------------------|-------|--------------|
|                           |                                         |                                   |                             | Rear-Most         | Mid   | Forward-Most |
| Driver Seat               | 18.5                                    | 33                                | Max                         | 66                | 66    | 66           |
|                           |                                         |                                   | Mid                         | 33                | 33    | 33           |
|                           |                                         |                                   | Min                         | 0                 | 0     | 0            |
| Front Passenger Seat      | 15.6                                    | Fixed                             | Max                         | Fixed             | Fixed | Fixed        |
|                           |                                         |                                   | Mid                         | Fixed             | Fixed | Fixed        |
|                           |                                         |                                   | Min                         | Fixed             | Fixed | Fixed        |
| Front Center Seat         |                                         |                                   | Max                         |                   |       |              |
|                           |                                         |                                   | Mid                         |                   |       |              |
|                           |                                         |                                   | Min                         |                   |       |              |
| 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: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

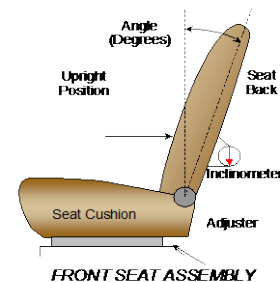
NHTSA No.: M20234212  
 Test Date: 3/3/2023

**SEAT FORE/AFT POSITIONS**

| Seat                      | Total Fore/Aft Travel |                                | Test Position from Forward-Most Position |                               |
|---------------------------|-----------------------|--------------------------------|------------------------------------------|-------------------------------|
|                           | mm                    | Detents (1 <sup>st</sup> as 1) | mm                                       | Detent (1 <sup>st</sup> as 0) |
| Driver Seat               | 260                   |                                | 0                                        |                               |
| Front Passenger Seat      | 260                   | 67                             | 0                                        | 0                             |
| Front Center Seat         |                       |                                |                                          |                               |
| Struck Side Rear Seat     | Fixed                 |                                | Fixed                                    |                               |
| Non-Struck Side Rear Seat | Fixed                 |                                | Fixed                                    |                               |
| Rear Center Seat          | Fixed                 |                                | Fixed                                    |                               |

**SEAT BACK ANGLE ADJUSTMENT**

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on S1 – Vehicle Setup Information for the 5<sup>th</sup> percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.



| Seat                      | Total Seat Back Angle Range |                                | Test Position from Vertical |                               |
|---------------------------|-----------------------------|--------------------------------|-----------------------------|-------------------------------|
|                           | Degrees                     | Detents (1 <sup>st</sup> as 1) | Degrees                     | Detent (1 <sup>st</sup> as 0) |
| Driver Seat               | 63.1                        |                                | -4.5                        |                               |
| Front Passenger Seat      | 58.1                        | 30                             | -4.0                        | 5                             |
| Front Center Seat         |                             |                                |                             |                               |
| Struck Side Rear Seat     | Fixed                       |                                | Fixed                       |                               |
| Non-Struck Side Rear Seat | Fixed                       |                                | Fixed                       |                               |
| Rear Center Seat          | Fixed                       |                                | Fixed                       |                               |

All seat back angles measured on outboard headrest post.

**SEAT BELT ANCHORAGE ADJUSTMENT**

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on S1 – Vehicle Setup Information.

|             | Total # of Positions | Placed in Position # |
|-------------|----------------------|----------------------|
| Driver Seat | 3                    | 0 (Uppermost as 0)   |

**HEAD RESTRAINT ADJUSTMENT**

Head restraints are adjusted to the lowest and most full forward in-use position.

|             | Total # of Positions | Placed in Position #             |
|-------------|----------------------|----------------------------------|
| Driver Seat | 6                    | 0 (Lowest as 0) / Fixed Fore-Aft |

**DATA SHEET NO. 2 (CONTINUED)**  
**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT, AND FUEL SYSTEM DATA**

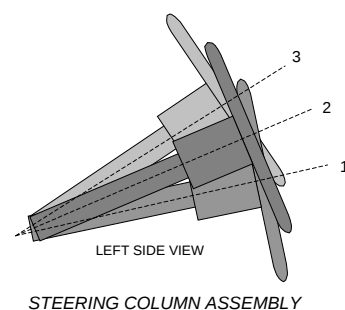
Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**STEERING COLUMN ADJUSTMENT**

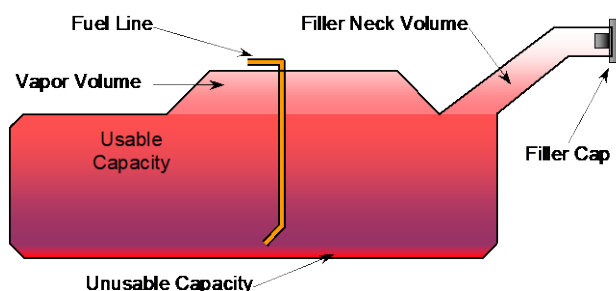
Steering wheel and column adjustments are made so that the steering wheel geometric locus is described when it moves through its full range of motion.

|                                   | Wheel Angle<br>(°) | Fore/Aft Position<br>(mm) |
|-----------------------------------|--------------------|---------------------------|
| Lowermost, Position 1             | 65.8               |                           |
| Geometric Center, Position 2      | 63.2               |                           |
| Uppermost, Position 3             | 60.5               |                           |
| Telescoping Steering Wheel Travel |                    | 54                        |
| Test Position                     | 63.2               | 27                        |



**FUEL PUMP**

The vehicle is equipped with an electronic fuel pump. The fuel pump normally operates when the vehicle's electrical system is activated. The filler neck is located on the driver's side.



**FUEL TANK CAPACITY DATA**

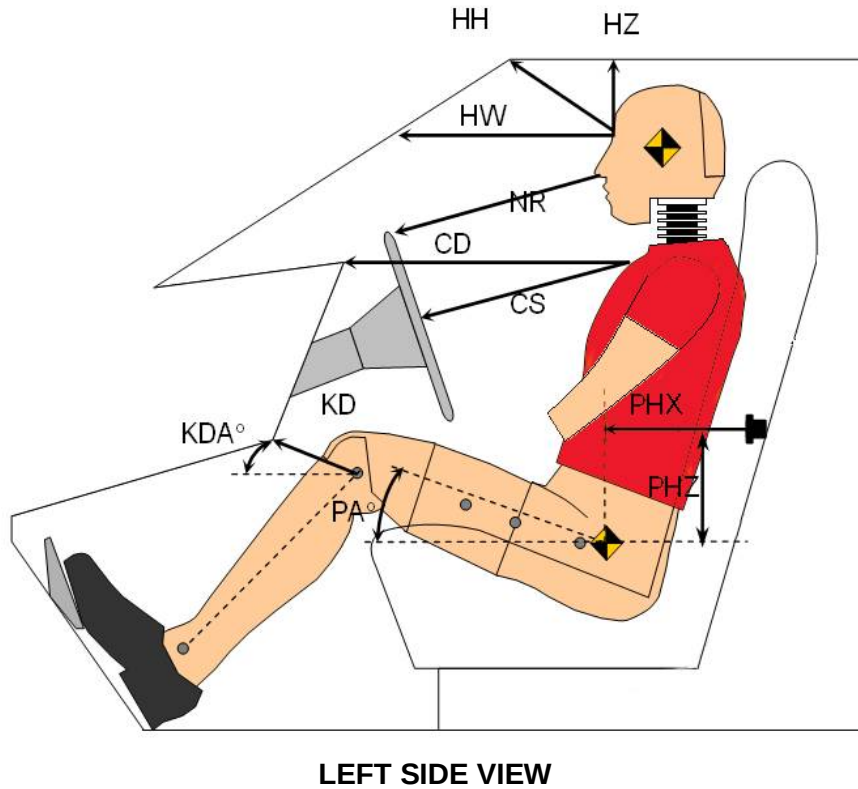
|                                                                       | Liters |
|-----------------------------------------------------------------------|--------|
| Usable Capacity of Standard Tank (see S1 – Vehicle Setup Information) | 42.0   |
| Usable Capacity of Optional Tank (see S1 – Vehicle Setup Information) |        |
| Usable Capacity of Standard Tank as Specified in Owner's Manual       | 42.0   |
| Usable Capacity of Optional Tank as Specified in Owner's Manual       |        |
| 93% of Usable Capacity                                                | 39.1   |
| Actual Amount of Solvent Used                                         | 39.0   |
| 1/3 of Usable Capacity                                                | 14.0   |

Is the actual amount of solvent used in the test equal to 93%  $\pm$  1% of the Usable Capacity stated in S1 – Vehicle Setup Information? **YES**

**DATA SHEET NO. 3**  
**DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

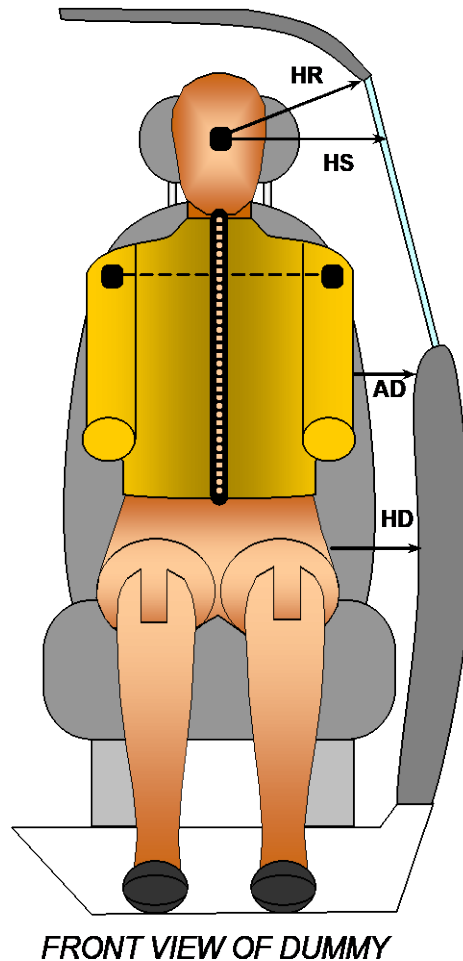


| Code       | Measurement Description       | Driver      |           |
|------------|-------------------------------|-------------|-----------|
|            |                               | Length (mm) | Angle (°) |
| HH         | Head to Header                | 242         |           |
| HW         | Head to Windshield            | 530         |           |
| HZ         | Head to Roof Liner            | 166         |           |
| NR         | Nose to Rim/Seat Back         | 251         |           |
| CD         | Chest to Dashboard/Seat Back  | 445         |           |
| CS         | Chest to Steering Wheel       | 187         |           |
| KDL / KDAL | Left Knee to Dash/Seat Back   | 147         | 33.4      |
| KDR / KDAL | Right Knee to Dash/Seat Back  | 152         | 33.0      |
| PAX        | Pelvic Tilt Angle X           |             | 20.6      |
| PAY        | Pelvic Tilt Angle Y           |             | -0.8      |
| PHX        | Hip Point to Striker (X-Axis) | 367         |           |
| PHZ        | Hip Point to Striker (Z-Axis) | 227         |           |

**DATA SHEET NO. 4**  
**DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

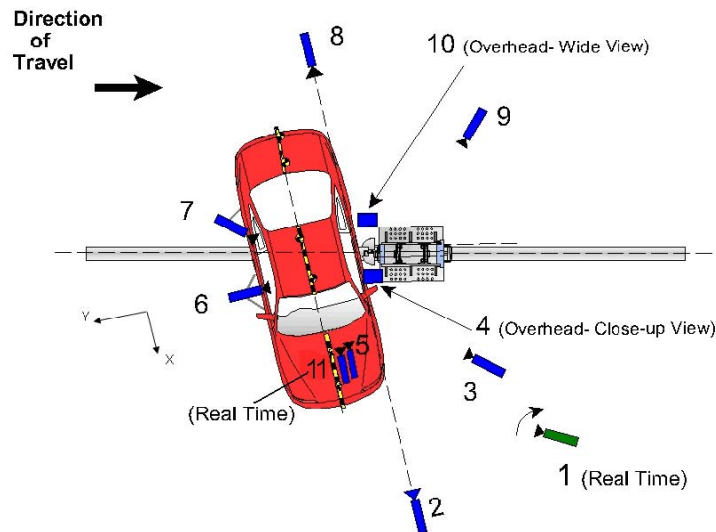


| Code | Measurement Description | Driver      |
|------|-------------------------|-------------|
|      |                         | Length (mm) |
| HR   | Head to Side Header     | 227         |
| HS   | Head to Side Window     | 335         |
| AD   | Arm to Door             | 185         |
| HD   | Hip Point to Door       | 202         |

**DATA SHEET NO. 5**  
**CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023



Reference: (from Point of Impact for X and Y; from Ground for Z):  
+X = Forward of Impact, + Y = Right of Impact, +Z = Down

| No. | Camera View                | Coordinates* (mm) |       |       | Lens (mm) | Frame Rate (fps) |
|-----|----------------------------|-------------------|-------|-------|-----------|------------------|
|     |                            | X                 | Y     | Z     |           |                  |
| 1   | Real-Time Pan View         |                   |       |       |           | 30               |
| 2   | Front Ground Level         | 6500              | -145  | -1395 | 24        | 1000             |
| 3   | Impact Side 45° Forward    | 4180              | -2015 | -1405 | 12        | 1000             |
| 4   | Overhead Closeup           | 0                 | 0     | -6670 | 85        | 1000             |
| 5   | Onboard – Driver Front     |                   |       |       | 16        | 1000             |
| 6   | Onboard – Driver Side      |                   |       |       | 8         | 1000             |
| 7   | Onboard – Driver Rear      |                   |       |       | 8         | 1000             |
| 8   | Rear Ground Level          | -7305             | -45   | -1390 | 24        | 1000             |
| 9   | Impact Side 45° Rearward   | -2995             | -3645 | -1410 | 12        | 1000             |
| 10  | Overhead Wide View         | 700               | 750   | -6650 | 12        | 1000             |
| 11  | Real-Time Dummy Front View |                   |       |       |           | 30               |

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

Note: Vehicle was positioned at a 75° angle to the rigid pole.

Explain why camera(s) did not operate as intended: None

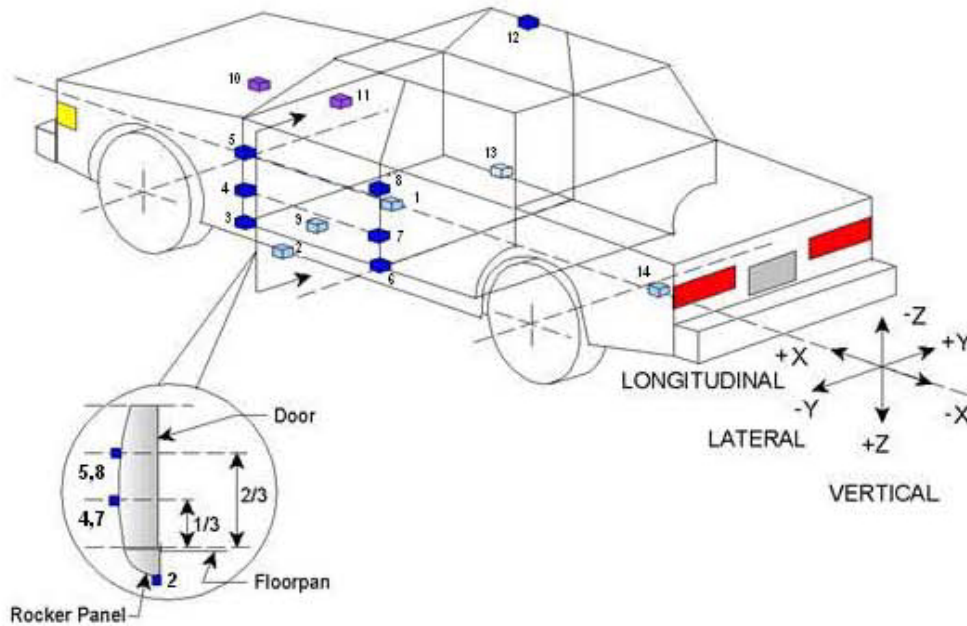
**INSTRUMENTATION**

|                   | Number of Channels |
|-------------------|--------------------|
| Driver Dummy      | 19                 |
| Vehicle Structure | 18                 |
| Pole Load Cells   | 8                  |
| Total             | 45                 |

# **DATA SHEET NO. 6** **TEST VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023



**TEST VEHICLE ACCELEROMETER LOCATIONS**

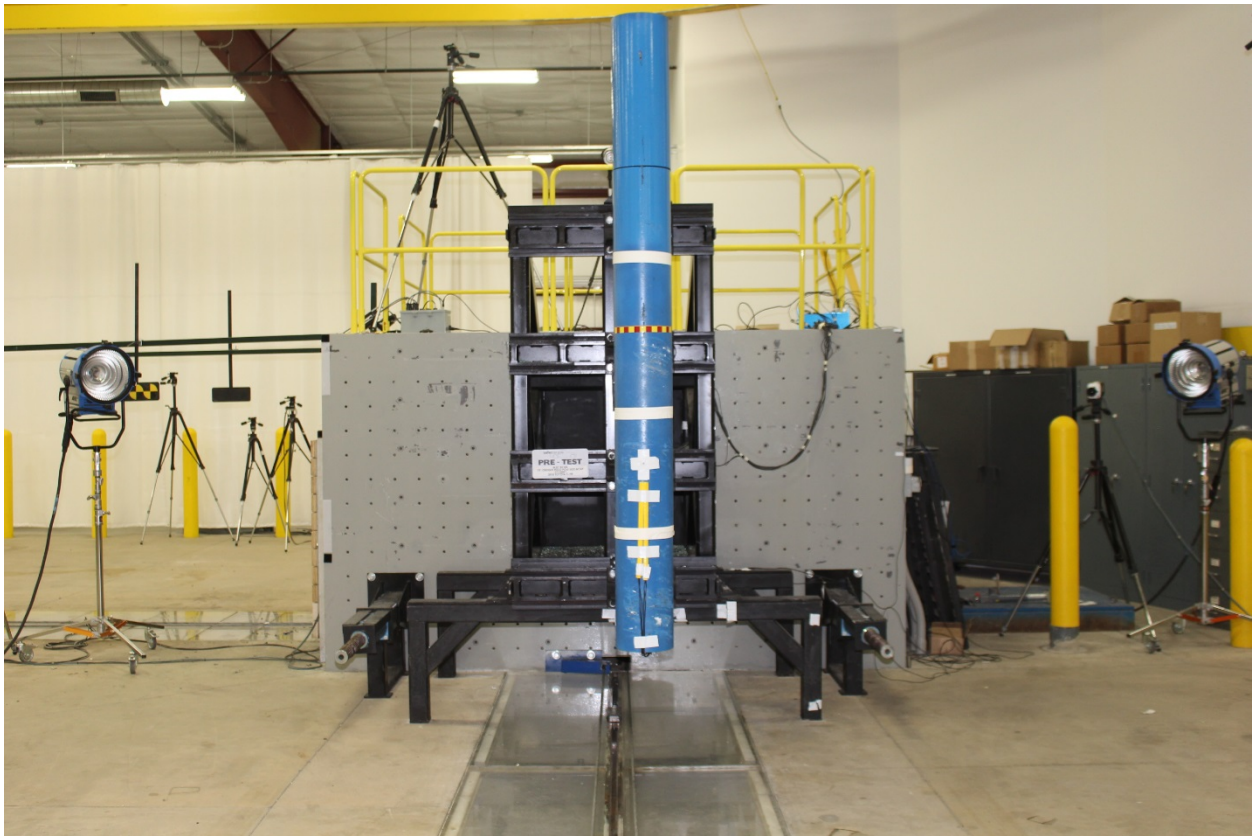
| No. | ID                | Coordinates (mm) |      |       |
|-----|-------------------|------------------|------|-------|
|     |                   | X                | Y    | Z     |
| 1   | Vehicle CG        | 2333             | 0    | -320  |
| 2   | Left Floor Sill   | 2689             | -750 | -210  |
| 3   | A Pillar Sill     | 2991             | -750 | -210  |
| 4   | A Pillar Low      | 2991             | -832 | -550  |
| 5   | A Pillar Mid      | 2991             | -832 | -773  |
| 6   | B Pillar Sill     | 1935             | -750 | -215  |
| 7   | B Pillar Low      | 1816             | -720 | -561  |
| 8   | B Pillar Mid      | 1816             | -720 | -768  |
| 9   | Driver Seat Track | 2111             | -366 | -273  |
| 10  | Engine Top        | 3724             | 362  | -831  |
| 11  | Firewall          | 3484             | 20   | -842  |
| 12  | Right Roof        | 1951             | 463  | -1520 |
| 13  | Right Floor Sill  | 2689             | 750  | -210  |
| 14  | Rear Floorpan     | 784              | 0    | -457  |

Reference: X – Test Vehicle Rear Bumper (+forward)  
Y – Test Vehicle Centerline (+ to right)  
Z – Ground Plane (+ down)

**DATA SHEET NO. 7**  
**RIGID POLE LOAD CELL DATA**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023



254 mm Diameter Rigid Pole

| Load Cell Locations |                               |
|---------------------|-------------------------------|
| ID                  | Height from Test Surface (mm) |
| 1                   | 182                           |
| 2                   | 470                           |
| 3                   | 698                           |
| 4                   | 986                           |
| 5                   | 1212                          |
| 6                   | 1641                          |
| 7                   | 1854                          |
| 8                   | 2053                          |

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

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023

**TEST DUMMY INFORMATION AND CONTACT POINTS**

| Description       | Driver Dummy (SID-IIs)                           |
|-------------------|--------------------------------------------------|
| Face              | Curtain Airbag                                   |
| Top of Head       | Curtain Airbag, Headrest                         |
| Left Side of Head | Curtain Airbag, Headrest                         |
| Back of Head      | Curtain Airbag, Seatback                         |
| Left Shoulder     | Side Torso/Pelvis Airbag, Seatback               |
| Upper Torso       | Seatback                                         |
| Lower Torso       | Side Torso/Pelvis Airbag, Seatback               |
| Left Hip          | Side Torso/Pelvis Airbag, Seatback, Seat Cushion |
| Left Knee         | None                                             |

**POST-TEST DOOR PERFORMANCE**

| Description                                                        | Struck Side |      | Non-Struck Side |      | Rear Hatch |
|--------------------------------------------------------------------|-------------|------|-----------------|------|------------|
|                                                                    | 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 Systems 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) |             |      |                 |      |            |

**POST-TEST SEAT PERFORMANCE**

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

**POST-TEST STRUCTURAL OBSERVATIONS**

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

**DATA SHEET NO. 8 (CONTINUED)**  
**POST-TEST OBSERVATIONS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

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

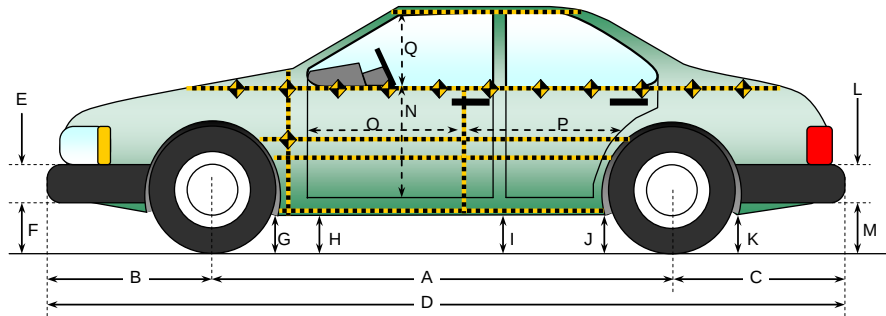
**SPEED, ANGLE AT IMPACT, AND IMPACT POINT LOCATION DATA**

| Measured Parameter                                                            | Units   | Tolerance                          | Value |
|-------------------------------------------------------------------------------|---------|------------------------------------|-------|
| Vertical Impact Reference Line (Aft of Front Axle)<br>(Intended Impact Point) | mm      |                                    | 1075  |
| Actual Impact Point (Aft of Front Axle)                                       | mm      |                                    | 1078  |
| Horizontal Offset (+forward / -rearward)                                      | mm      | +/- 38 of Intended<br>Impact Point | -3    |
| Angle Between Vehicle's Longitudinal Centerline and Line of<br>Forward Motion | degrees | 75 +/- 3                           | 75.1  |
| Trap No. 1 Velocity (Primary)                                                 | km/h    | 31.4 to 33.0                       | 32.13 |
| Trap No. 2 Velocity (Redundant)                                               | km/h    | 31.4 to 33.0                       | 32.10 |

**DATA SHEET NO. 9**  
**TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023



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

**LEFT SIDE VIEW**

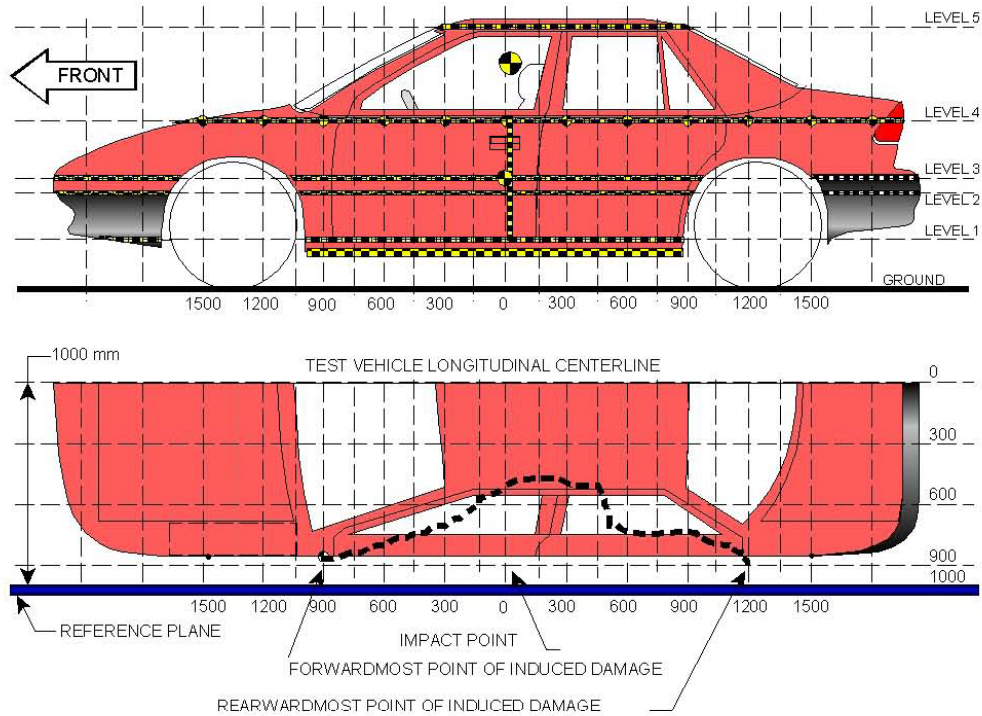
**VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION**

| Code | Measurement Description                    | Pre-Test | Post-Test | Change |
|------|--------------------------------------------|----------|-----------|--------|
| A    | Wheelbase                                  | 2725     | 2638      | -87    |
| B    | Front Axle to FSOV                         | 925      | 964       | 39     |
| C    | Rear Axle to RSOV                          | 784      | 780       | -4     |
| D    | Total Vehicle Length at Centerline         | 4434     | 4382      | -52    |
| E    | Front Bumper Thickness                     | 110      | 110       | 0      |
| F    | Front Bumper Bottom to Ground              | 200      | 217       | 17     |
| G    | Sill Height at Front Wheel Well            | 185      | 180       | -5     |
| H    | Sill Height at Front Door Leading Edge     | 192      | 185       | -7     |
| I    | Sill Height at B-Pillar                    | 198      | 186       | -12    |
| J1   | Sill Height at Rear Wheel Well             | 199      | 217       | 18     |
| J2   | Pinch Weld Height at Rear Wheel Well       | 197      | 216       | 19     |
| K    | Sill Height Aft of Rear Wheel Well         | 285      | 274       | -11    |
| L    | Rear Bumper Thickness                      | 126      | 126       | 0      |
| M    | Rear Bumper Bottom to Ground               | 264      | 288       | 24     |
| N    | Sill Height to Bottom of Front Window Sill | 592      | 590       | -2     |
| O    | Front Door Leading Edge to Impact CL       | 662      | 563       | -99    |
| P    | Rear Door Trailing Edge to Impact CL       | 1320     | 1250      | -70    |
| Q    | Front Window Opening                       | 384      | 351       | -33    |
| R    | Right Side Length                          | 3454     | 3455      | 1      |
| S    | Left Side Length                           | 3454     | 3384      | -70    |
| T    | Vehicle Width at B-Pillars                 | 1857     | 1852      | -5     |
| U    | Front Wheel Track Width                    | 1588     |           |        |
| V    | Rear Wheel Track Width                     | 1598     |           |        |

# **DATA SHEET NO. 10** **TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023



NOTE: The measurements are taken along the vertical impact reference line.  
Vehicle measurements forward of the vertical impact reference line are negative.

## **MAXIMUM EXTERIOR CRUSH MEASUREMENTS**

| Level | Measurement Description | Height Above Ground | Maximum Exterior Static Crush | Distance from Impact |
|-------|-------------------------|---------------------|-------------------------------|----------------------|
| 1     | Sill Top                | 240                 | 253                           | 150                  |
| 2     | Occupant H-Point        | 568                 | 309                           | 75                   |
| 3     | Mid Door                | 592                 | 318                           | 75                   |
| 4     | Window Sill             | 981                 | 287                           | 75                   |
| 5     | Window Top              | 1450                | 126                           | 150                  |

**DATA SHEET NO. 10 (CONTINUED)**  
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

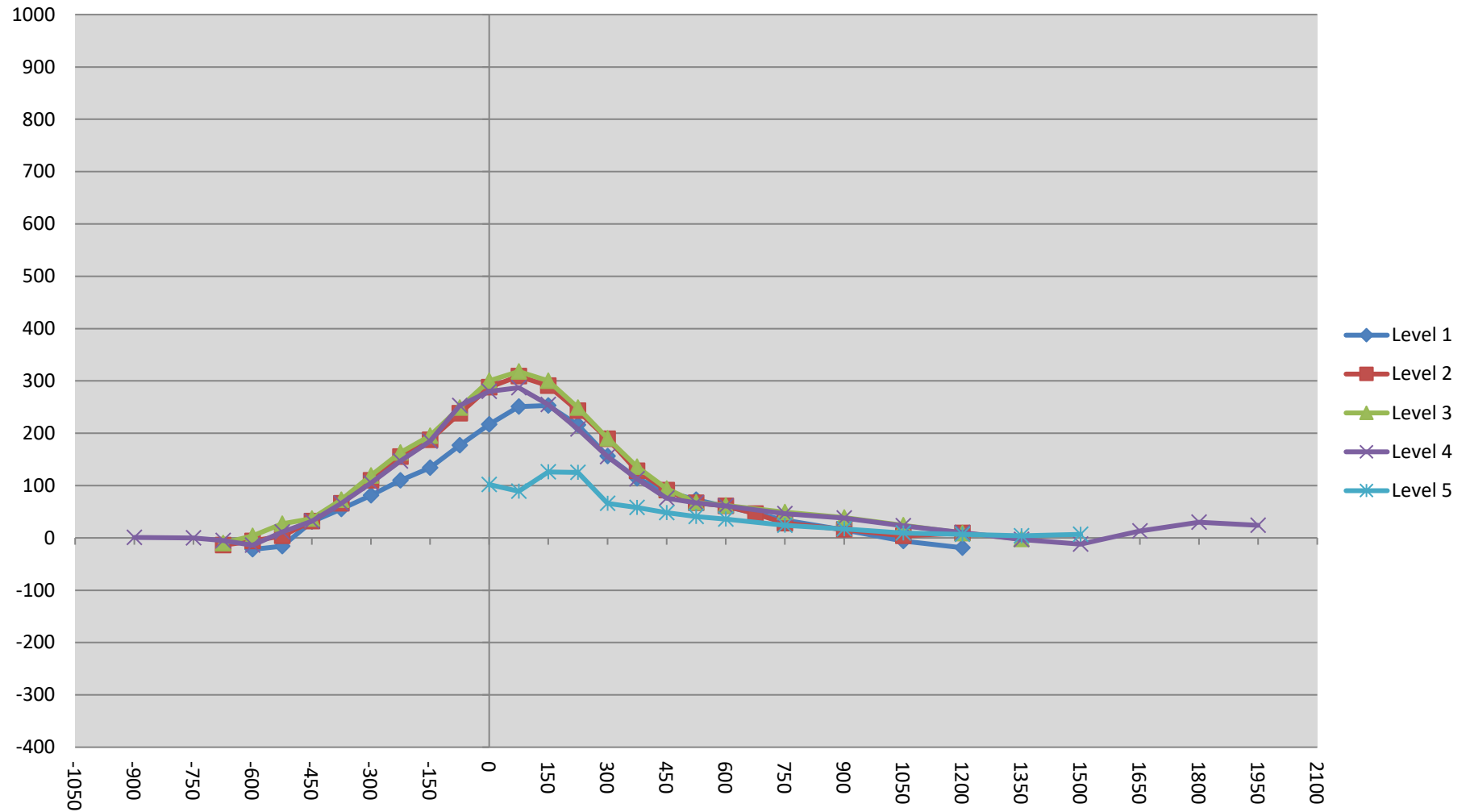
Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point.

|       | Pre-Test |     |     |     |     | Post-Test |     |     |     |     | Exterior Crush |     |     |     |     |
|-------|----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|----------------|-----|-----|-----|-----|
|       | 1        | 2   | 3   | 4   | 5   | 1         | 2   | 3   | 4   | 5   | 1              | 2   | 3   | 4   | 5   |
| -2700 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -2550 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -2400 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -2250 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -2100 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -1950 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -1800 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -1650 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -1500 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -1350 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -1200 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -1050 |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -900  |          |     |     | 315 |     |           |     |     | 316 |     |                |     |     | 1   |     |
| -825  |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| -750  |          |     |     | 302 |     |           |     |     | 302 |     |                |     |     | 0   |     |
| -675  |          | 197 | 201 | 300 |     |           | 183 | 191 | 295 |     |                | -14 | -10 | -5  |     |
| -600  | 249      | 207 | 210 | 295 |     | 227       | 201 | 214 | 281 |     | -22            | -6  | 4   | -14 |     |
| -525  | 249      | 214 | 210 | 290 |     | 233       | 218 | 237 | 301 |     | -16            | 4   | 27  | 11  |     |
| -450  | 249      | 217 | 212 | 285 |     | 280       | 249 | 249 | 317 |     | 31             | 32  | 37  | 32  |     |
| -375  | 249      | 217 | 213 | 276 |     | 304       | 283 | 286 | 342 |     | 55             | 66  | 73  | 66  |     |
| -300  | 249      | 218 | 213 | 273 |     | 330       | 328 | 332 | 378 |     | 81             | 110 | 119 | 105 |     |
| -225  | 249      | 218 | 213 | 268 |     | 359       | 373 | 376 | 415 |     | 110            | 155 | 163 | 147 |     |
| -150  | 250      | 218 | 213 | 265 |     | 384       | 405 | 408 | 450 |     | 134            | 187 | 195 | 185 |     |
| -75   | 251      | 218 | 213 | 264 |     | 428       | 456 | 462 | 517 |     | 177            | 238 | 249 | 253 |     |
| 0     | 251      | 218 | 213 | 260 | 513 | 468       | 506 | 513 | 540 | 615 | 217            | 288 | 300 | 280 | 102 |
| 75    | 253      | 219 | 214 | 256 | 500 | 504       | 528 | 532 | 543 | 589 | 251            | 309 | 318 | 287 | 89  |
| 150   | 254      | 220 | 214 | 254 | 449 | 507       | 511 | 514 | 509 | 575 | 253            | 291 | 300 | 255 | 126 |
| 225   | 254      | 220 | 214 | 251 | 443 | 470       | 463 | 463 | 459 | 568 | 216            | 243 | 249 | 208 | 125 |
| 300   | 255      | 220 | 214 | 250 | 490 | 411       | 409 | 404 | 405 | 556 | 156            | 189 | 190 | 155 | 66  |
| 375   | 255      | 220 | 214 | 248 | 488 | 369       | 348 | 350 | 361 | 546 | 114            | 128 | 136 | 113 | 58  |
| 450   | 256      | 219 | 213 | 245 | 489 | 344       | 310 | 307 | 321 | 537 | 88             | 91  | 94  | 76  | 48  |
| 525   | 256      | 220 | 213 | 245 | 490 | 329       | 287 | 281 | 312 | 531 | 73             | 67  | 68  | 67  | 41  |
| 600   | 256      | 220 | 214 | 245 | 486 | 316       | 281 | 276 | 306 | 522 | 60             | 61  | 62  | 61  | 36  |
| 675   |          | 220 |     |     |     |           | 266 |     |     |     |                | 46  |     |     |     |
| 750   | 259      | 222 | 216 | 243 | 485 | 293       | 250 | 265 | 289 | 509 | 34             | 28  | 49  | 46  | 24  |
| 825   |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| 900   | 260      | 215 | 216 | 244 | 486 | 275       | 231 | 255 | 282 | 503 | 15             | 16  | 39  | 38  | 17  |
| 1050  | 249      | 210 | 209 | 246 | 489 | 243       | 214 | 233 | 269 | 498 | -6             | 4   | 24  | 23  | 9   |
| 1200  | 228      | 196 | 196 | 250 | 495 | 209       | 205 | 205 | 260 | 502 | -19            | 9   | 9   | 10  | 7   |
| 1350  |          |     | 197 | 253 | 504 |           |     | 195 | 250 | 508 |                |     | -2  | -3  | 4   |
| 1500  |          |     |     | 255 | 520 |           |     |     | 243 | 527 |                |     |     | -12 | 7   |
| 1650  |          |     |     | 258 |     |           |     |     | 271 |     |                |     |     | 13  |     |
| 1800  |          |     |     | 275 |     |           |     |     | 305 |     |                |     |     | 30  |     |
| 1950  |          |     |     | 300 |     |           |     |     | 324 |     |                |     |     | 24  |     |
| 2100  |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| 2250  |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| 2400  |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| 2550  |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |
| 2700  |          |     |     |     |     |           |     |     |     |     |                |     |     |     |     |

**DATA SHEET NO. 10 (CONTINUED)**  
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

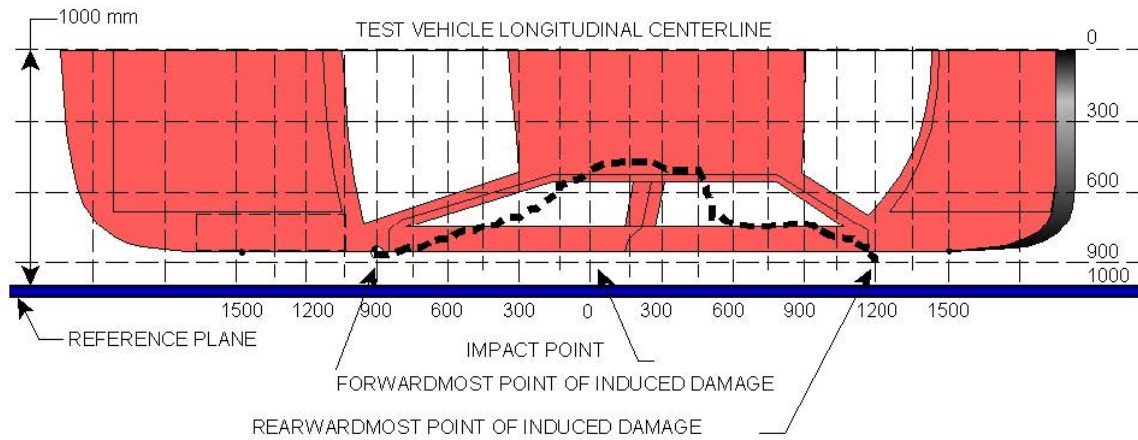
NHTSA No.: M20234212  
Test Date: 3/3/2023



**DATA SHEET NO. 10 (CONTINUED)**  
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023



**VEHICLE DAMAGE PROFILE DISTANCES**

| DPD | Distance from Impact Point (mm) | Level | Pre-Test (mm) | Post-Test (mm) | Max. Static Crush (mm) |
|-----|---------------------------------|-------|---------------|----------------|------------------------|
| 1   | 550                             | 3     | 210           | 278            | 68                     |
| 2   | 310                             | 3     | 214           | 400            | 186                    |
| 3   | 70                              | 3     | 214           | 534            | 320                    |
| 4   | -170                            | 3     | 213           | 400            | 187                    |
| 5   | -410                            | 3     | 213           | 267            | 54                     |
| 6   | -650                            | 3     | 204           | 193            | -11                    |

**DATA SHEET NO. 11**  
**FMVSS NO. 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

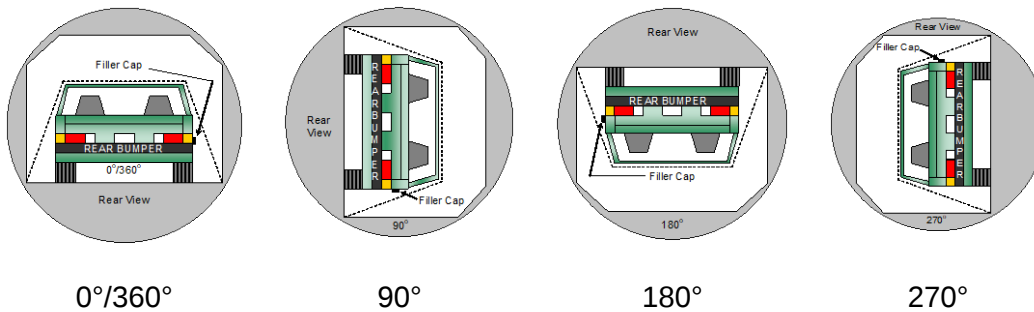
NHTSA No.: M20234212  
 Test Date: 3/3/2023

Test Time: 11:37 am

Temperature: 21.1°C

- A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.  
 B. For the 5 minute period after motion ceases: (Maximum Allowable = 5 ounces) 0.0 oz.  
 C. For the following 25 minutes: (Maximum Allowable = 1 ounce / minute) None  
 D. Spillage Details: None

**FMVSS 301 STATIC ROLLOVER DATA**



**ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase   | Rotation Time | Hold Time | Total Time |
|--------------|---------------|-----------|------------|
| 0° to 90°    | 112           | 300       | 412        |
| 90° to 180°  | 111           | 300       | 411        |
| 180° to 270° | 108           | 300       | 408        |
| 270° to 360° | 111           | 300       | 411        |

**FMVSS 301 ROLLOVER SPILLAGE TABLE (UNITS IN OUNCES)**

| Test Phase   | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|--------------|-----------------|--------------|----------------|---------------|
| 0° to 90°    | 0.0             | 0.0          | 0.0            |               |
| 90° to 180°  | 0.0             | 0.0          | 0.0            |               |
| 180° to 270° | 0.0             | 0.0          | 0.0            |               |
| 270° to 360° | 0.0             | 0.0          | 0.0            |               |

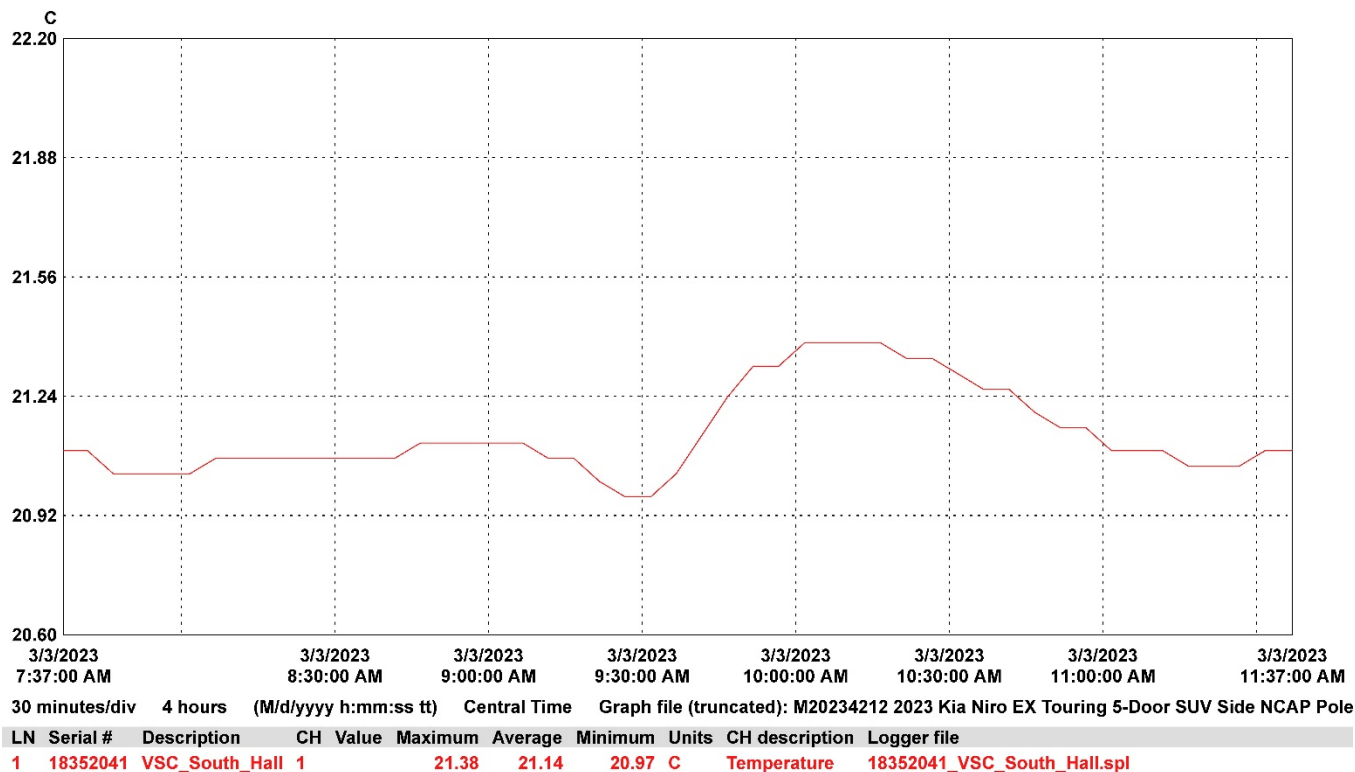
**ROLLOVER SOLVENT SPILLAGE LOCATION TABLE**

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

# **DATA SHEET NO. 12** **DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023



**DATA SHEET NO. 305-1**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**ELECTRIC VEHICLE PROPULSION SYSTEM**

|                                                              | Units | Observations and Conclusions |
|--------------------------------------------------------------|-------|------------------------------|
| Type of Electric Vehicle                                     |       | Gasoline / Electric Hybrid   |
| Propulsion Battery Type                                      |       | Lithium-Ion                  |
| Nominal Voltage                                              | V     | 240                          |
| Physical Location of Automatic Propulsion Battery Disconnect |       | Under rear seat              |
| Auxiliary Battery Type                                       |       | Lithium-Ion                  |

**PROPULSION BATTERY SYSTEM DATA**

|                                                                          | Units | Observations and Conclusions                                                    |
|--------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------|
| Electrolyte Fluid Type                                                   |       | LiPF6 salt, carbonate solvent                                                   |
| Electrolyte Fluid Specific Gravity                                       | g/L   | 1.23                                                                            |
| Electrolyte Fluid Kinematic Viscosity                                    | cSt   | 3.0                                                                             |
| Electrolyte Fluid Color                                                  |       | Transparent & pale yellow                                                       |
| Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable) |       | Air-Cooled                                                                      |
| Location of Battery Modules                                              |       | X Inside Passenger Compartment                                                  |
|                                                                          |       | Outside Passenger Compartment                                                   |
|                                                                          |       | The high-voltage battery is located below the 2 <sup>nd</sup> row seat cushion. |

**PROPULSION BATTERY STATE OF CHARGE**

|                                                                                     |         |
|-------------------------------------------------------------------------------------|---------|
| <i>For all battery types:</i>                                                       |         |
| Voltage range corresponding to <b>useable energy</b> of the battery:                |         |
| Minimum State of Charge                                                             |         |
| Maximum State of Charge                                                             |         |
| 95% of Maximum State of Charge                                                      |         |
| Test Voltage - No less than 95% of maximum State of Charge                          |         |
| <i>For batteries that are rechargeable ONLY by an energy source on the vehicle:</i> |         |
| Voltage range corresponding to <b>useable energy</b> of the battery:                |         |
| Minimum State of Charge                                                             | 160.0 V |
| Maximum State of Charge                                                             | 275.2 V |
| Test Voltage – Maximum practicable State of Charge within Normal Operating Range    | 244.0 V |

**DATA SHEET NO. 305-2  
PRE-IMPACT DATA  
FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023

**VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)**

|                                                             |                                                       |
|-------------------------------------------------------------|-------------------------------------------------------|
| Details of Vehicle Chassis<br>Ground Point(s) & Location(s) | Vehicle chassis ground near high voltage battery pack |
|-------------------------------------------------------------|-------------------------------------------------------|

**PROPULSION BATTERY SYSTEM**

|                                                                     |                                                         |
|---------------------------------------------------------------------|---------------------------------------------------------|
| Details of Electric Energy Storage/Conversion<br>System Test Points | Connected at + and – terminal ends of propulsion system |
| Additional Comments                                                 | None                                                    |

**DATA SHEET NO. 305-3**  
**PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**VOLTMETER INFORMATION**

|                          | Units | Observations and Conclusions |
|--------------------------|-------|------------------------------|
| Make                     |       | Fluke                        |
| Model                    |       | 177                          |
| Serial Number            |       | 57580164                     |
| Internal Impedance Value | MΩ    | > 10 MΩ < 100 pF             |
| Resolution               | V     | 0.001                        |
| Last Calibration Date    |       | 6/21/2022                    |

**PROPULSION BATTERY VOLTAGE**

|                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Measurement shall be made with Energy Storage/Conversion System connected to the vehicle propulsion system, and the vehicle in the "ready-to-drive" (propulsion system energized) position. |
| NOTE: If voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.                                 |

|    |   |       |
|----|---|-------|
| Vb | V | 244.0 |
|----|---|-------|

**ELECTRIC ISOLATION MEASUREMENTS**  
**PROPULSION BATTERY TO VEHICLE CHASSIS**

|                                                                        |
|------------------------------------------------------------------------|
| Vehicle chassis point(s) determined and supplied to contractor by COR. |
|------------------------------------------------------------------------|

|    |   |       |
|----|---|-------|
| V1 | V | 143.1 |
| V2 | V | 161.6 |

**PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR**

|                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------|
| The known resistance Ro (in ohms) should be approximately 500 times the normal operating voltage of the vehicle (in volts) per SAE J1766. |
|-------------------------------------------------------------------------------------------------------------------------------------------|

|    |   |         |
|----|---|---------|
| Ro | Ω | 146,000 |
|----|---|---------|

|                |   |     |
|----------------|---|-----|
| V1' Pre-Impact | V | 3.7 |
| V2' Pre-Impact | V | 3.5 |

**DATA SHEET NO. 305-3 (CONTINUED)**  
**PRE-IMPACT ELECTRICAL ISOLATION MEASUREMENTS AND CALCULATIONS**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**ELECTRICAL ISOLATION CALCULATIONS**

NOTE: If measured voltage is zero and results in a division by zero, record "Zero Volts".  
 This "zero voltage" condition is considered as being compliant.

|                                                                                  |          |            |
|----------------------------------------------------------------------------------|----------|------------|
| $R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$                                 |          |            |
| Ri1 Pre-Impact                                                                   | $\Omega$ | 11,712,422 |
| $R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$                                 |          |            |
| Ri2 Pre-Impact                                                                   | $\Omega$ | 12,435,057 |
| $R_i = \text{The lesser of } R_{i1} \text{ and } R_{i2}$                         |          |            |
| Ri Pre-Impact                                                                    | $\Omega$ | 11,712,422 |
| $R_i / V_b = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$ |          |            |
| Ri / Vb Pre-Impact                                                               | $\Omega$ | 48,002     |

NOTE: The minimum Electrical Isolation Value is 500  $\Omega/V$ .

|                                                                  | Yes  | No (Fail) |
|------------------------------------------------------------------|------|-----------|
| Is the measured Electrical Isolation Value $\geq 500 \Omega/V$ ? | X    |           |
| Additional Comments                                              | None |           |

**DATA SHEET NO. 305-4  
POST-IMPACT DATA  
FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
Test Date: 3/3/2023

**VOLTMETER INFORMATION**

|                          | Units | Observations and Conclusions |
|--------------------------|-------|------------------------------|
| Make                     |       | Fluke                        |
| Model                    |       | 177                          |
| Serial Number            |       | 57580164                     |
| Internal Impedance Value | MΩ    | > 10 MΩ < 100 pF             |
| Resolution               | V     | 0.001                        |
| Last Calibration Date    |       | 6/21/2022                    |

**ELECTRICAL ISOLATION MEASUREMENTS**

|                |   |     |
|----------------|---|-----|
| Vb Post-Impact | V | 0.1 |
|----------------|---|-----|

|                 |   |     |             |   |         |    |         |
|-----------------|---|-----|-------------|---|---------|----|---------|
| V1 Post-Impact  | V | 2.9 | Impact Time | 1 | Minutes | 43 | Seconds |
| V2 Post-Impact  | V | 2.8 |             | 1 | Minutes | 47 | Seconds |
| V1' Post-Impact | V | 0.1 |             | 1 | Minutes | 57 | Seconds |
| V2' Post-Impact | V | 0.1 |             | 1 | Minutes | 52 | Seconds |

**DATA SHEET NO. 305-4 (CONTINUED)**  
**POST-IMPACT DATA**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**ELECTRICAL ISOLATION CALCULATIONS**

NOTE: If measured voltage is zero and results in a division by zero, record "Zero Volts".  
 This "zero voltage" condition is considered as being compliant.

|                                                                                  |   |           |             |   |         |    |         |
|----------------------------------------------------------------------------------|---|-----------|-------------|---|---------|----|---------|
| $R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$                                 |   |           |             |   |         |    |         |
| Ri1 Post-Impact                                                                  | Ω | 8,035,034 | Impact Time | 1 | Minutes | 57 | Seconds |
| $R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$                                 |   |           |             |   |         |    |         |
| Ri2 Post-Impact                                                                  | Ω | 8,024,786 | Impact Time | 1 | Minutes | 52 | Seconds |
| $R_i = \text{The lesser of } R_{i1} \text{ and } R_{i2}$                         |   |           |             |   |         |    |         |
| Ri Post-Impact                                                                   | Ω | 8,024,786 | Impact Time | 1 | Minutes | 57 | Seconds |
| $R_i / V_b = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$ |   |           |             |   |         |    |         |
| Ri / Vb Post-Impact                                                              | Ω | 32,888    | Impact Time | 1 | Minutes | 57 | Seconds |

NOTE: The minimum Electrical Isolation Value is 500 Ω/V.

|                                                                  |      |           |
|------------------------------------------------------------------|------|-----------|
|                                                                  | Yes  | No (Fail) |
| Is the measured Electrical Isolation Value $\geq 500 \Omega/V$ ? | X    |           |
| Additional Comments                                              | None |           |

**DATA SHEET NO. 305-4 (CONTINUED)**  
**POST-IMPACT DATA**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**PROPULSION BATTERY SYSTEM COMPONENTS**

|                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------|
| Describe any Propulsion Battery Module movement within the passenger compartment<br>[Supply photographs as appropriate]: |
| Not Applicable                                                                                                           |

|                                                                           | Yes (Fail) | No |
|---------------------------------------------------------------------------|------------|----|
| Has the Propulsion Battery Module moved within the passenger compartment? |            | X  |

|                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------|
| Describe intrusion of an outside Propulsion Battery Component into the passenger compartment<br>[Supply photographs as appropriate]: |
| No Intrusion                                                                                                                         |

|                                                                                      | Yes (Fail) | No |
|--------------------------------------------------------------------------------------|------------|----|
| Has an outside Propulsion Battery Component intruded into the passenger compartment? |            | X  |

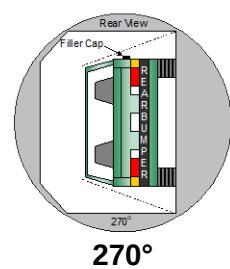
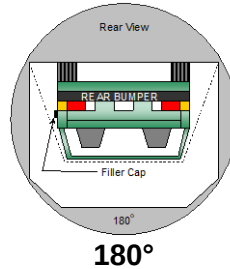
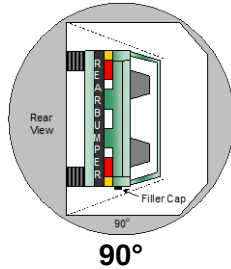
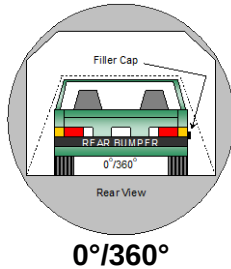
|                                                                                      | Yes (Fail) | No |
|--------------------------------------------------------------------------------------|------------|----|
| Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment? |            | X  |

**DATA SHEET NO. 305-5**  
**STATIC ROLLOVER TEST DATA**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**PROPULSION BATTERY SYSTEM COMPONENTS**



**PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD**

| Test Phase  | Rotation Time<br>(spec. 1-3 min) |     |    |     | FMVSS 301<br>Hold Time |     | Total Time |     |    |     | Next Whole<br>Minute<br>Interval |     |
|-------------|----------------------------------|-----|----|-----|------------------------|-----|------------|-----|----|-----|----------------------------------|-----|
| 0° - 90°    | 1                                | min | 52 | sec | 5                      | min | 6          | min | 52 | sec | 7                                | min |
| 90° - 180°  | 1                                | min | 51 | sec | 5                      | min | 6          | min | 51 | sec | 7                                | min |
| 180° - 270° | 1                                | min | 48 | sec | 5                      | min | 6          | min | 48 | sec | 7                                | min |
| 270° - 360° | 1                                | min | 51 | sec | 5                      | min | 6          | min | 51 | sec | 7                                | min |

**TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE**

NOTE: The maximum allowable Propulsion Battery Electrolyte Spillage is 5.0 Liters.

| Test Phase     | Propulsion Battery<br>Electrolyte Spillage (L) | Spillage Location |
|----------------|------------------------------------------------|-------------------|
| 0° to 90°      | 0                                              | Not Applicable    |
| 90° to 180°    | 0                                              | Not Applicable    |
| 180° to 270°   | 0                                              | Not Applicable    |
| 270° to 360°   | 0                                              | Not Applicable    |
| Total Spillage | 0                                              |                   |

|                                                                                      | Yes (Fail) | No |
|--------------------------------------------------------------------------------------|------------|----|
| Is the total Propulsion Battery Electrolyte Spillage greater than 5.0 Liters?        |            | X  |
| Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment? |            | X  |

**DATA SHEET NO. 305-5 (CONTINUED)**  
**STATIC ROLLOVER TEST DATA**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**VOLTMETER INFORMATION**

|                          | Units | Observations and Conclusions |
|--------------------------|-------|------------------------------|
| Make                     |       | Fluke                        |
| Model                    |       | 177                          |
| Serial Number            |       | 57580164                     |
| Internal Impedance Value | MΩ    | > 10 MΩ < 100 pF             |
| Resolution               | V     | 0.001                        |
| Last Calibration Date    |       | 6/21/2022                    |

**ELECTRICAL ISOLATION MEASUREMENTS**

|                |   |     |
|----------------|---|-----|
| Vb Post-Impact | V | 0.1 |
|----------------|---|-----|

Record V1, V2, V1', V2' voltage measurements at the start of each successive increment of 90°, 180°, 270°, and 360° of the static rollover test.

|     | Voltage | Units | Test Phase | Time |     |    |     |
|-----|---------|-------|------------|------|-----|----|-----|
| V1  | 0.0     | V     | 0°         |      | min |    | sec |
|     | 0.0     |       | 90°        | 2    |     | 46 |     |
|     | 0.0     |       | 180°       | 2    |     | 49 |     |
|     | 0.0     |       | 270°       | 2    |     | 50 |     |
|     | 0.0     |       | 360°       | 2    |     | 37 |     |
| V2  | 0.0     | V     | 0°         |      | min |    | sec |
|     | 0.0     |       | 90°        | 2    |     | 49 |     |
|     | 0.0     |       | 180°       | 2    |     | 53 |     |
|     | 0.0     |       | 270°       | 2    |     | 54 |     |
|     | 0.0     |       | 360°       | 2    |     | 40 |     |
| V1' | 0.0     | V     | 0°         |      | min |    | sec |
|     | 0.0     |       | 90°        | 2    |     | 59 |     |
|     | 0.0     |       | 180°       | 3    |     | 2  |     |
|     | 0.0     |       | 270°       | 3    |     | 2  |     |
|     | 0.0     |       | 360°       | 2    |     | 48 |     |
| V2' | 0.0     | V     | 0°         |      | min |    | sec |
|     | 0.0     |       | 90°        | 2    |     | 53 |     |
|     | 0.0     |       | 180°       | 2    |     | 57 |     |
|     | 0.0     |       | 270°       | 2    |     | 58 |     |
|     | 0.0     |       | 360°       | 2    |     | 44 |     |

**DATA SHEET NO. 305-5 (CONTINUED)**  
**STATIC ROLLOVER TEST DATA**  
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2023 Kia Niro EX Touring 5-Door SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20234212  
 Test Date: 3/3/2023

**ELECTRICAL ISOLATION CALCULATIONS**

NOTE: If measured voltage is zero and results in a division by zero, record "Zero Volts".  
 This "zero voltage" condition is considered as being compliant.

|                                                                | Voltage    | Units | Test Phase | Time |     |    |     |
|----------------------------------------------------------------|------------|-------|------------|------|-----|----|-----|
| Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']                            |            |       |            |      |     |    |     |
| Ri1                                                            | Zero Volts | Ω     | 0°         |      | min |    | sec |
|                                                                | Zero Volts |       | 90°        | 2    |     | 59 |     |
|                                                                | Zero Volts |       | 180°       | 3    |     | 2  |     |
|                                                                | Zero Volts |       | 270°       | 3    |     | 2  |     |
|                                                                | Zero Volts |       | 360°       | 2    |     | 48 |     |
| Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']                            |            |       |            |      |     |    |     |
| Ri2                                                            | Zero Volts | Ω     | 0°         |      | min |    | sec |
|                                                                | Zero Volts |       | 90°        | 2    |     | 53 |     |
|                                                                | Zero Volts |       | 180°       | 2    |     | 57 |     |
|                                                                | Zero Volts |       | 270°       | 2    |     | 58 |     |
|                                                                | Zero Volts |       | 360°       | 2    |     | 44 |     |
| Ri = The lesser of Ri1 and Ri2                                 |            |       |            |      |     |    |     |
| Ri                                                             | Zero Volts | Ω     | 0°         |      | min |    | sec |
|                                                                | Zero Volts |       | 90°        | 2    |     | 59 |     |
|                                                                | Zero Volts |       | 180°       | 3    |     | 2  |     |
|                                                                | Zero Volts |       | 270°       | 3    |     | 2  |     |
|                                                                | Zero Volts |       | 360°       | 2    |     | 48 |     |
| Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage |            |       |            |      |     |    |     |
| Ri / Vb                                                        | Zero Volts | Ω/V   | 0°         |      | min |    | sec |
|                                                                | Zero Volts |       | 90°        | 2    |     | 59 |     |
|                                                                | Zero Volts |       | 180°       | 3    |     | 2  |     |
|                                                                | Zero Volts |       | 270°       | 3    |     | 2  |     |
|                                                                | Zero Volts |       | 360°       | 2    |     | 48 |     |

NOTE: The minimum Electrical Isolation Value is 500  $\Omega/V$ .

|                                                                  | Yes  | No (Fail) |
|------------------------------------------------------------------|------|-----------|
| Is the measured Electrical Isolation Value $\geq 500 \Omega/V$ ? | X    |           |
| Additional Comments                                              | None |           |

**APPENDIX A  
PHOTOGRAPHS**

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Photo No. 001 - As Delivered Right Front Three-Quarter View of Test Vehicle



Photo No. 002 - As Delivered Left Rear Three-Quarter View of Test Vehicle

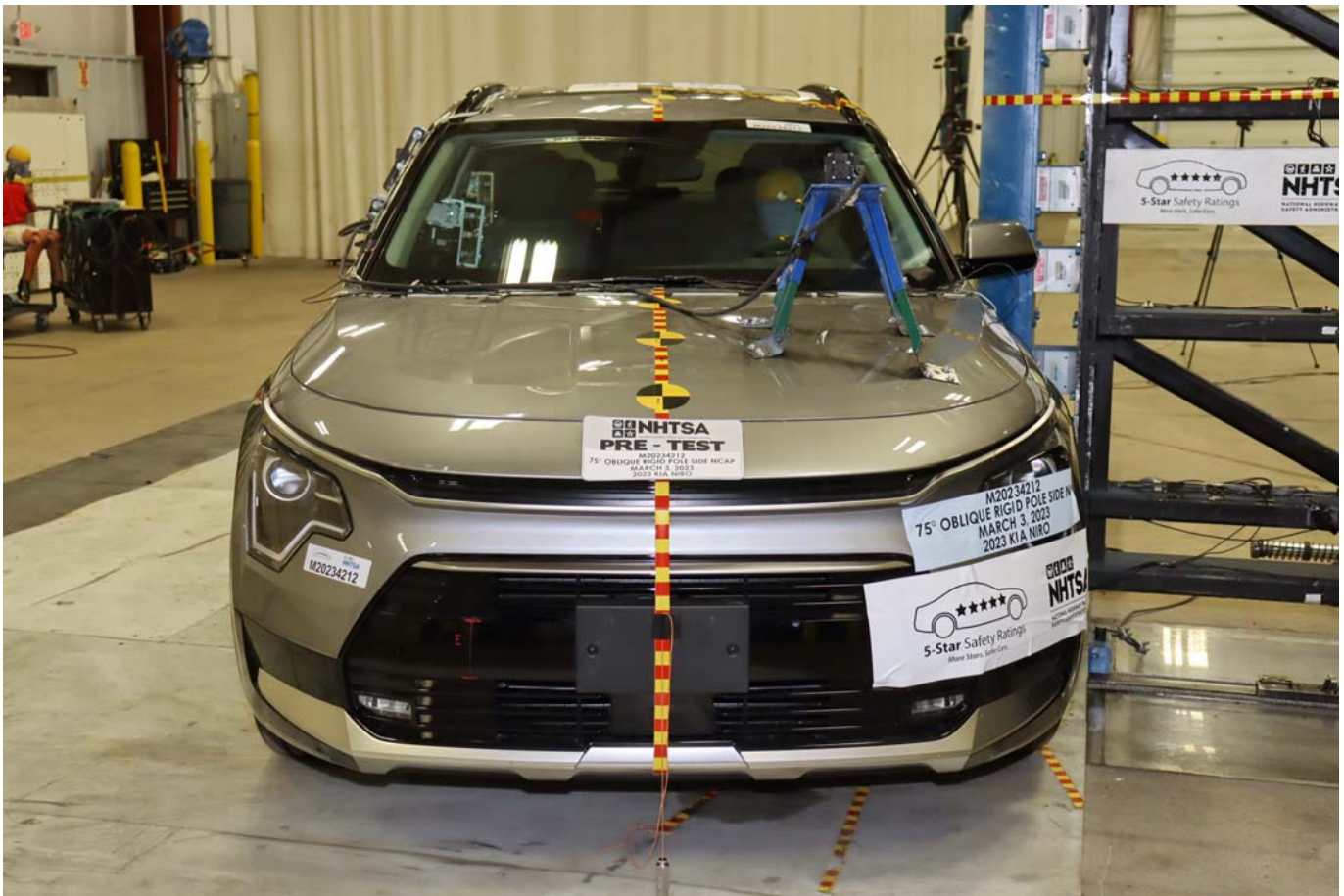


Photo No. 003 - Pre-Test Frontal View of Test Vehicle



Photo No. 004 - Post-Test Frontal View of Test Vehicle



Photo No. 005 - Pre-Test Left Front Three-Quarter View of Test Vehicle



Photo No. 006 - Post-Test Left Front Three-Quarter View of Test Vehicle



Photo No. 007 - Pre-Test Left Side View of Test Vehicle



Photo No. 008 - Post-Test Left Side View of Test Vehicle



Photo No. 009 - Pre-Test Left Rear Three-Quarter View of Test Vehicle



Photo No. 010 - Post-Test Left Rear Three-Quarter View of Test Vehicle



Photo No. 011 - Pre-Test Rear View of Test Vehicle



Photo No. 012 - Post-Test Rear View of Test Vehicle



Photo No. 013 - Pre-Test Right Side View of Test Vehicle



Photo No. 014 - Post-Test Right Side View of Test Vehicle

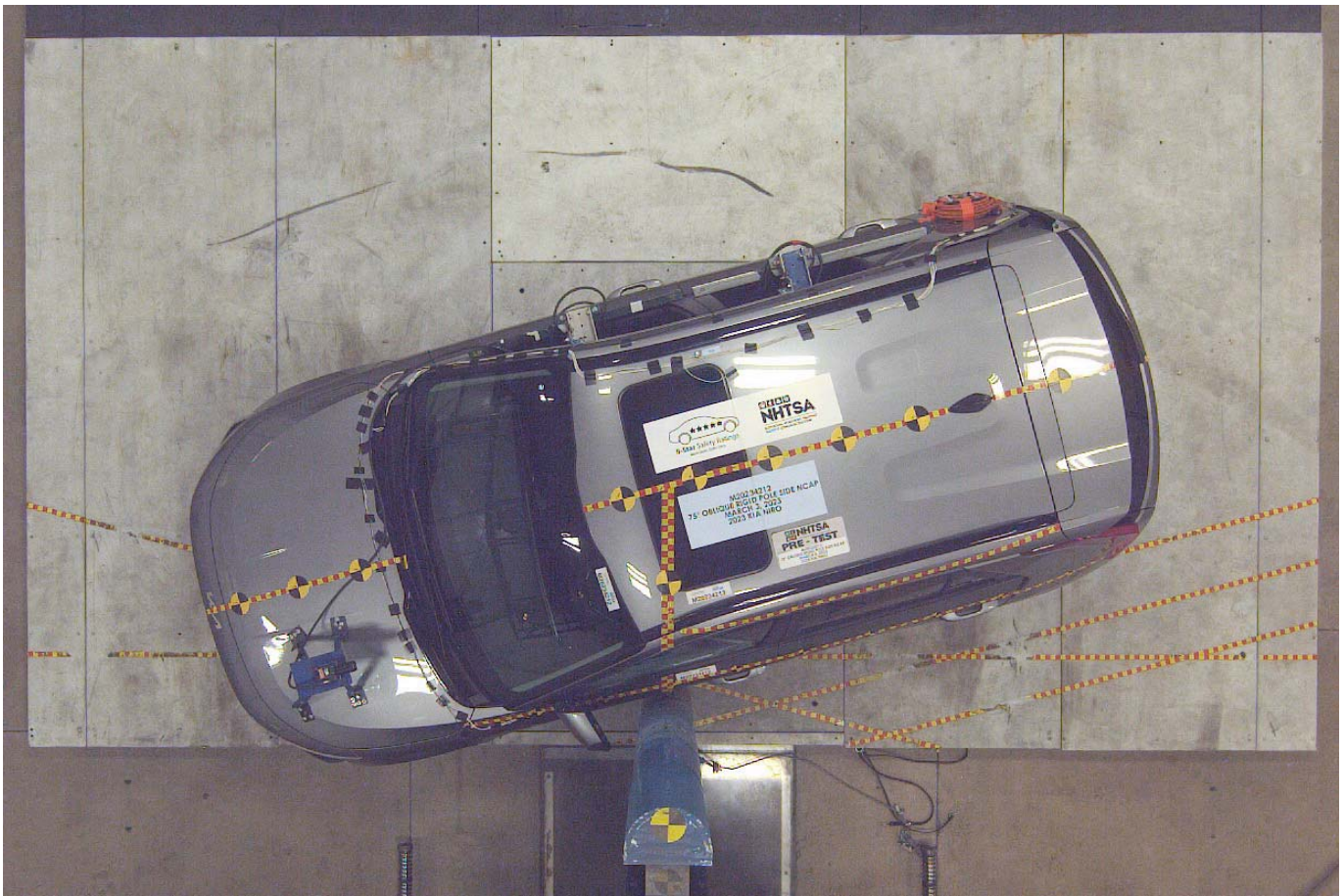


Photo No. 015 - Pre-Test Overhead View of Test Area

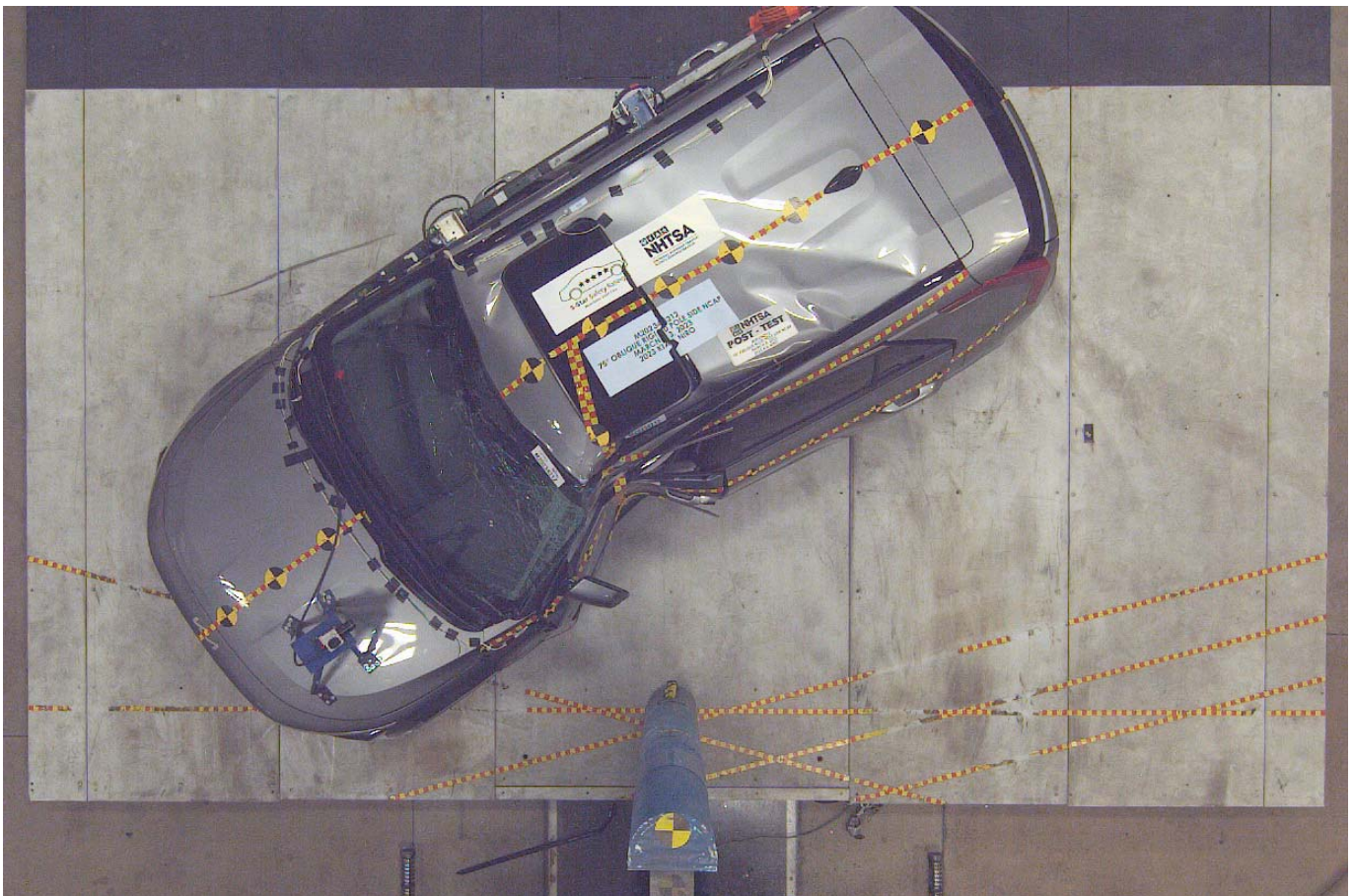


Photo No. 016 - Post-Test Overhead View of Test Area



Photo No. 017 - Pre-Test Left Side View of Pole Positioned Against Side of Vehicle

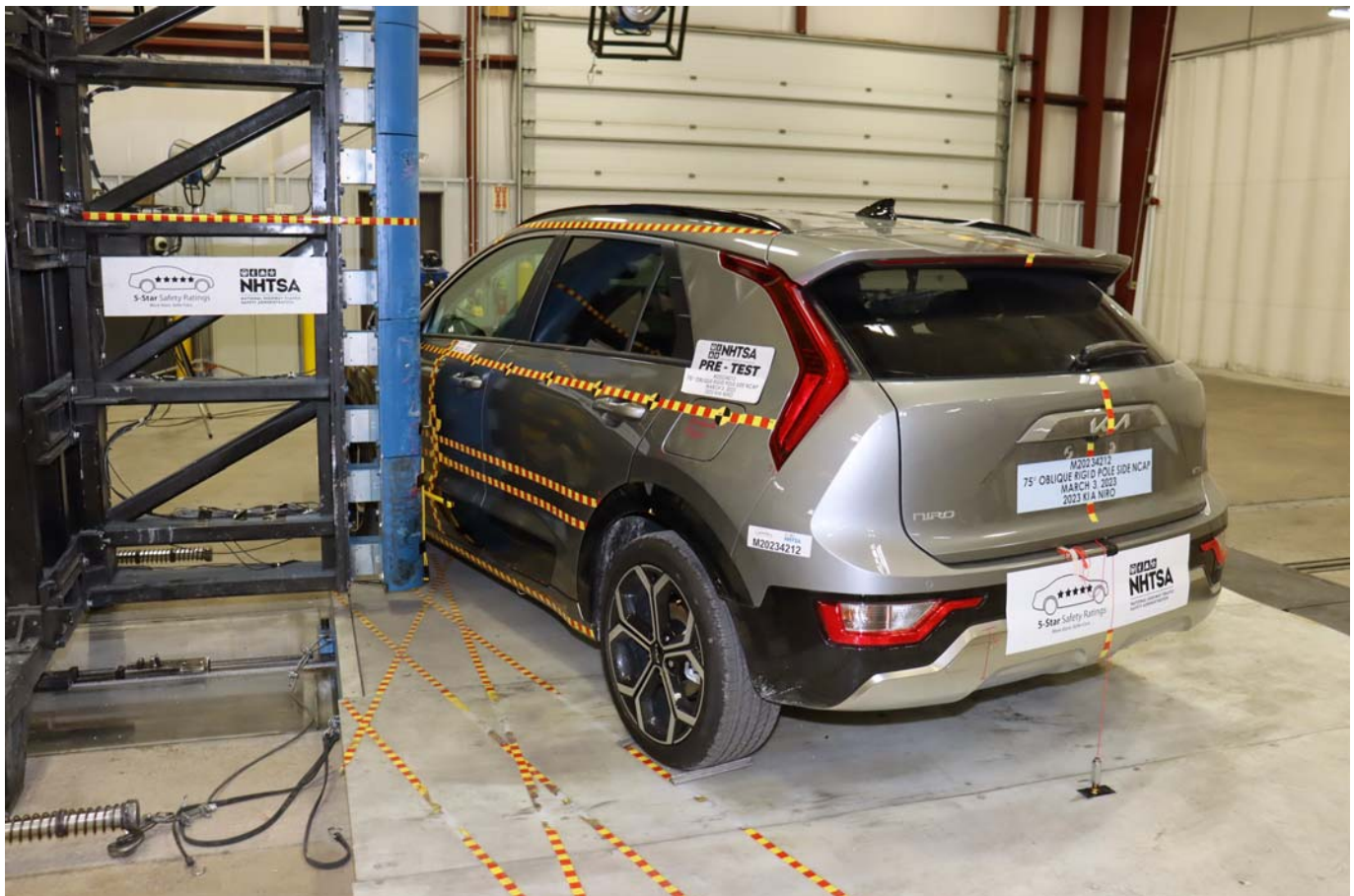


Photo No. 018 - Pre-Test Right Side View of Pole Positioned Against Side of Vehicle

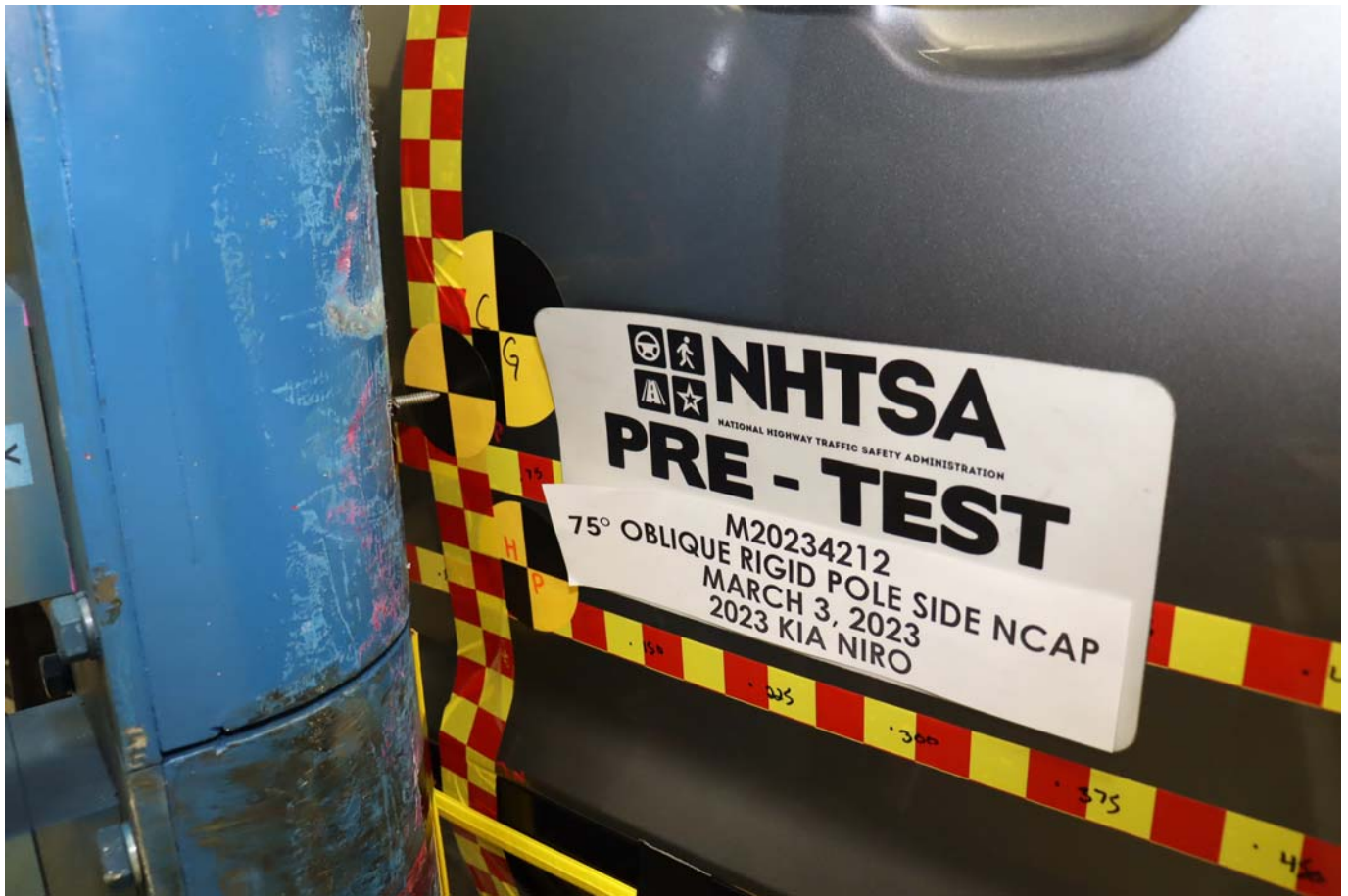


Photo No. 019 - Pre-Test Close-Up View of Impact Point Target



Photo No. 020 - Post-Test Close-Up View of Impact Point Target Showing Impact Location



Photo No. 021 - Pre-Test Front Close-Up View of Dummy Head and Chest



Photo No. 022 - Post-Test Front Close-Up View of Dummy



Photo No. 023 - Pre-Test Left Side View of Dummy Showing Belt and Chalking



Photo No. 024 - Pre-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 025 - Post-Test Left Side View of Dummy Shoulder and Door Top View



Photo No. 026 - Pre-Test Front View of Seat Back Prior to Dummy Positioning



Photo No. 027 - Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint



Photo No. 028 - Pre-Test Front View of Seat Pan Prior to Dummy Positioning



Photo No. 029 - Pre-Test Overhead View of Dummy Thighs on Seat Pan



Photo No. 030 - Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket



Photo No. 031 - Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level



Photo No. 032 - Pre-Test Placement of Dummy's Feet



Photo No. 033 - Pre-Test View of Belt Anchorage for Dummy



Photo No. 034 - Pre-Test Left Side View of Steering Wheel

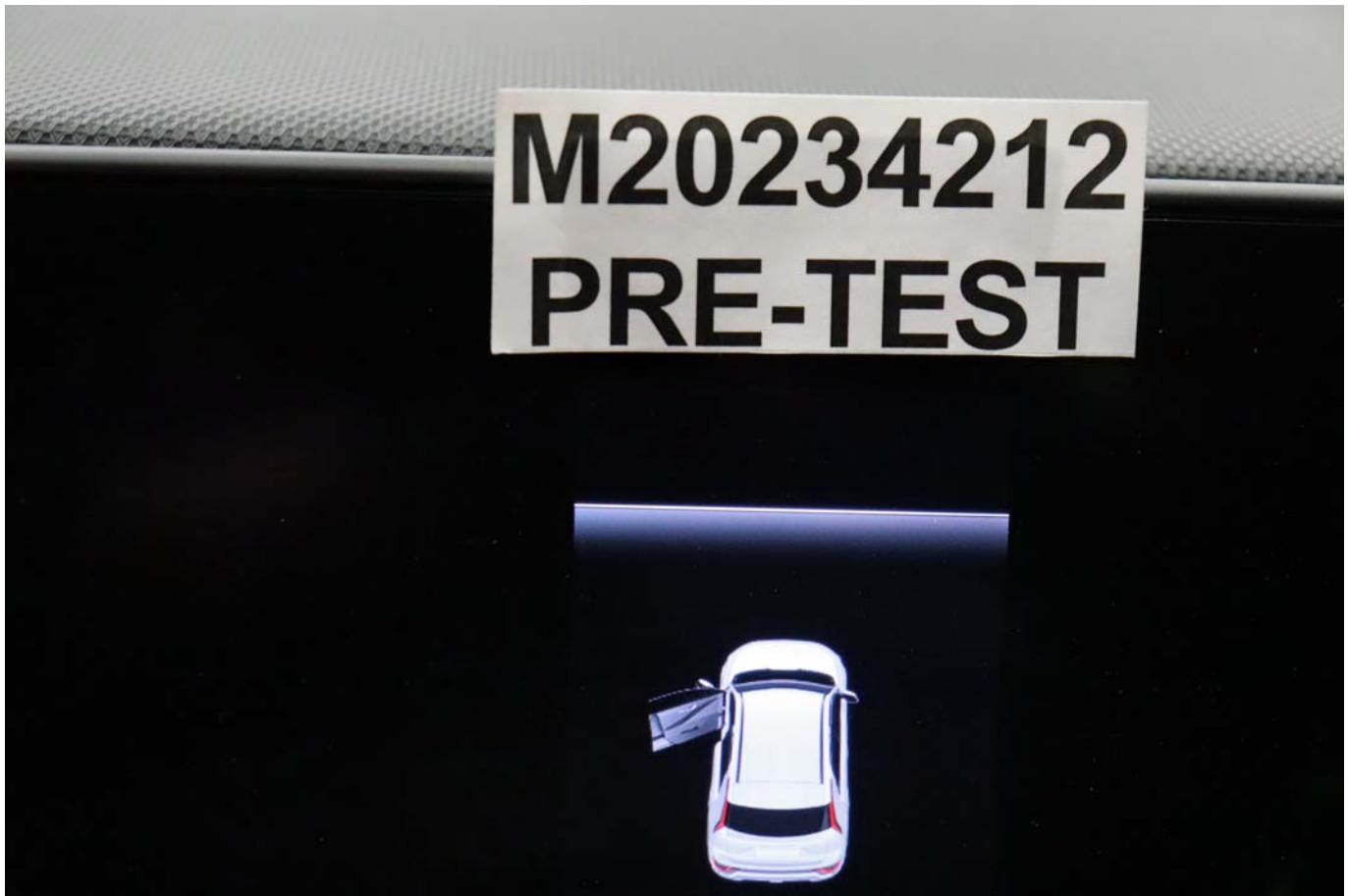


Photo No. 035 - Pre-Test View of Disengaged Parking Brake



Photo No. 036 - Pre-Test View of Parking Brake

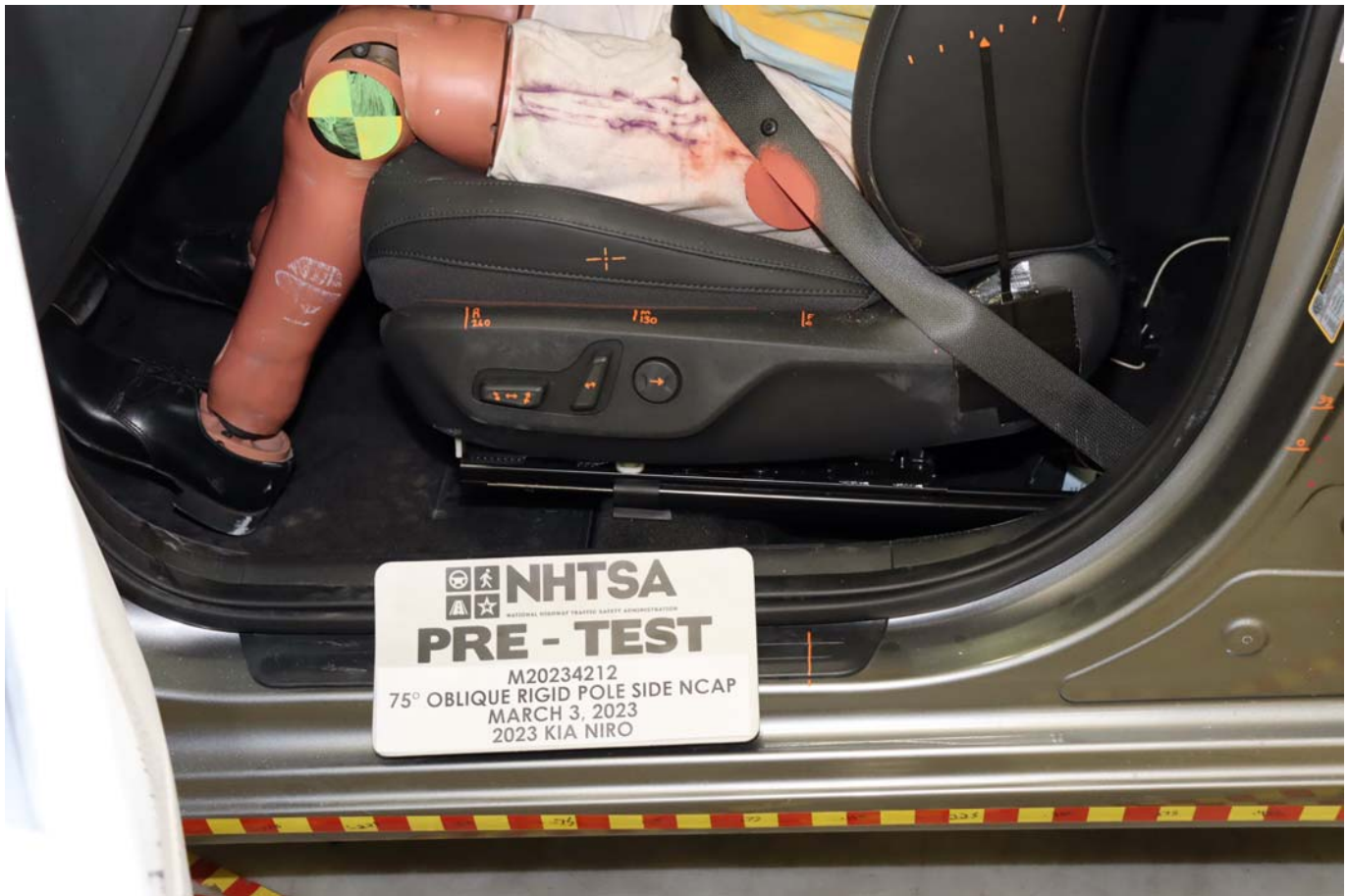


Photo No. 037 - Pre-Test Close-Up Left Side View of Driver Seat Track



Photo No. 038 - Pre-Test Close-Up Left Side View of Driver Seat Back



Photo No. 039 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint



Photo No. 040 - Pre-Test Dummy and Door Clearance View



Photo No. 041 - Post-Test Dummy and Door Clearance View



Photo No. 042 - Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 043 - Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment



Photo No. 044 - Pre-Test Inner Door Panel View



Photo No. 045 - Post-Test Inner Door Panel View Showing Dummy Contact Location



Photo No. 046 - Post-Test Dummy Close-Up Head Contact with Vehicle Interior View



Photo No. 047 - Post-Test Dummy Close-Up Head Contact with Side Air Bag View



Photo No. 048 - Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View



Photo No. 049 - Post-Test Dummy Close-Up Torso Contact with Side Air Bag View



Photo No. 050 - Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View



Photo No. 051 - Post-Test Dummy Close-Up Pelvis Contact with Side Air Bag View

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 052 - Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View



Photo No. 053 - Post-Test Right Side View of Dummy and Rear Seat of Occupant Compartment

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 054 - Post-Test Inner Rear Passenger Torso Air Bag Deployment View



Photo No. 055 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 056 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck



Photo No. 057 - Close-Up View of Vehicle's Certification Label



Photo No. 058 - Close-Up View of Vehicle's Tire Information Placard or Label



Photo No. 059 - Pre-Test Pole Barrier Front View



Photo No. 060 - Post-Test Pole Barrier Front View

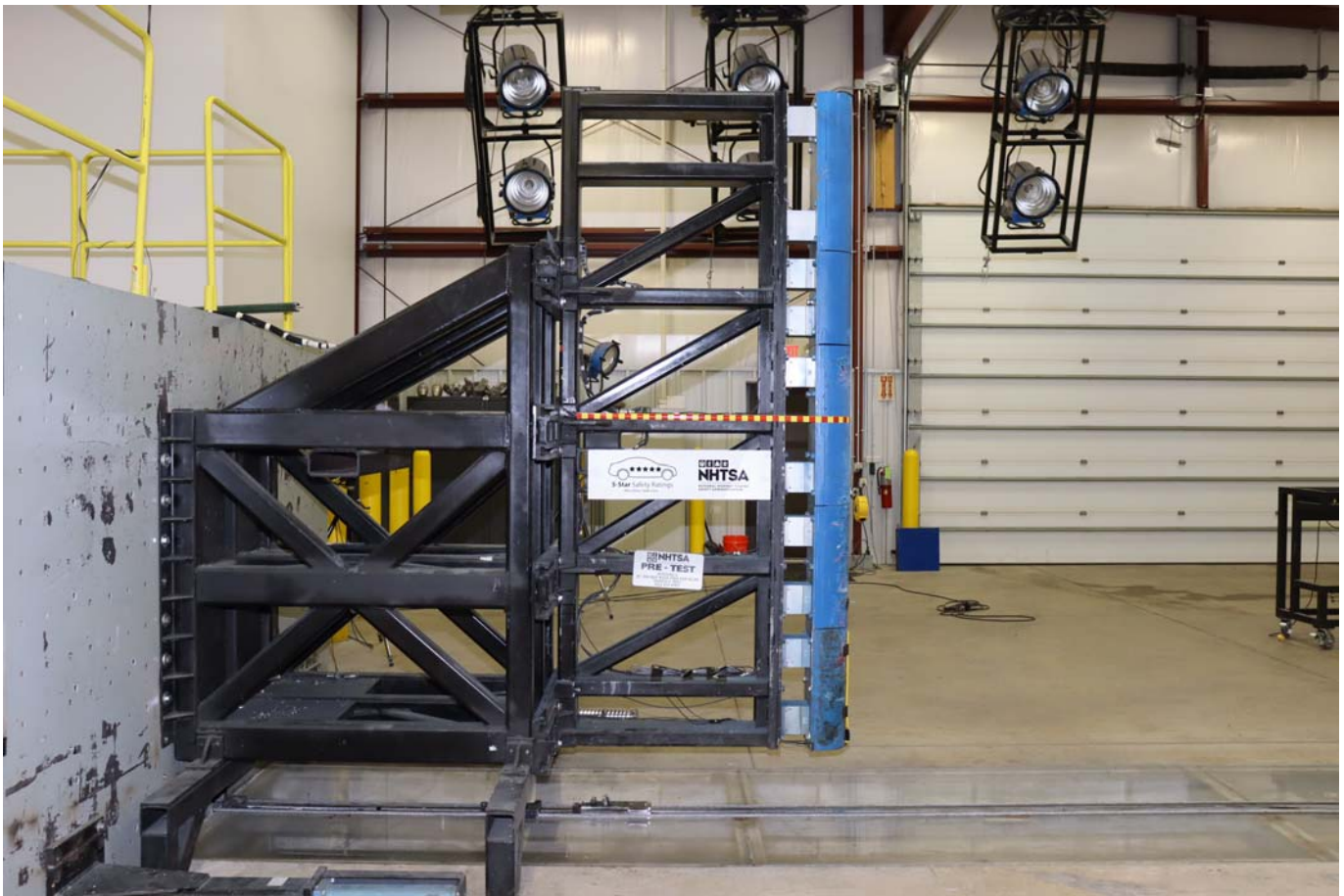


Photo No. 061 - Pre-Test Pole Barrier Side View



Photo No. 062 - Post-Test Pole Barrier Side View



Photo No. 063 - Pre-Test Ballast View



Photo No. 064 - Post-Test Primary and Redundant Speed Trap Read-Out



Photo No. 065 - FMVSS Photo No. 301 Static Rollover 0 Degrees



Photo No. 066 - FMVSS Photo No. 301 Static Rollover 90 Degrees



Photo No. 067 - FMVSS Photo No. 301 Static Rollover 180 Degrees



Photo No. 068 - FMVSS Photo No. 301 Static Rollover 270 Degrees



Photo No. 069 - FMVSS Photo No. 301 Static Rollover 360 Degrees



Photo No. 070 - Impact Event

2023 NIRO EX TOURING

MODEL/OPT.CODE: G4252 / 010

EXTERIOR COLOR: STEEL GRAY

INTERIOR COLOR: CHARCOAL

VEHICLE ID NUMBER: KNDRC3LE9P5052378

PORT OF ENTRY: TACOMA

Sold To: W032

Rosen Kia

5565 S. 27TH STREET

MILWAUKEE WI 53221

Ship To: W032

STANDARD FEATURES

STANDARD EX FEATURES

MECHANICAL

1.6L 4-Cyl Engine w/ Hybrid Electric Motor

6-Speed Dual Clutch Automatic Transmission

Drive Mode Select

Electronic Parking Brake w/ Auto Hold

KIA DRIVE WISE DRIVER-ASSIST TECHNOLOGY

Forward Collision-Avoidance Assist - Cyclist/Jct Turning

Blind-Spot Collision Warning

Rear Cross-Traffic Collision-Avoidance Assist

Lane Following Assist

Safe Exit Warning

Smart Cruise Control w/Stop & Go

Parking Distance Warning - Reverse

Highway Driving Assist

SAFETY

Dual Front Advanced Airbags & Driver's Knee Airbag

Dual Front Seat-Mounted Side & Full-Length Curtain Airbags

Electronic Stability Control

INTERIOR, COMFORT & CONVENIENCE

10.25" Touchscreen w/Nav, Android Auto & Apple CarPlay

Kia Connect w/ Free 12-Mo. Trial.\* Where Available\*\*

SIRIUSXM® w/Free 3-Mo. Subscription\*

Rear View Camera with Dynamic Guidelines

Smart Key w/ Push Button & Remote Start

Wireless Phone Charger

USB / Media Port and 12 Volt Outlet

Power Driver's Seat

Heated Front Seats

Cloth & SynTex Seating Material

Dual-Zone Automatic Climate Control w/ Rear Vents

EXTERIOR

16" Alloy Wheels

Roof Rails

Rear Privacy Glass

LED Rear Combination Lights & Daytime Running Lights

Rain-Sensing Wipers

Tire Mobility Kit (Spare Tire Not Included)

WARRANTY

10 Year/100,000 Mile Limited Powertrain Warranty

10 Year/100,000 Mile Limited Battery Warranty

5 Year/60,000 Mile Limited Basic Warranty

5 Year/60,000 Mile Roadside Assistance

MANUFACTURER'S SUGGESTED RETAIL PRICE ▶ \$ 31,390.00

COMPARE EX TOURING FEATURES

Added to/in place of standard EX features

- Power Sunroof

- 18" Alloy Wheels

- LED Fog Lights

- Power Folding Outside Mirrors

- Gloss Black Exterior Accents

- LED Interior Lighting

- Aluminum Pedals

ADDITIONAL INSTALLED EQUIPMENT:

(In addition to or in place of standard features)

Carpeted Floor Mats

MSRP INCLUDING OPTIONS \$ 31,545.00

INLAND FREIGHT AND HANDLING \$ 1,295.00

TOTAL MANUFACTURER'S SUGGESTED RETAIL PRICE ▶ \$ 32,840.00

TOTAL ADDITIONAL WEIGHT: 7.5

#1 Brand in Dependability Awarded to Kia

Fuel Economy and Environment

Fuel Economy

49 MPG

53 city

45 highway

2.0 gallons per 100 miles

You save \$3,500 in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost \$900

Fuel Economy & Greenhouse Gas Rating (tailpipe only)

1 8 10

Smog Rating (tailpipe only)

1 7 10

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 28 MPG and costs \$5,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$2.95 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fuel economy.gov

Calculate personalized estimates and compare vehicles

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score Not Rated

Based on the combined rating of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Driver Not Rated

Crash Passenger Not Rated

Based on the risk of injury in a frontal impact. Should ONLY be compared to other vehicles of similar size and weight.

Side Front seat Not Rated

Crash Rear seat Not Rated

Star ratings based on the risk of injury in a side impact.

Rollover Not Rated

Star ratings based on the risk of rollover in a single-vehicle crash.

Star ratings range from 1 to 5 stars (★★★★★) with 5 being the highest. Source: National Highway Traffic Safety Administration (NHTSA). www.safercar.gov or 1-888-327-4236

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

PARTS CONTENT INFORMATION

FOR VEHICLES IN THIS CAR LINE U.S./CANADIAN PARTS CONTENT: 1 %

MAJOR SOURCES OF FOREIGN PARTS: KOREA: 90%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE FINAL ASSEMBLY POINT: HWASUNG, KOREA

COUNTRY OF ORIGIN ENGINE: KOREA

TRANSMISSION: KOREA

Photo No. 071 - Monroney Label

Safety features of your vehicle

Seat

3. Release the switch once the seat reaches the desired position.

Adjusting lumbar support for driver's seat (if equipped)

The lumbar support can be adjusted by pressing the lumbar support switch on the side of the seat.

1. Press the front portion (1) of the switch to increase support or the rear portion (2) of the switch to decrease support.

2. Release the switch once it reaches the desired position.

Headrest for front seat

The driver's and front passenger's seats are equipped with a headrest for the occupant's safety and comfort.

The headrest not only provides comfort for the driver and front passenger, but also helps protect the head and neck in the event of a rear collision. For maximum effectiveness in case of an accident, the headrest should be

adjusted so the middle of the headrest is as high as the center of gravity of an occupant's head. Generally, the center of gravity of most people's head is similar with the height of the top of their eyes.

Also, adjust the headrest as close to your head as possible. For this reason, the use of a cushion that holds the body away from the seatback is not recommended.

WARNING

Headrest removal/adjustment

Do not operate the vehicle with the headrests removed. Headrests can provide critical neck and head support in a crash.

Do not adjust the headrest height while the vehicle is in motion. Driver may lose control of the vehicle.

CAUTION

Excessive pulling or pushing may damage the headrest.

Adjusting the height up and down

To raise the headrest:

Pull it up to the desired position (1).

To lower the headrest, push on the headrest support.

Lower the headrest to the desired position (3).

Safety features of your vehicle

Seat

\* NOTICE

If you recline the seatback towards the front with the headrest and seat cushion raised, the headrest may come in contact with the sun visor or other parts of the vehicle.

Forward and backward adjustment (for front seats)

The headrest may be adjusted forward to 3 different positions by pulling the headrest forward to the desired position. To adjust the headrest to its furthest backwards position, pull it fully forward to the farthest position and release it. Adjust the headrest so that it properly supports the head and neck.

Removing headrest

Type A

Type B

To remove the headrest:

1. Recline the seatback (2) with the recline lever or switch (1).

2. Raise headrest as far as it can go.

3. Press the headrest release button (3) while pulling the headrest up (4).

WARNING

Removing headrest

NEVER allow anyone to ride in a seat with the headrest removed or reversed. Headrests can provide critical neck and head support in a crash.

Photo No. 072 - Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



Photo No. 073 - Post-Test View of Shattered Vehicle Inner Door Panel

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-01 - Auxiliary Power Module Warning Label

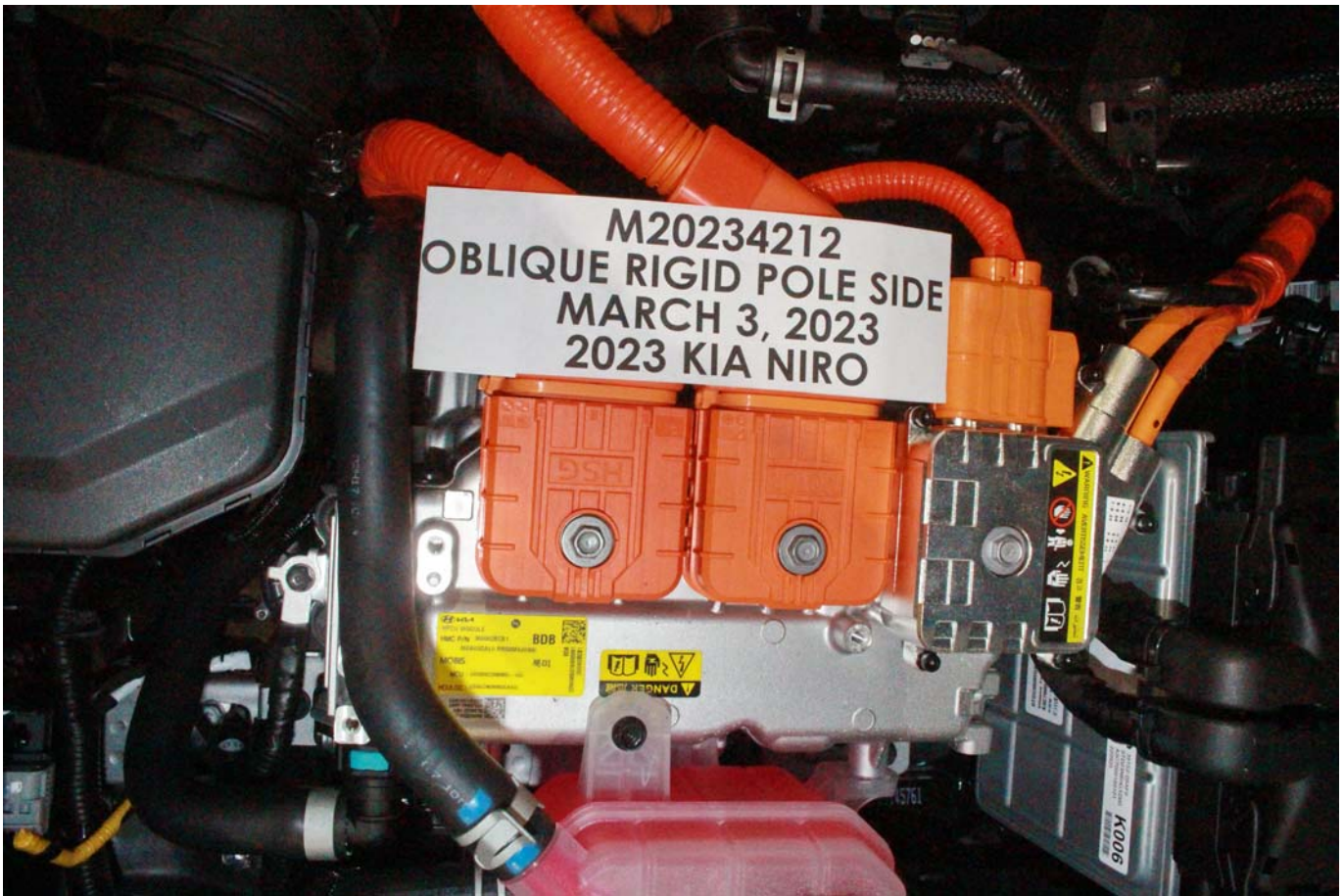


Photo No. 305-02 - Power Inverter Warning Label



Photo No. 305-03 - First Responder Warning Label

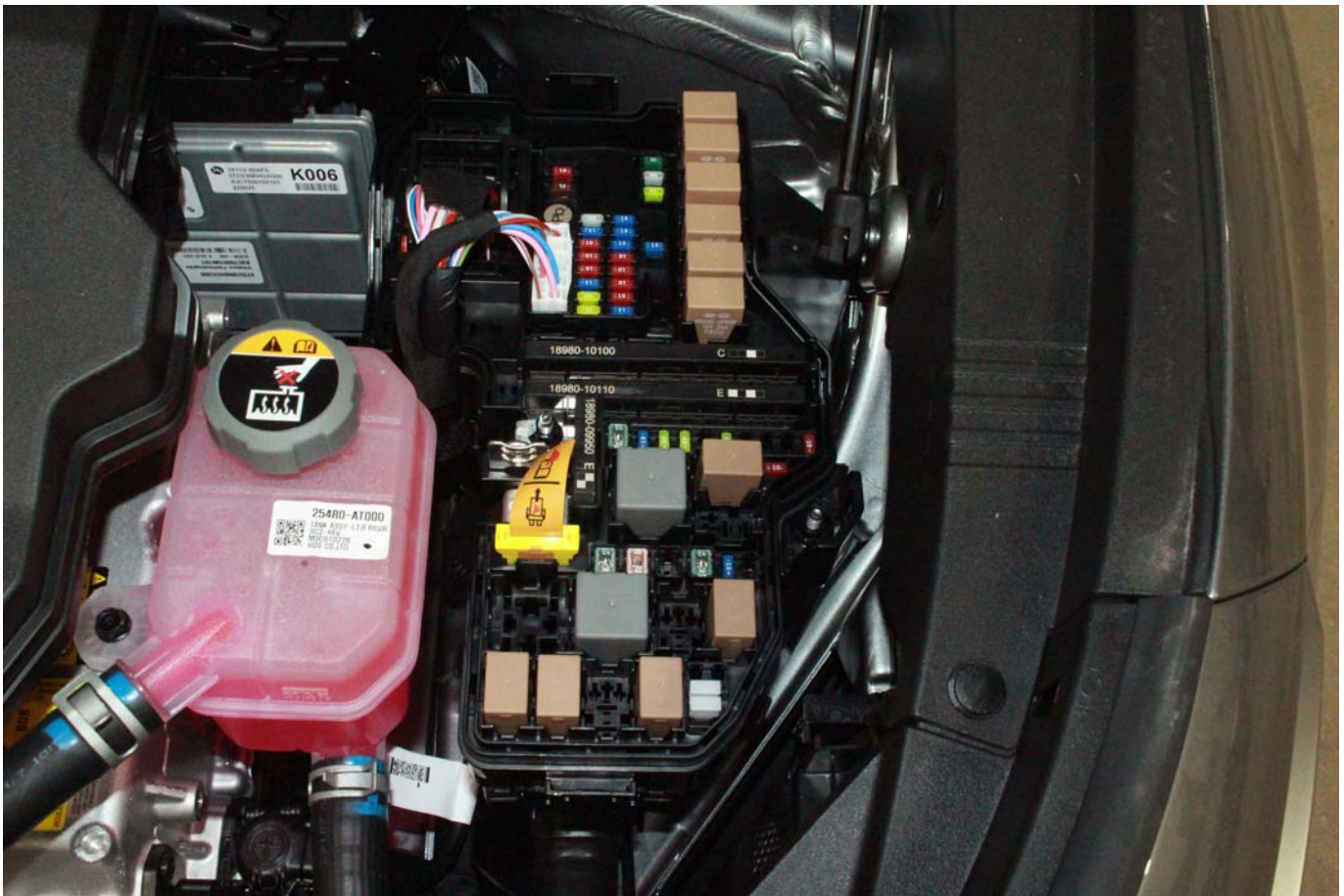


Photo No. 305-04 - First Responder Warning Location



Photo No. 305-05 - Other Vehicle Label(s) Related to Electrical Propulsion System

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-06 - Manual High Voltage Service Disconnect in Place

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-07 - Manual High Voltage Service Disconnect Removed

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-08 - Manual High Voltage Service Disconnect Removed



Photo No. 305-09 - Pre-Impact View of Propulsion Battery

**PHOTOGRAPH NOT AVAILABLE**

Photo No. 305-10 - Post-Impact Front View of Propulsion Battery

**PHOTOGRAPH NOT AVAILABLE**

Photo No. 305-11 - Post-Impact Rear View of Propulsion Battery

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-12 - Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-13 - Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-14 - Pre-Impact View of Propulsion Battery Module(s)

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-15 - Post-Impact View of Propulsion Battery Module(s)

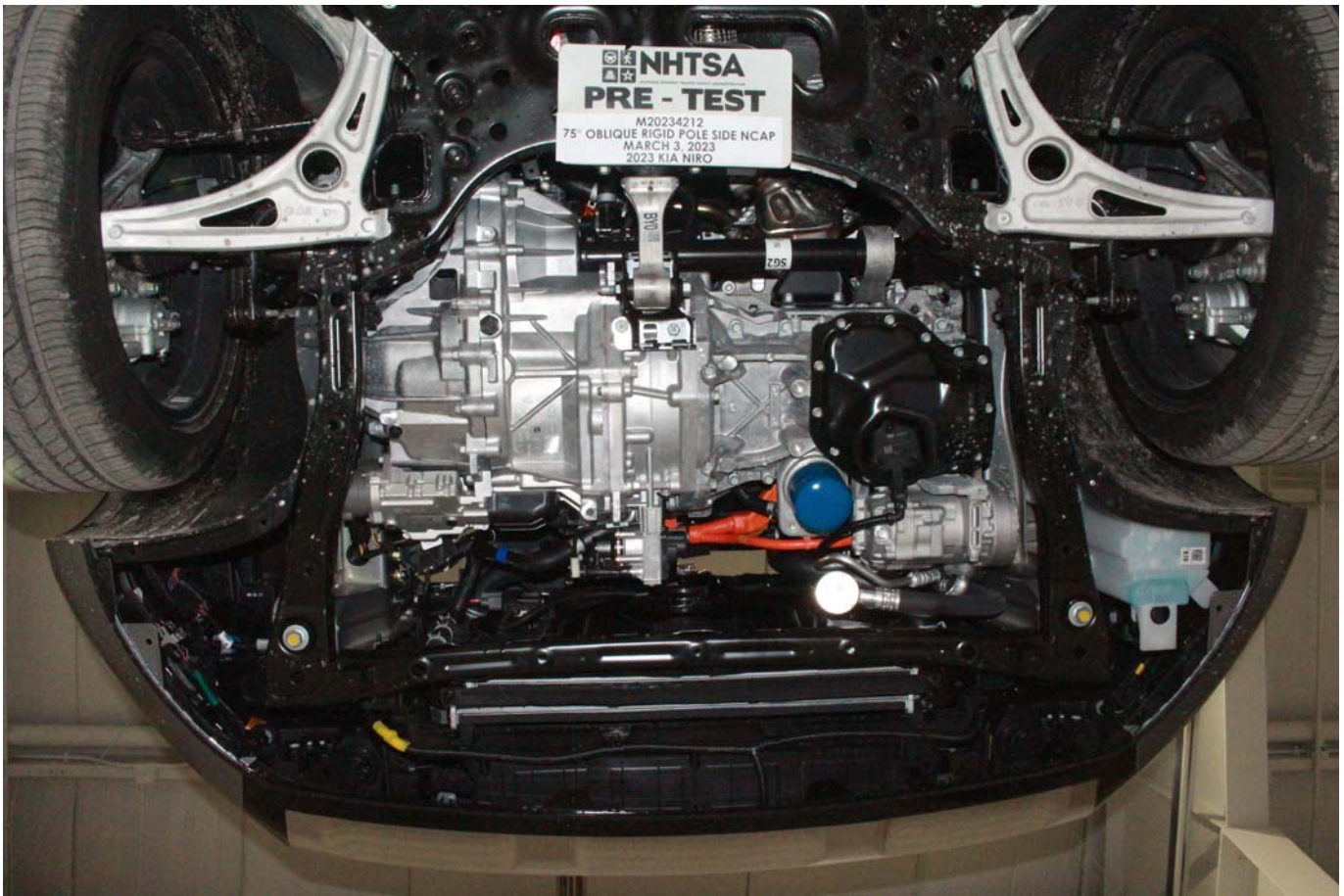


Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive

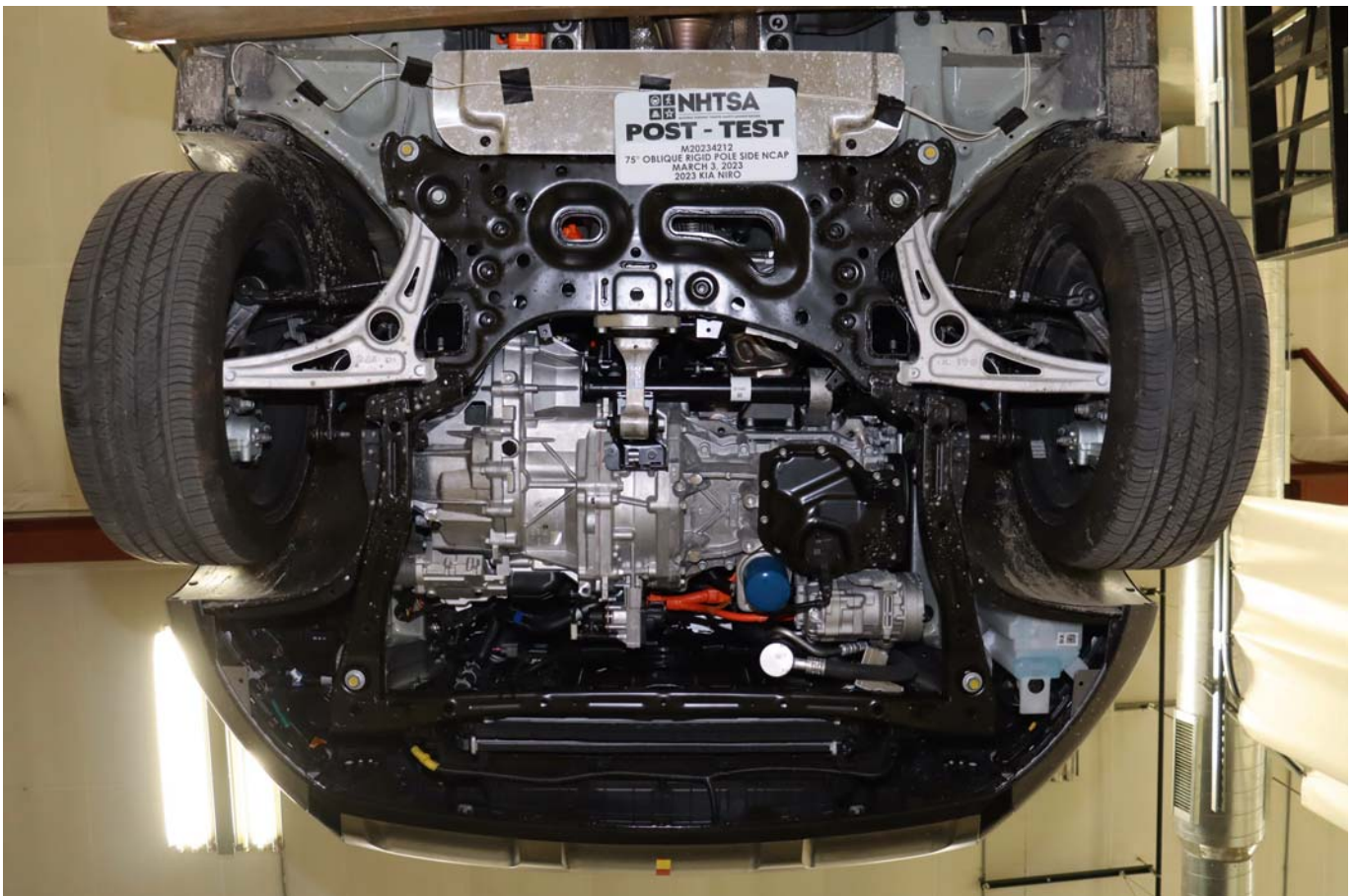


Photo No. 305-17 - Post-Impact View of Electric Propulsion Drive



Photo No. 305-18 - Pre-Impact View of High Voltage Interconnect(s)



Photo No. 305-19 - Pre-Impact View Propulsion Battery Venting System(s)



Photo No. 305-20 - Pre-Impact View of Other Visible Electric Propulsion Components



Photo No. 305-21 - Pre-Impact View of Ground Lead Attached

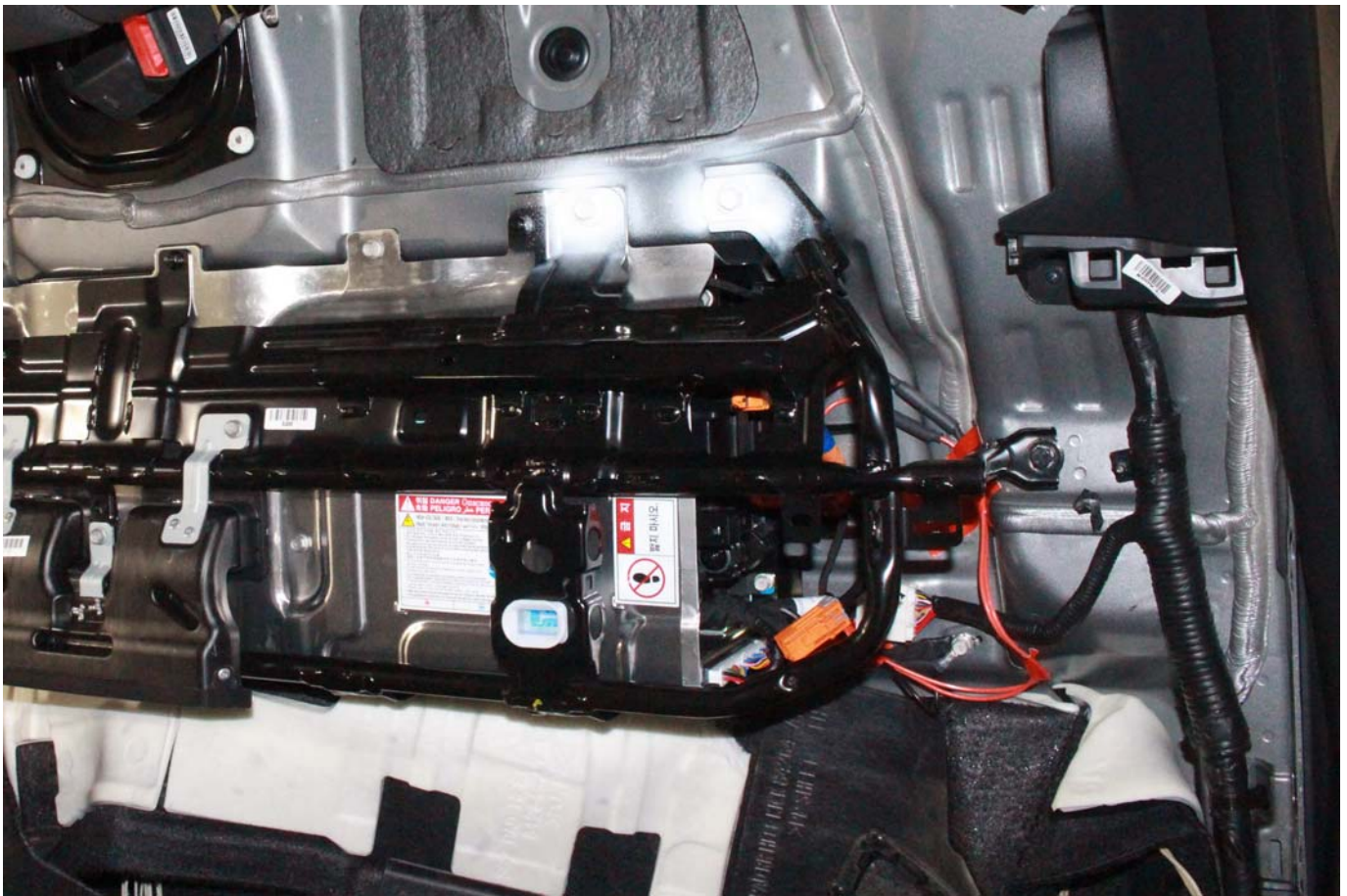


Photo No. 305-22 - Pre-Impact View of High Voltage Leads Attached



Photo No. 305-23 - Pre-Impact Close-Up View of High Voltage Leads Attached



Photo No. 305-24 - Pre-Impact View of Installed Test Interface Port



Photo No. 305-25 - Post-Impact View of Installed Test Interface Port

**PHOTOGRAPH NOT AVAILABLE**

Photo No. 305-26 - Pre-Impact View of Other Test Devices

**PHOTOGRAPH NOT AVAILABLE**

Photo No. 305-27 - Post-Impact View of Other Test Devices



Photo No. 305-28 - FMVSS No. 305 Static Rollover at 90 Degrees



Photo No. 305-29 - FMVSS No. 305 Static Rollover at 180 Degrees





Photo No. 305-32 - Pre-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery



Photo No. 305-33 - Post-Impact View of the Vehicle Passenger Compartment Adjacent to Propulsion Battery

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-34 - Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-35 - Post-Impact View of Battery Component Intrusion

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-36 - Post-Impact View of Battery Module Movement or Retention Loss

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-37 - Post-Impact View of Propulsion Battery Electrolyte Spillage Location

**PHOTOGRAPH NOT APPLICABLE**

Photo No. 305-38 - Post-Test View of Propulsion Battery Electrolyte Spillage Location

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

**TABLE OF DATA PLOTS**  
**Driver Dummy Instrumentation Plots**

|                |                                                        | <u>Page No.</u> |
|----------------|--------------------------------------------------------|-----------------|
| Figure No. 1.  | Driver Head CG Acceleration (X) vs. Time               | B-1             |
| Figure No. 2.  | Driver Head CG Acceleration (Y) vs. Time               | B-1             |
| Figure No. 3.  | Driver Head CG Acceleration (Z) vs. Time               | B-1             |
| Figure No. 4.  | Driver Head CG Resultant Acceleration (X) vs. Time     | B-1             |
| Figure No. 5.  | Driver Lower Spine T12 Acceleration (X) vs. Time       | B-2             |
| Figure No. 6.  | Driver Lower Spine T12 Acceleration (Y) vs. Time       | B-2             |
| Figure No. 7.  | Driver Lower Spine T12 Acceleration (Z) vs. Time       | B-2             |
| Figure No. 8.  | Driver Lower Spine T12 Resultant Acceleration vs. Time | B-2             |
| Figure No. 9.  | Driver Iliac Wing Force on Impact Side (Y) vs. Time    | B-3             |
| Figure No. 10. | Driver Acetabulum Force on Impact Side (Y) vs. Time    | B-3             |
| Figure No. 11. | Driver Total Pelvis Force on Impact Side (Y) vs. Time  | B-3             |

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

**Additional Driver Dummy Instrumentation Data**

Driver Head CG Redundant Acceleration (X) vs. Time  
Driver Head CG Redundant Acceleration (Y) vs. Time  
Driver Head CG Redundant Acceleration (Z) vs. Time  
Driver Head Angular Velocity X (Deg/Sec) vs. Time  
Driver Head Angular Velocity Y (Deg/Sec) vs. Time  
Driver Head Angular Velocity Z (Deg/Sec) vs. Time  
Driver Upper Thorax Rib Deflection (Y)  
Driver Middle Thorax Rib Deflection (Y)  
Driver Lower Thorax Rib Deflection (Y)  
Driver Upper Abdomen Rib Deflection (Y)  
Driver Lower Abdomen Rib Deflection (Y)

### **Vehicle Instrumentation Data**

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Left Floor Sill Acceleration (Y)

Left A-Pillar Sill Acceleration (Y)

Left Lower A-Pillar Acceleration (Y)

Left Mid A-Pillar Acceleration (Y)

Left B-Pillar Sill Acceleration (Y)

Left Lower B-Pillar Acceleration (Y)

Left Mid B-Pillar Acceleration (Y)

Driver Seat Track at Dummy Hip Point Acceleration (Y)

Engine Top Acceleration (X)

Engine Top Acceleration (Y)

Firewall Center Acceleration (Y)

Right Roof at Vertical Impact Reference Line Acceleration (Y)

Right Sill at Vertical Impact Reference Line Acceleration (Y)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)

Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

### **Pole Instrumentation Data**

Load Cell Pole Barrier #1 Force (Y)

Load Cell Pole Barrier #2 Force (Y)

Load Cell Pole Barrier #3 Force (Y)

Load Cell Pole Barrier #4 Force (Y)

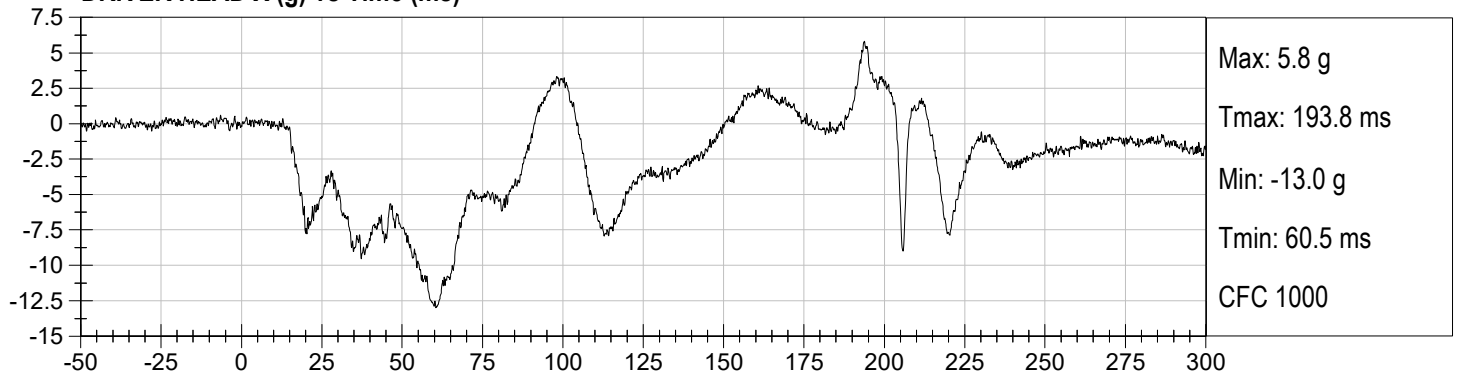
Load Cell Pole Barrier #5 Force (Y)

Load Cell Pole Barrier #6 Force (Y)

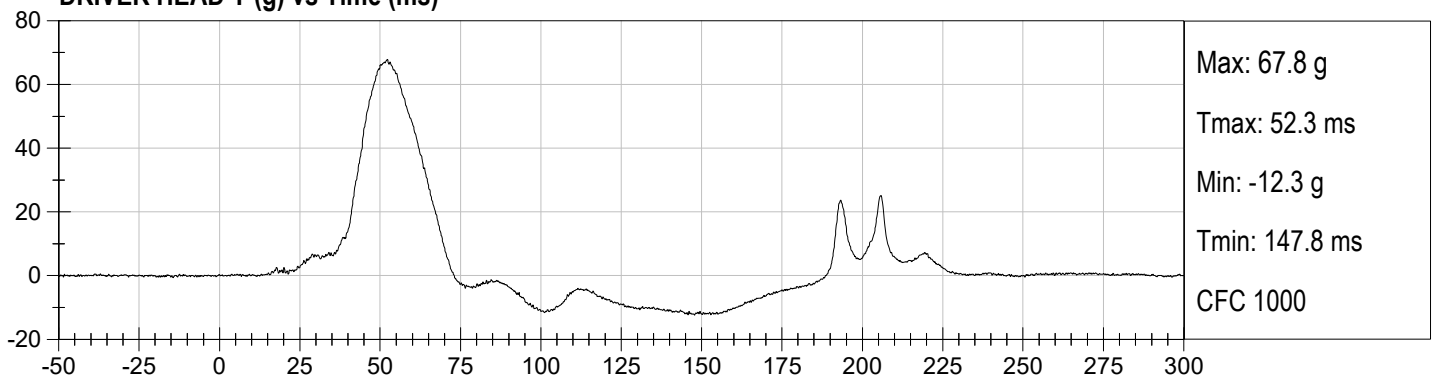
Load Cell Pole Barrier #7 Force (Y)

Load Cell Pole Barrier #8 Force (Y)

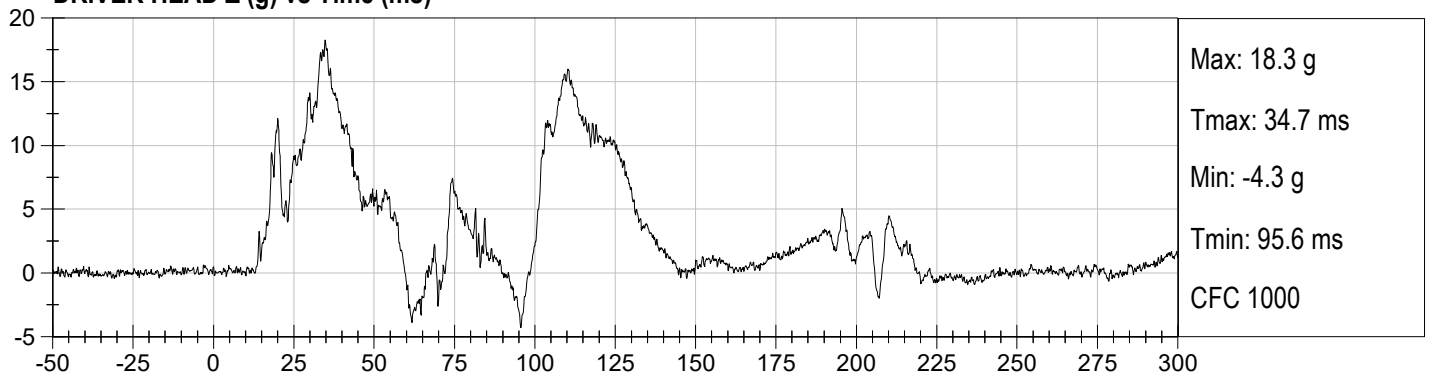
**DRIVER HEAD X (g) vs Time (ms)**



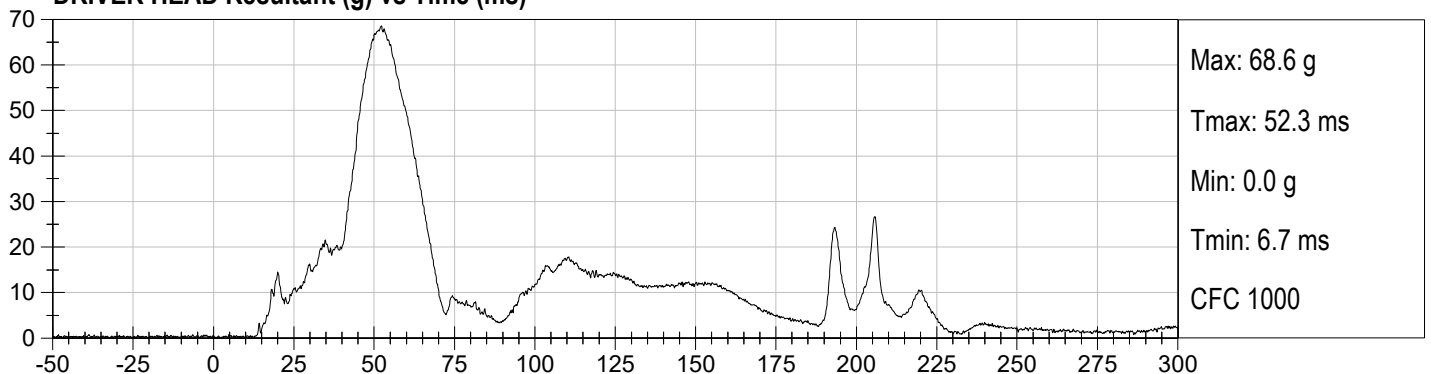
**DRIVER HEAD Y (g) vs Time (ms)**



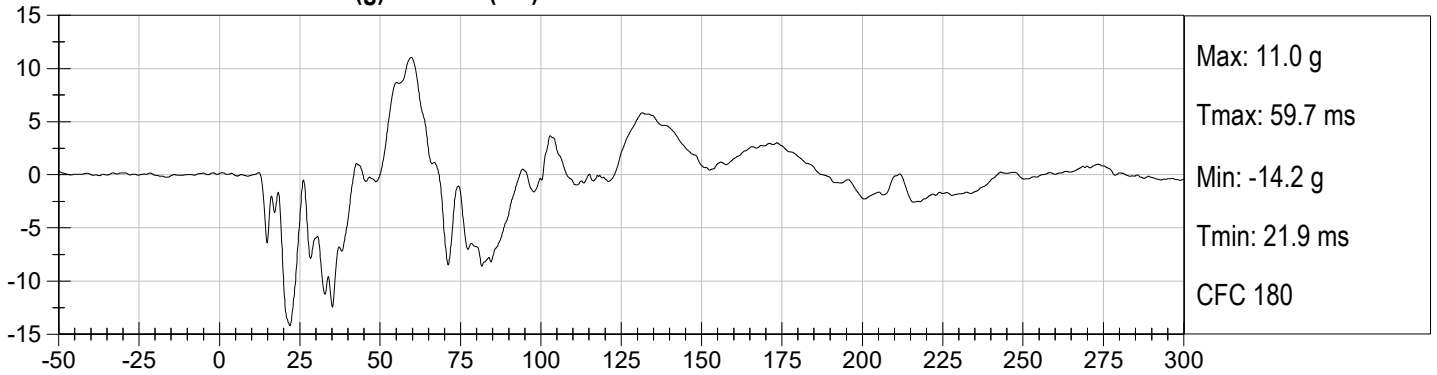
**DRIVER HEAD Z (g) vs Time (ms)**



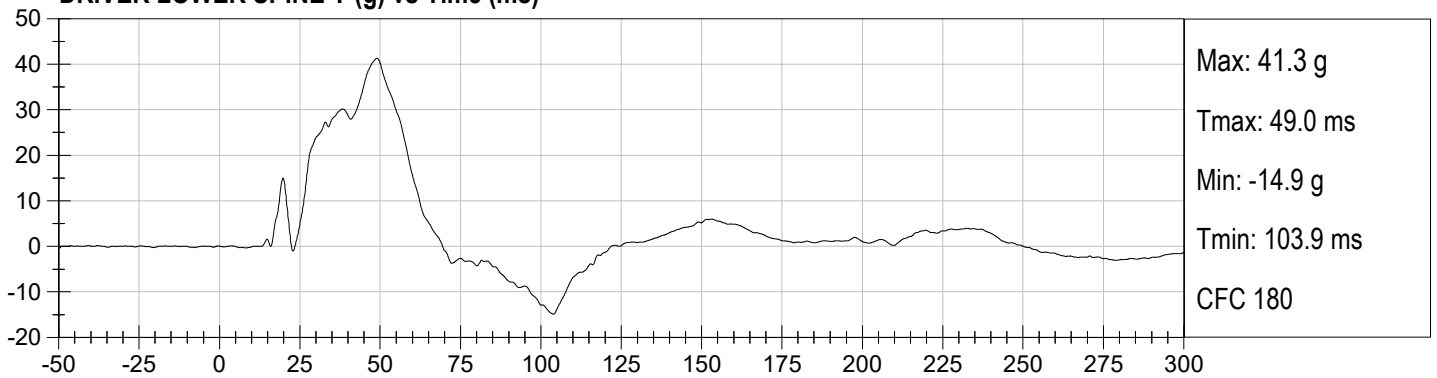
**DRIVER HEAD Resultant (g) vs Time (ms)**



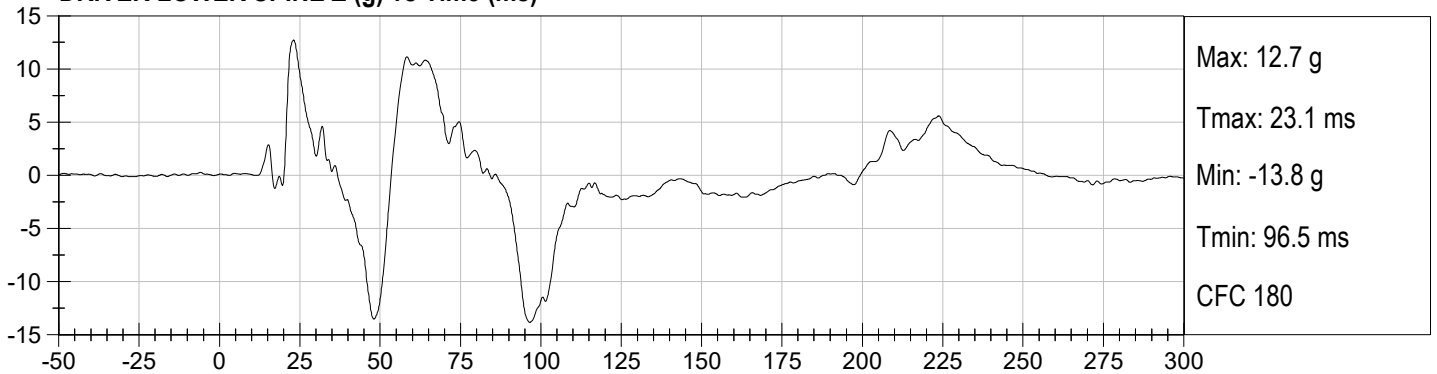
**DRIVER LOWER SPINE X (g) vs Time (ms)**



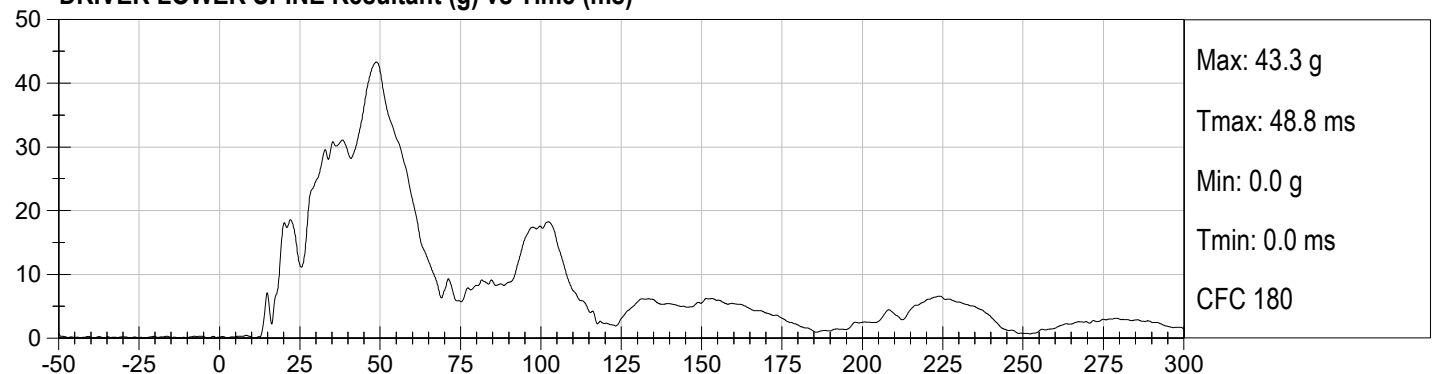
**DRIVER LOWER SPINE Y (g) vs Time (ms)**



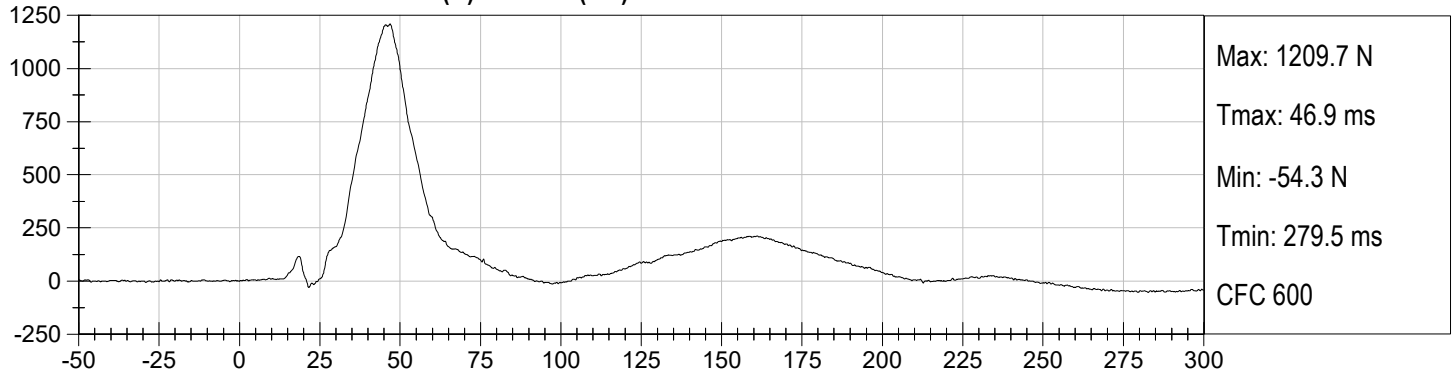
**DRIVER LOWER SPINE Z (g) vs Time (ms)**



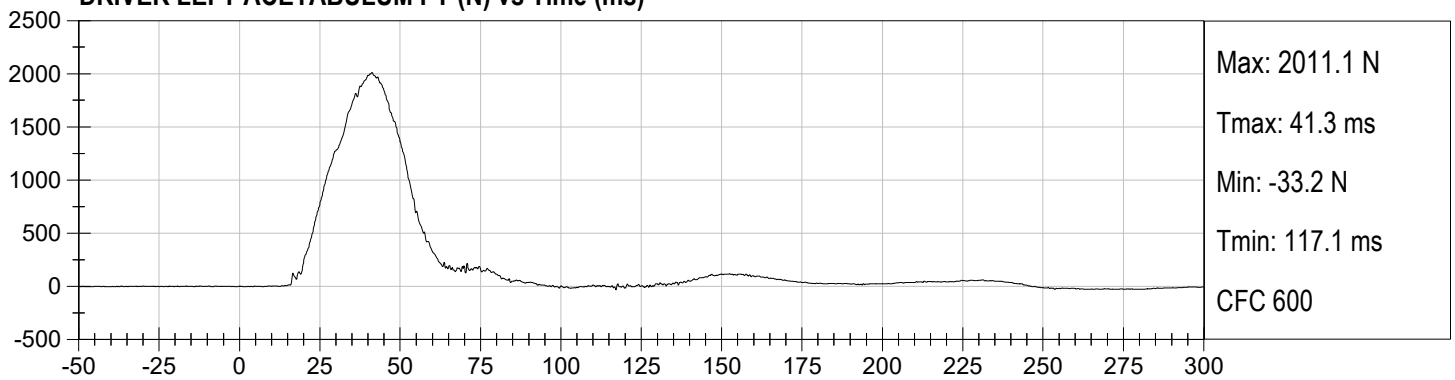
**DRIVER LOWER SPINE Resultant (g) vs Time (ms)**



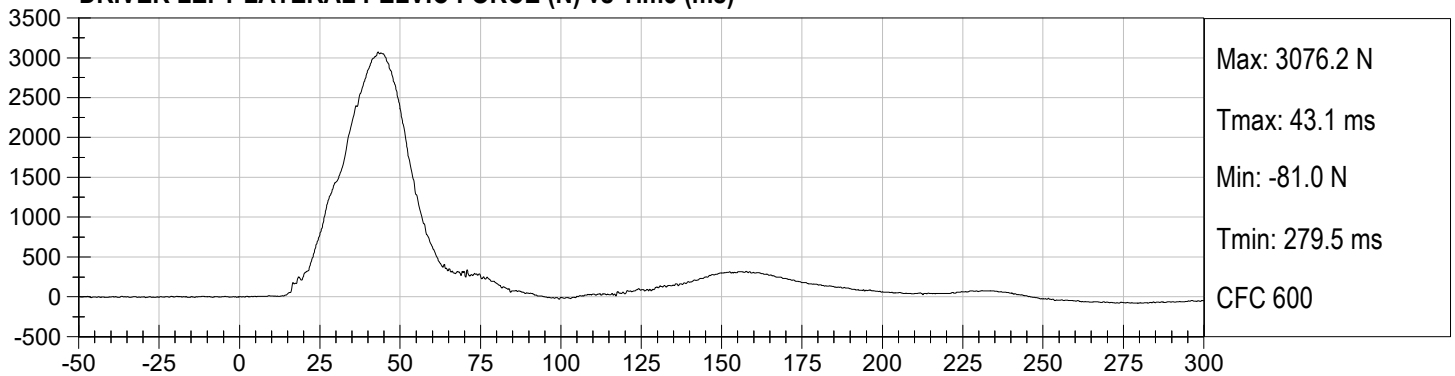
**DRIVER LEFT ILIUM CREST FY (N) vs Time (ms)**



**DRIVER LEFT ACETABULUM FY (N) vs Time (ms)**



**DRIVER LEFT LATERAL PELVIC FORCE (N) vs Time (ms)**



**APPENDIX C**  
**DUMMY QUALIFICATION AND PERFORMANCE VERIFICATION**

## **QUALIFICATION TEST RESULTS**

### **PRE-TEST**

**SID-IIS 5<sup>TH</sup> PERCENTILE FEMALE - DRIVER ATD**

**SID-IIsD External Measurements**  
**SN: 296**

| No.      | Name                          | Spec. (mm) | Result | Pass/Fail |
|----------|-------------------------------|------------|--------|-----------|
| <b>A</b> | Sitting Height                | 772 - 788  | 784    | Pass      |
| <b>B</b> | Shoulder Pivot Height         | 437 - 453  | 442    | Pass      |
| <b>C</b> | H-point Height                | 79 - 89    | 83     | Pass      |
| <b>D</b> | H-point from Seatback         | 141 - 151  | 145    | Pass      |
| <b>E</b> | Shoulder Pivot from Backline  | 97 - 107   | 99     | Pass      |
| <b>F</b> | Thigh Clearance               | 119 -135   | 121    | Pass      |
| <b>G</b> | Head Breadth                  | 140 - 148  | 142    | Pass      |
| <b>H</b> | Head Back from Backline       | 40 - 46    | 45     | Pass      |
| <b>I</b> | Head Depth                    | 178 - 188  | 180    | Pass      |
| <b>J</b> | Head Circumference            | 541 - 551  | 548    | Pass      |
| <b>K</b> | Buttock to Knee Length        | 514 - 540  | 535    | Pass      |
| <b>L</b> | Popliteal Height              | 343 - 369  | 358    | Pass      |
| <b>M</b> | Knee Pivot to Floor Height    | 392 - 409  | 404    | Pass      |
| <b>N</b> | Buttock Popliteal Length      | 416 - 442  | 435    | Pass      |
| <b>O</b> | Chest Depth w/o Jacket        | 195 - 211  | 206    | Pass      |
| <b>P</b> | Foot Length                   | 216 - 232  | 219    | Pass      |
| <b>Q</b> | Hip Breadth (w/ pelvic plugs) | 313 - 323  | 316    | Pass      |
| <b>R</b> | Arm Length                    | 249 - 259  | 250    | Pass      |
| <b>S</b> | Knee Joint to Seatback        | 477 - 493  | 481    | Pass      |
| <b>V</b> | Shoulder Width                | 341 - 357  | 346    | Pass      |
| <b>W</b> | Foot Width                    | 78 - 94    | 85     | Pass      |
| <b>Y</b> | Chest Circumference w/ jacket | 851 - 881  | 870    | Pass      |
| <b>Z</b> | Waist Circumference           | 761 - 791  | 772    | Pass      |

**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

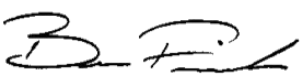
**ATD Serial No:** 296

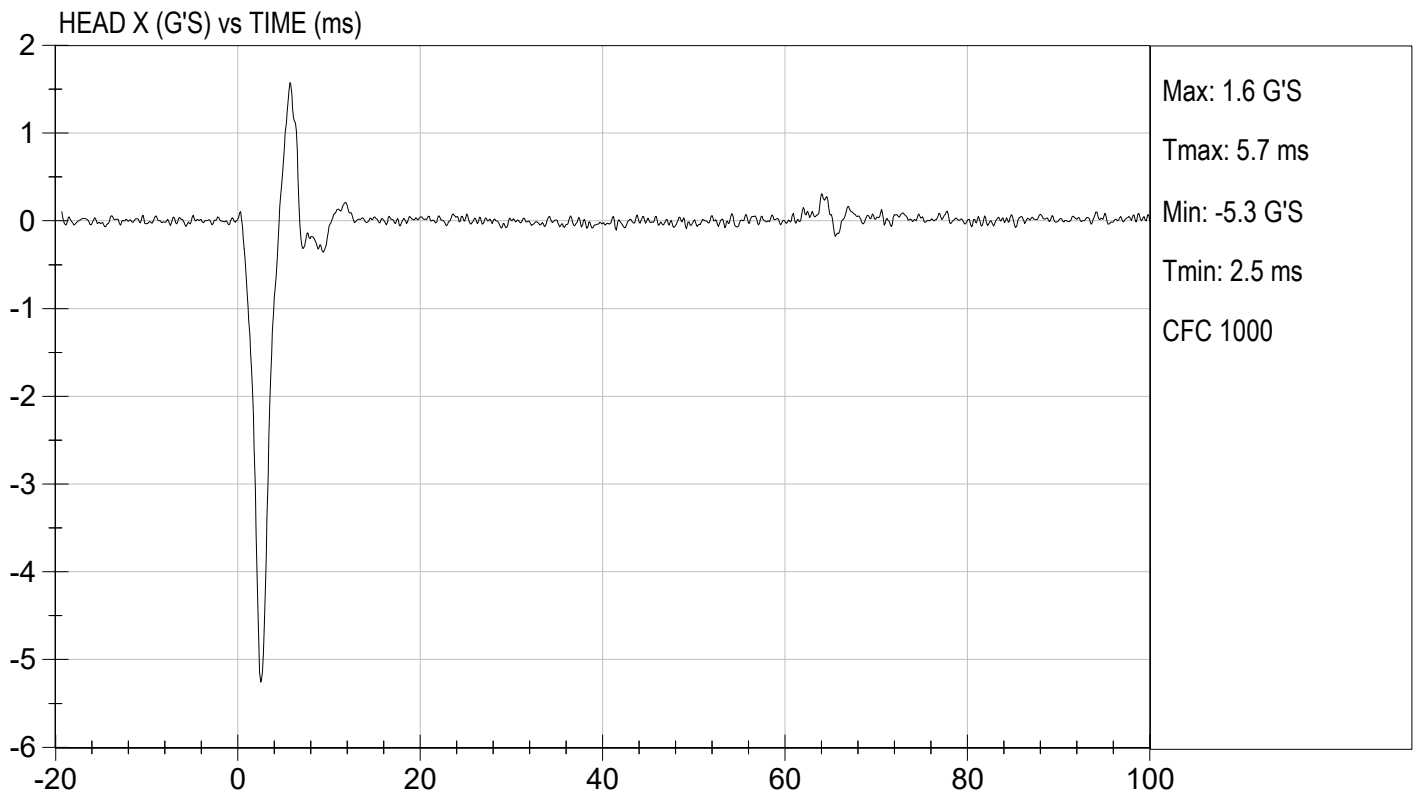
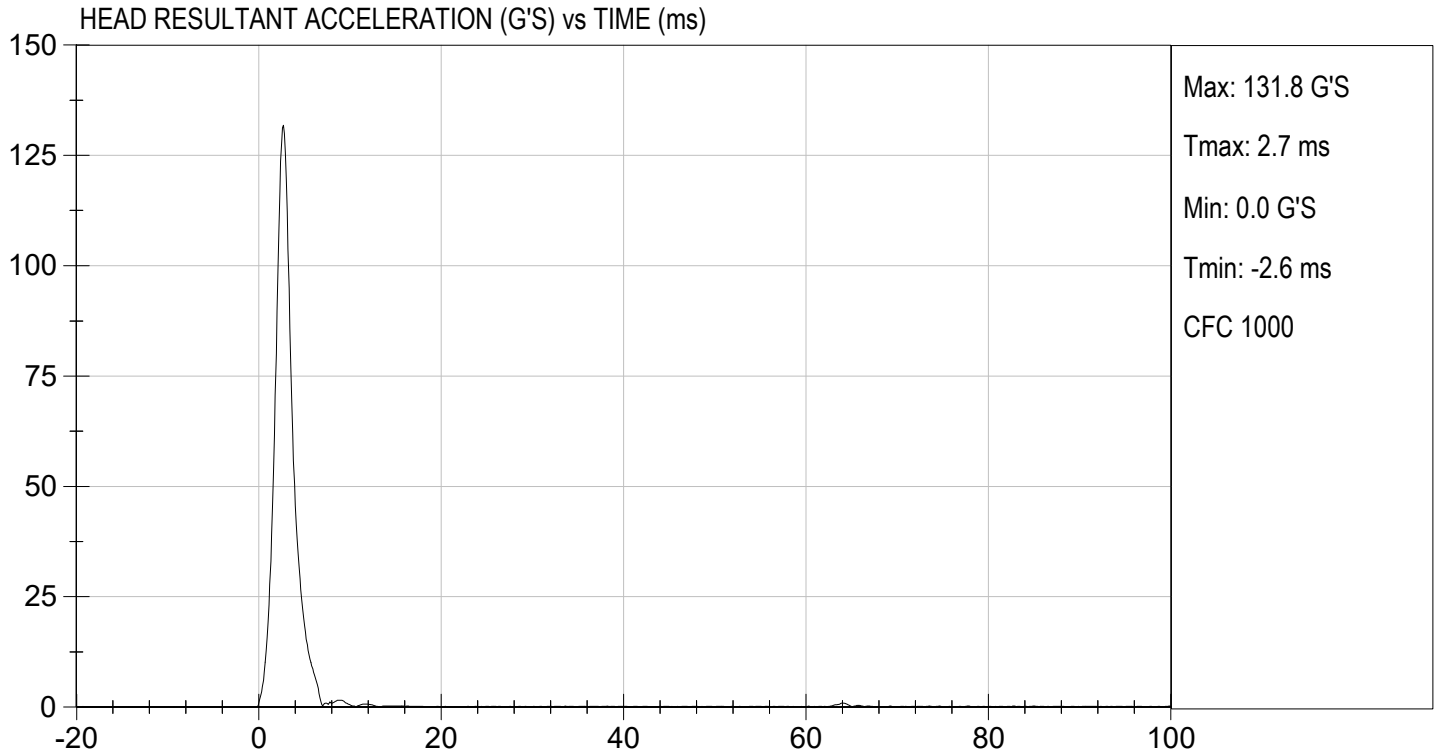
**Test ID:** D230251

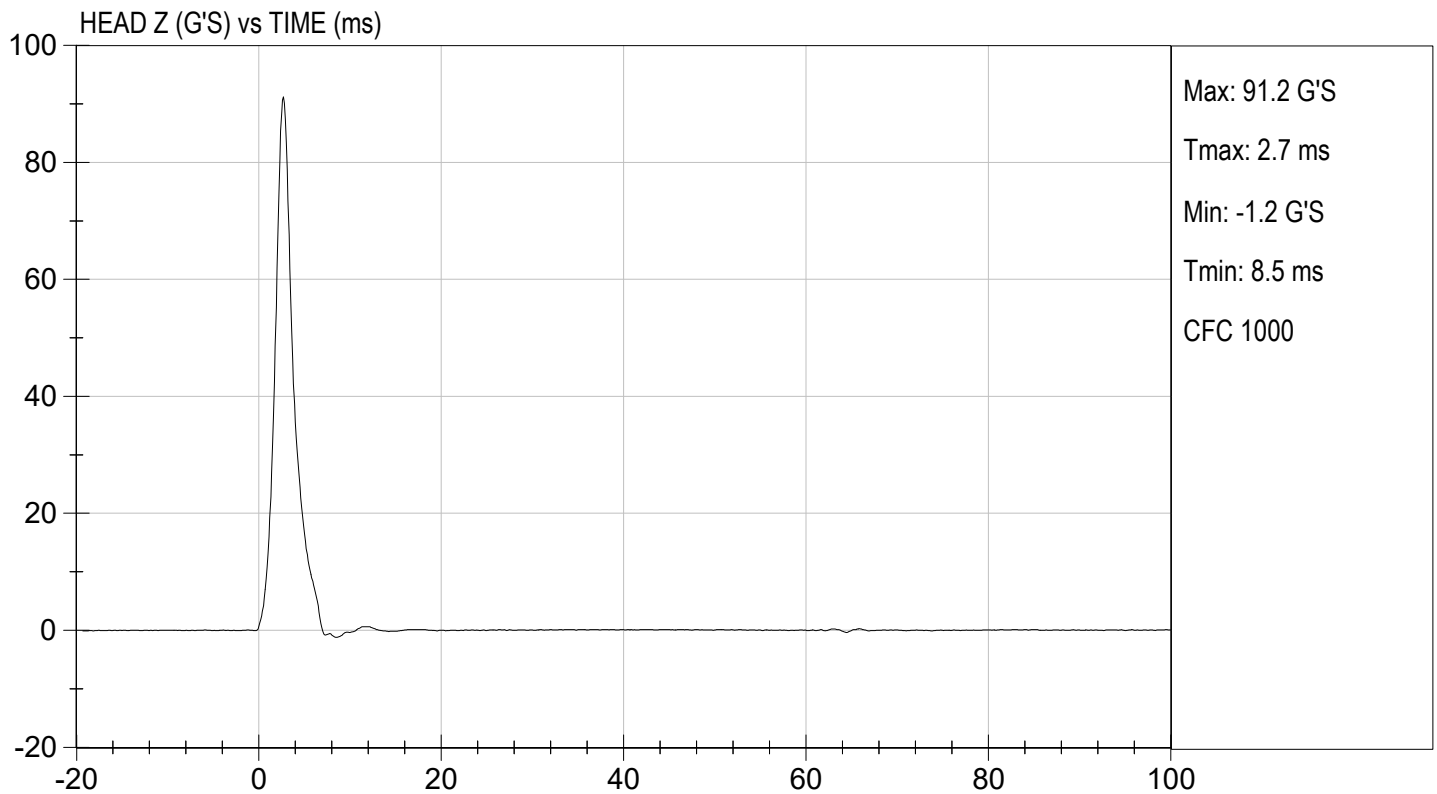
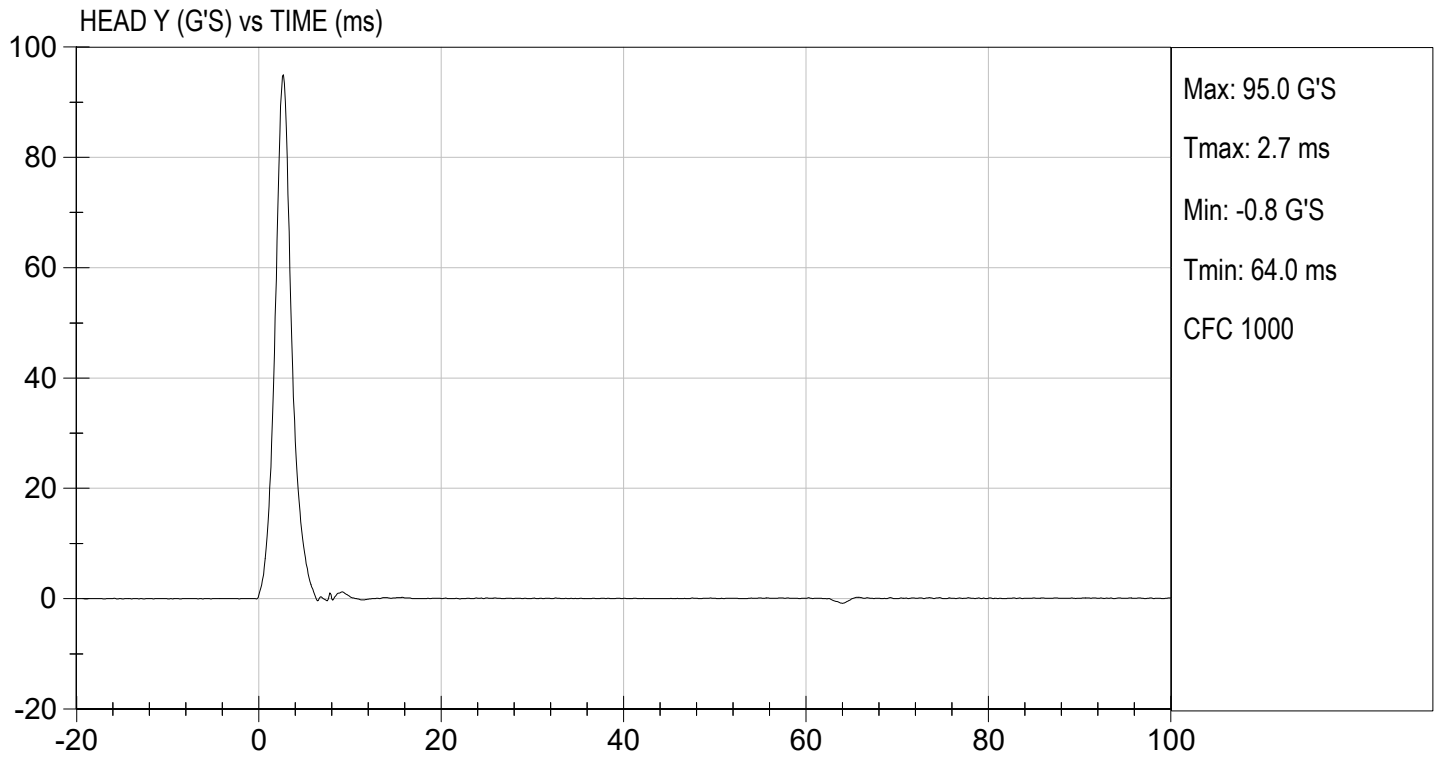
| Tested Parameter               | Units | Specification | Result               | Pass/Fail |
|--------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature         | deg C | 20.6 to 22.2  | 21.4                 | Pass      |
| Laboratory Relative Humidity   | %     | 10 to 70      | 20                   | Pass      |
| Peak Resultant Acceleration    | G's   | 115 to 137    | 132                  | Pass      |
| Peak Longitudinal Acceleration | G's   | +/- 15        | -5.3                 | Pass      |
| Unimodal                       | N/A   | Yes           | Yes                  | Pass      |
| Oscillations                   | N/A   | <15%          | Yes                  | Pass      |
|                                |       |               | Overall Test Results | Pass      |

  
Laboratory Technician

01/27/2023  
Test Date

  
Approved By





**MGA RESEARCH CORPORATION**  
**LATERAL NECK PENDULUM TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

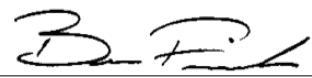
**Test I.D:** D230252

| Tested Parameter                 |           | Units | Specification | Result | Pass/Fail |
|----------------------------------|-----------|-------|---------------|--------|-----------|
| Temperature                      |           | deg C | 20.6 to 22.2  | 21.5   | Pass      |
| Humidity                         |           | %     | 10 to 70      | 20     | Pass      |
| Impact Velocity                  |           | m/s   | 5.51 to 5.63  | 5.58   | Pass      |
| Pendulum Velocity                | 10 ms     | m/s   | 2.20 to 2.80  | 2.44   | Pass      |
|                                  | 15 ms     | m/s   | 3.30 to 4.10  | 3.72   | Pass      |
|                                  | 20 ms     | m/s   | 4.40 to 5.40  | 5.30   | Pass      |
|                                  | 25 ms     | m/s   | 5.40 to 6.10  | 5.67   | Pass      |
|                                  | 25-100 ms | m/s   | 5.50 to 6.20  | 5.67   | Pass      |
| Maximum D-Plane Rotation         |           | deg   | 71 to 81      | 72     | Pass      |
| Time of Maximum D-Plane Rotation |           | ms    | 50 to 70      | 61     | Pass      |
| Maximum Occipital Condyle Moment |           | Nm    | -44 to -36    | -37    | Pass      |
| Time of Moment Decay to 0 Nm     |           | ms    | 102 to 126    | 119    | Pass      |
| Overall Test Results             |           |       |               | Pass   |           |

  
 Laboratory Technician

01/27/2023

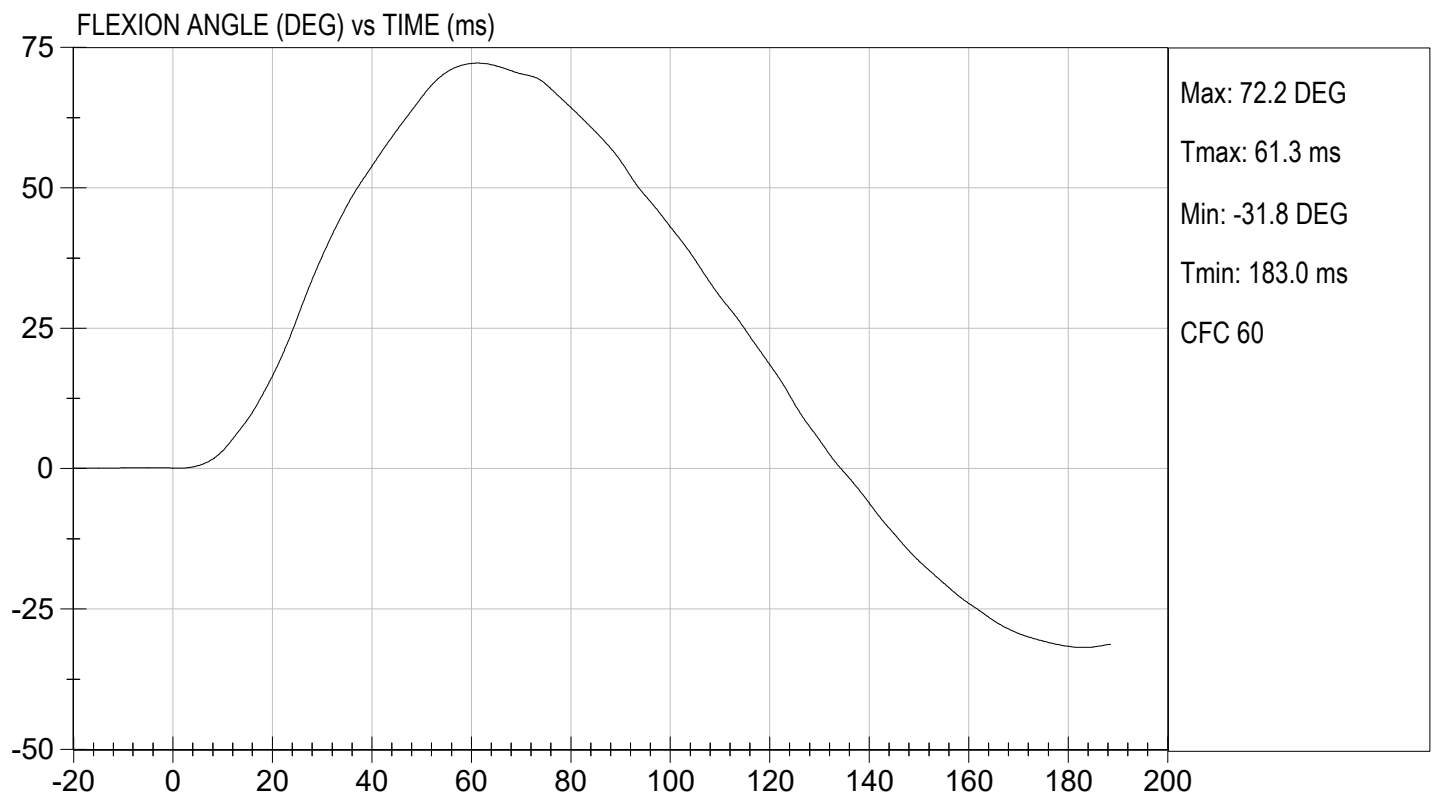
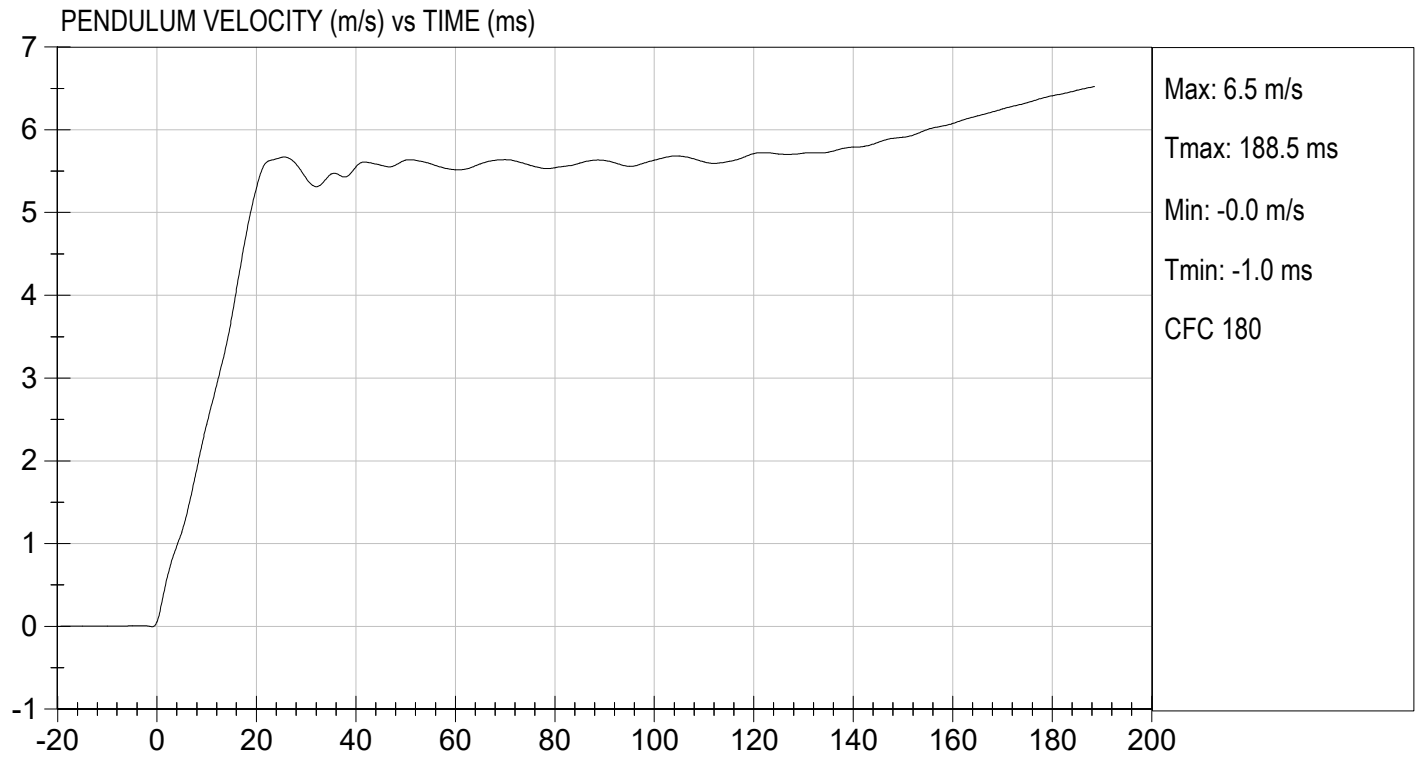
Test Date

  
 Approved By



TEST DESC: NECK BENDING  
VELOCITY: 18.31 ft/s, 5.58 m/s

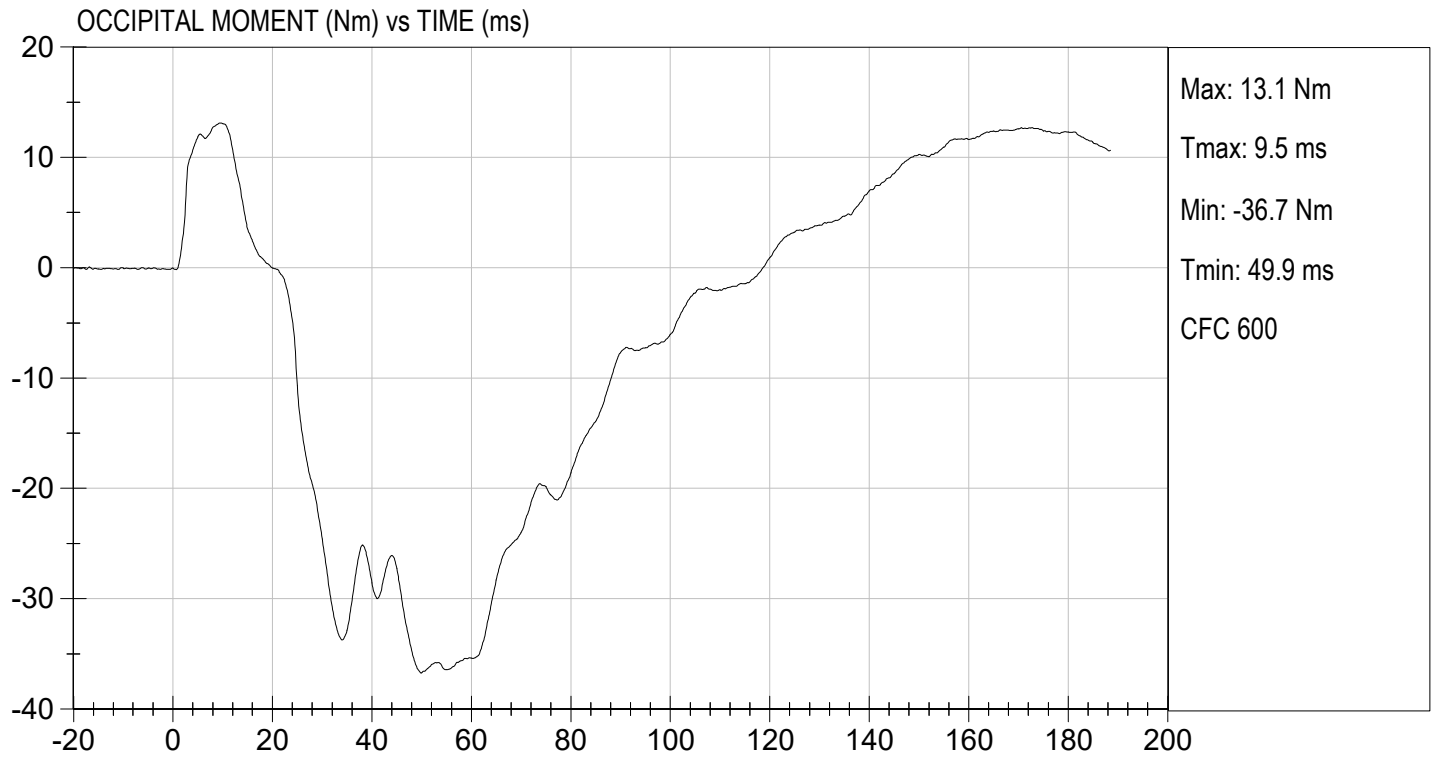
TEST DATE: 01/27/2023  
TEST #: D230252





TEST DESC: NECK BENDING  
VELOCITY: 18.31 ft/s, 5.58 m/s

TEST DATE: 01/27/2023  
TEST #: D230252



**MGA RESEARCH CORPORATION**  
**SHOULDER IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

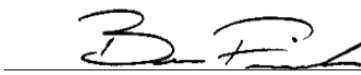
**ATD Serial No:** 296

**Test ID:** D230253

| Tested Parameter                | Units | Specification | Result | Pass/Fail |
|---------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature          | deg C | 20.6 to 22.2  | 21.4   | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 21     | Pass      |
| Impact Velocity                 | m/s   | 4.20 to 4.40  | 4.34   | Pass      |
| Maximum Probe Acceleration      | G's   | 13 to 18      | 16     | Pass      |
| Shoulder Displacement           | mm    | 28 to 37      | 31     | Pass      |
| Upper Spine (T1) Y Acceleration | G's   | 17 to 22      | 20     | Pass      |
| Overall Test Results            |       |               | Pass   |           |

  
Laboratory Technician

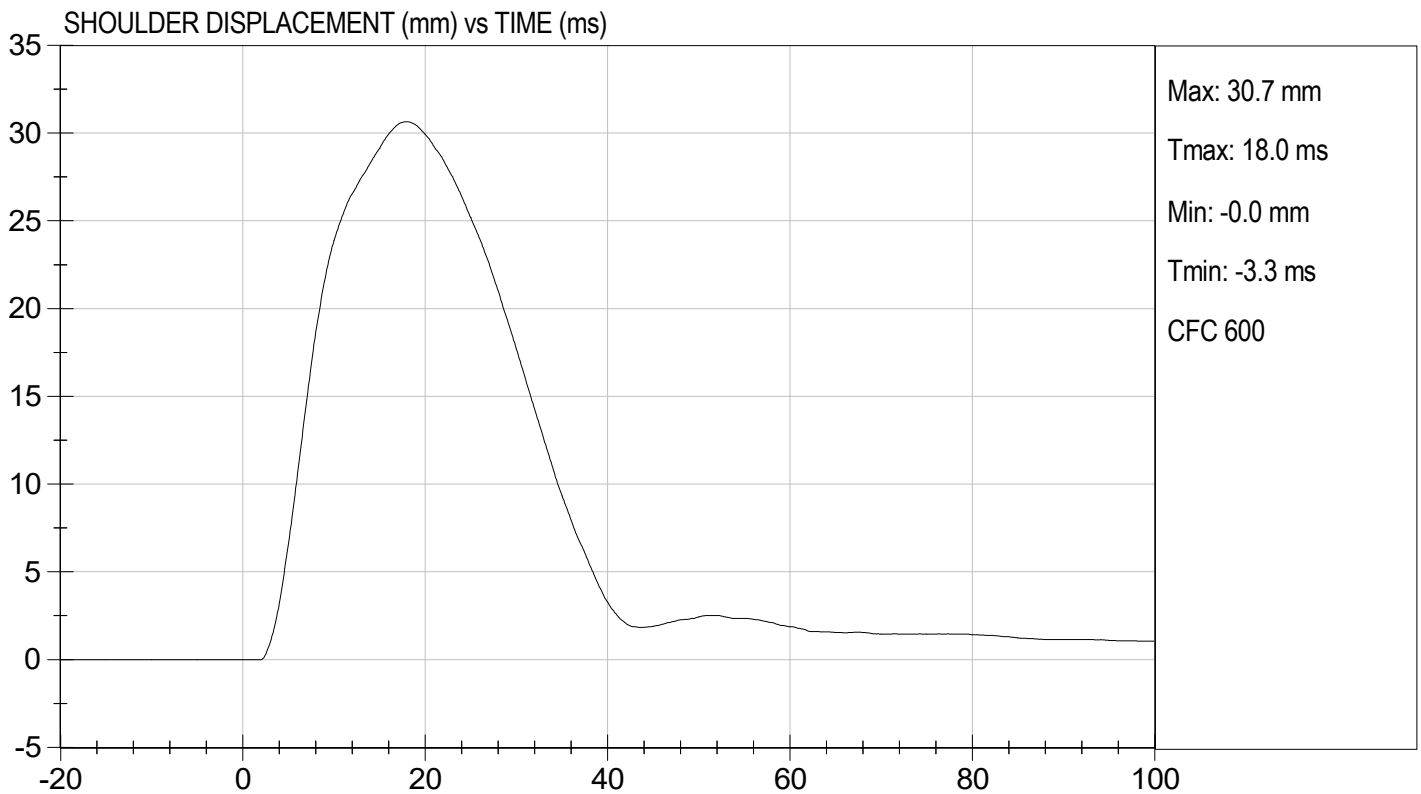
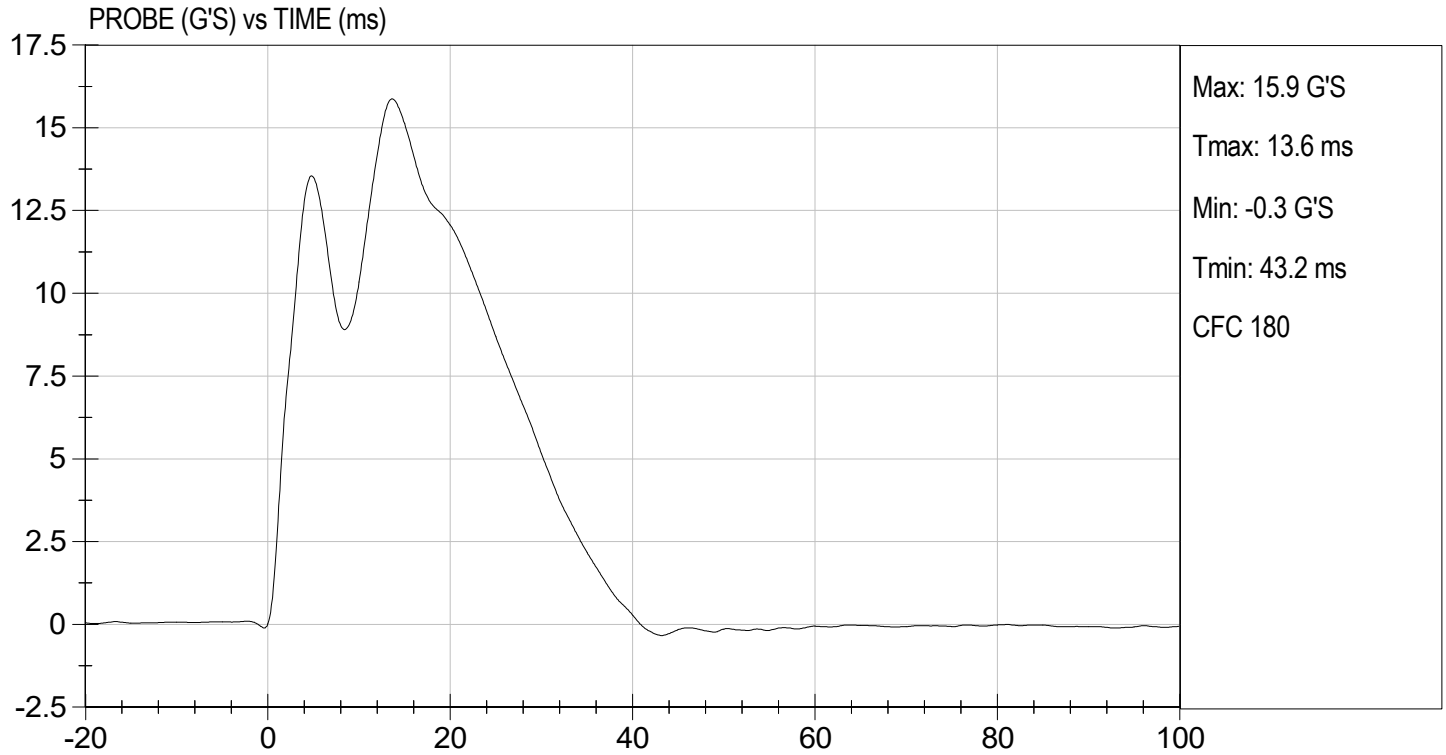
01/27/2023  
Test Date

  
Approved By



TEST DESC: SHOULDER IMPACT  
VELOCITY: 14.25 ft/s, 4.34 m/s

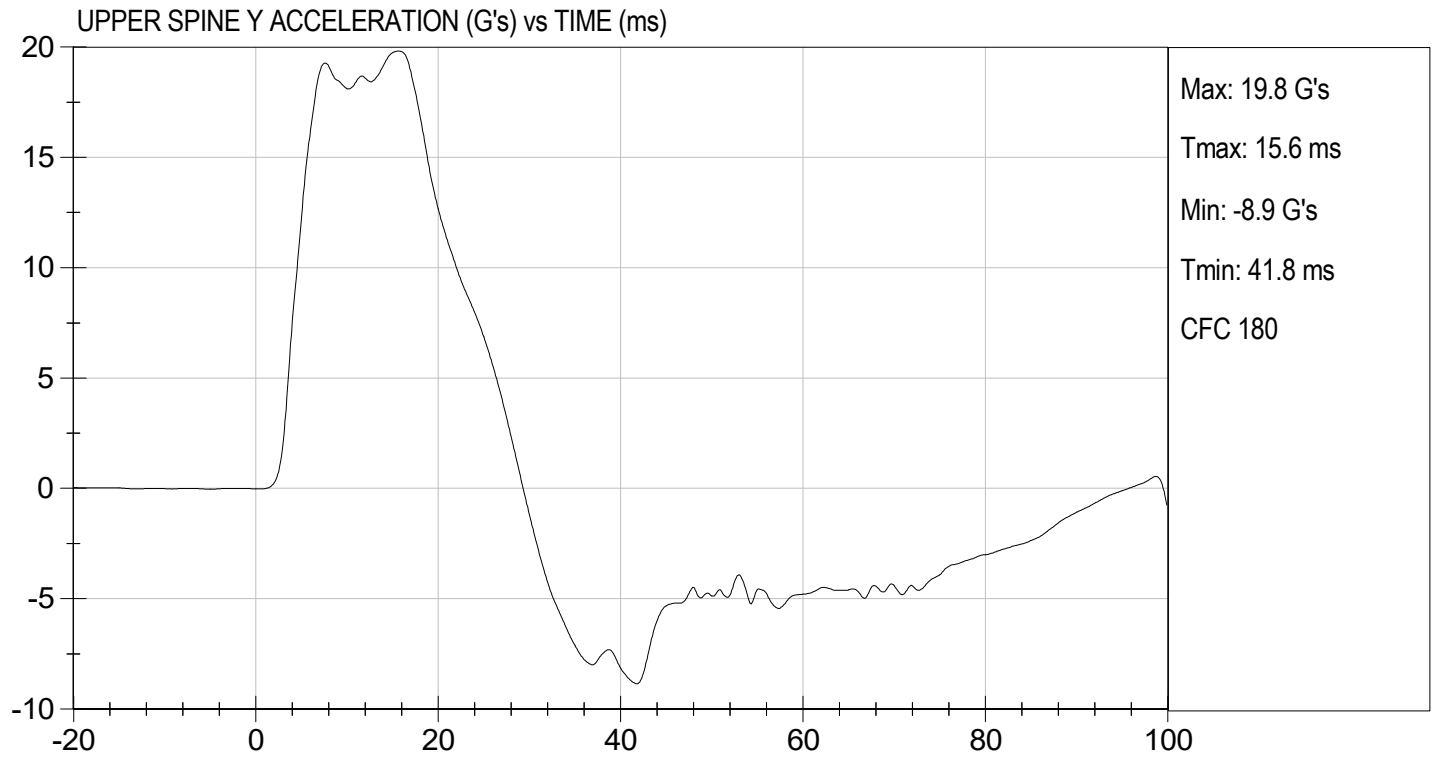
TEST DATE: 01/27/2023  
TEST #: D230253





TEST DESC: SHOULDER IMPACT  
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/27/2023  
TEST #: D230253



**MGA RESEARCH CORPORATION**  
**THORAX (WITH ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

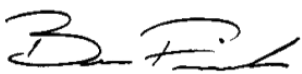
**ATD Serial No:** 296

**Test I.D:** D230254

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 22     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.68   | Pass      |
| Maximum Probe Acceleration       | G's   | 30 to 36      | 33     | Pass      |
| Shoulder Displacement            | mm    | 31 to 40      | 33     | Pass      |
| Upper Rib Displacement           | mm    | 25 to 32      | 27     | Pass      |
| Middle Rib Displacement          | mm    | 30 to 36      | 32     | Pass      |
| Lower Rib Displacement           | mm    | 32 to 38      | 35     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 34 to 43      | 38     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 29 to 37      | 32     | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

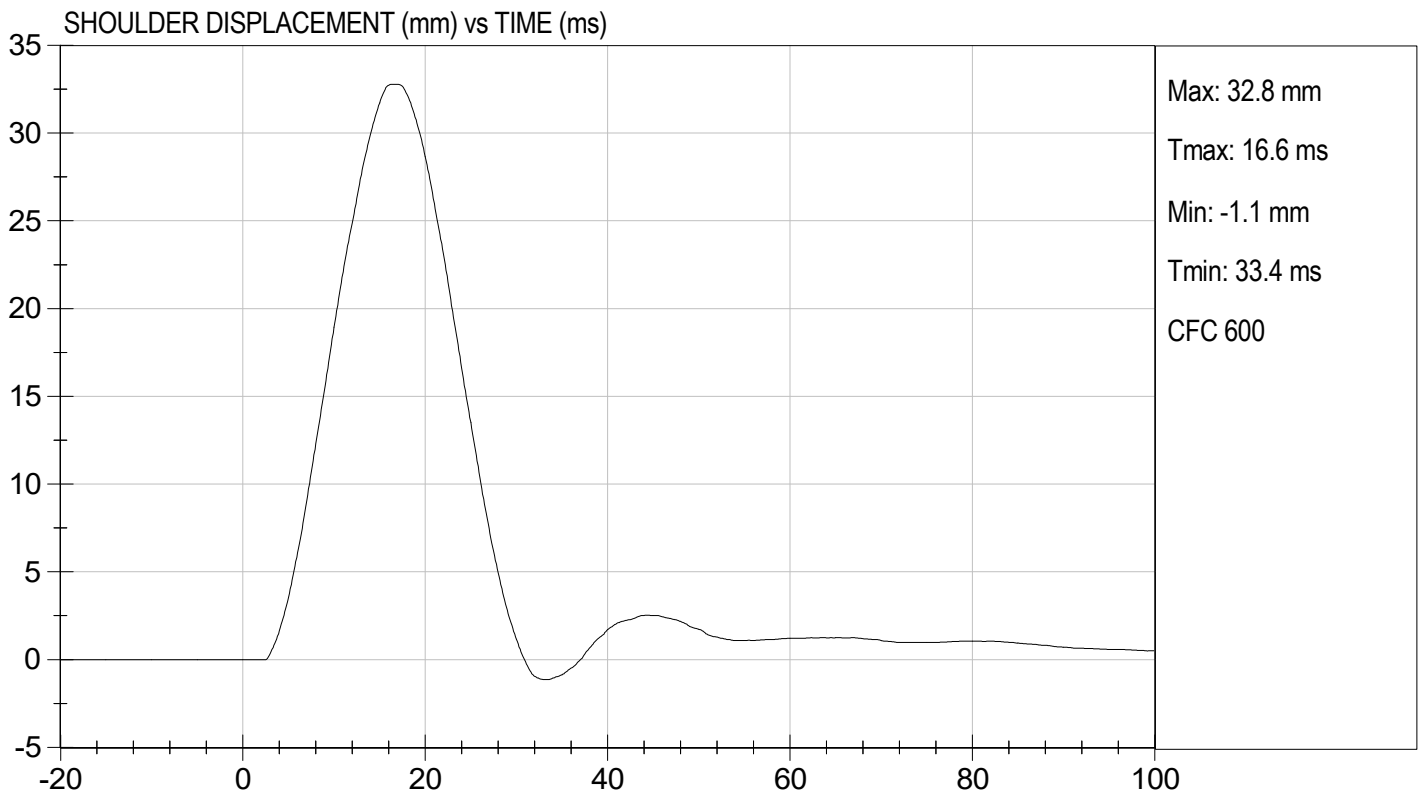
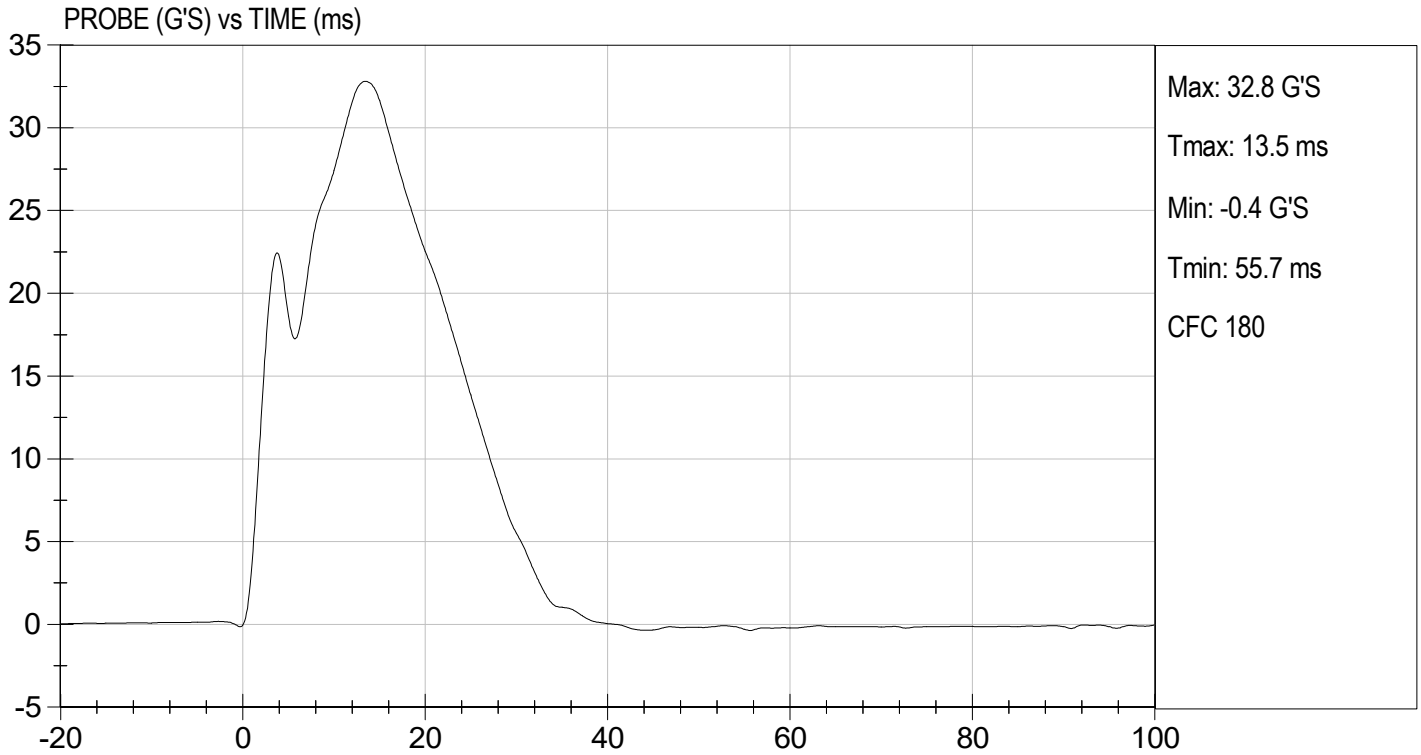
01/27/2023  
Test Date

  
Approved By



TEST DESC: THORAX IMPACT WITH ARM  
VELOCITY: 21.93 ft/s, 6.68 m/s

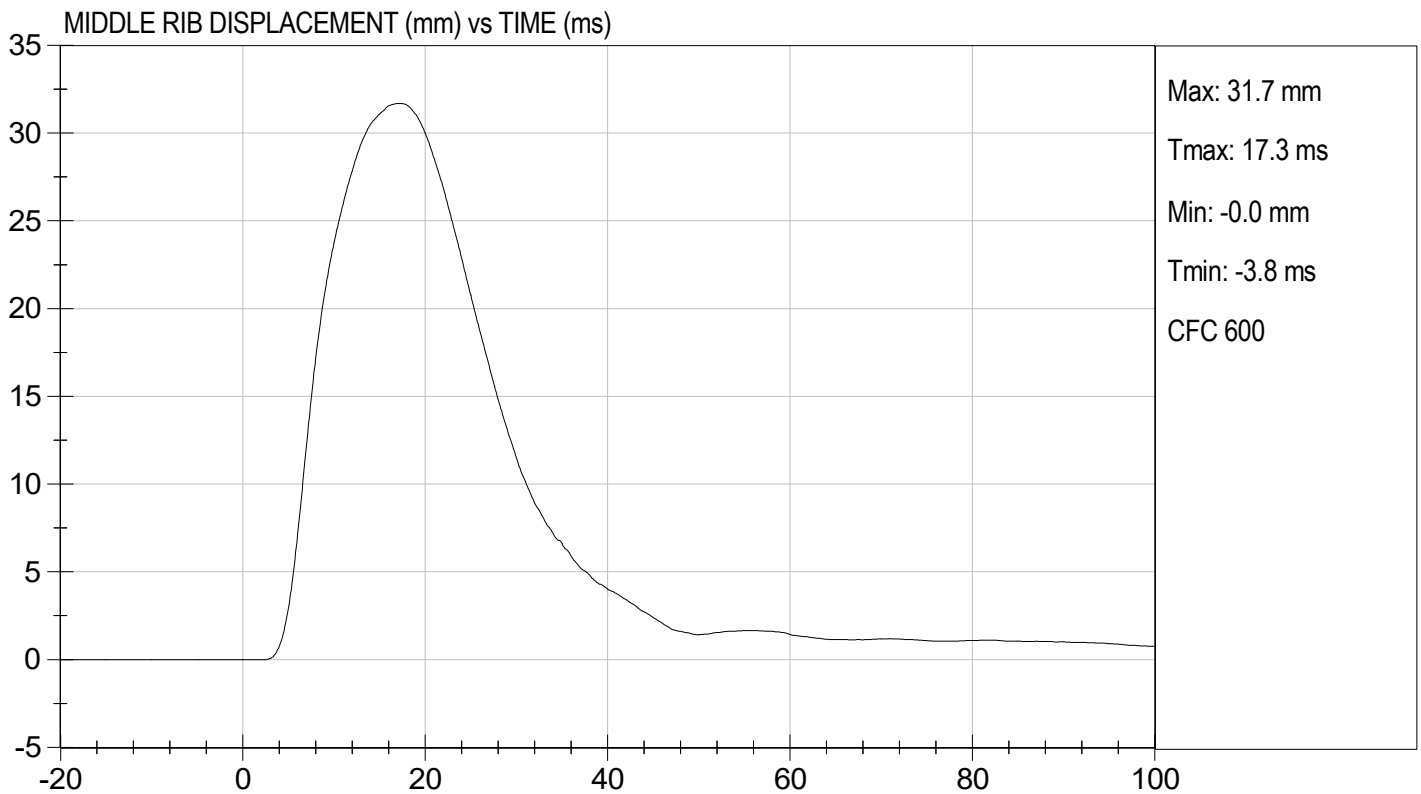
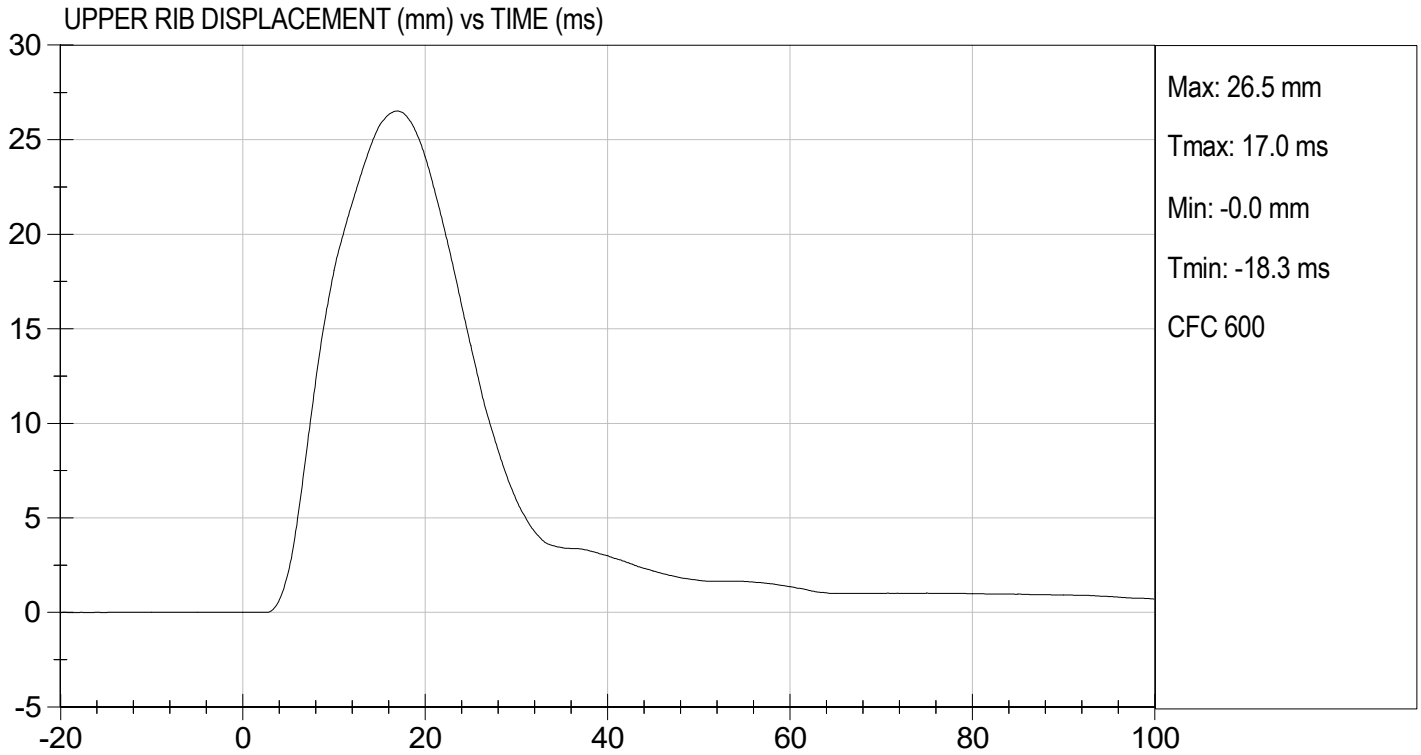
TEST DATE: 01/27/2023  
TEST #: D230254





TEST DESC: THORAX IMPACT WITH ARM  
VELOCITY: 21.93 ft/s, 6.68 m/s

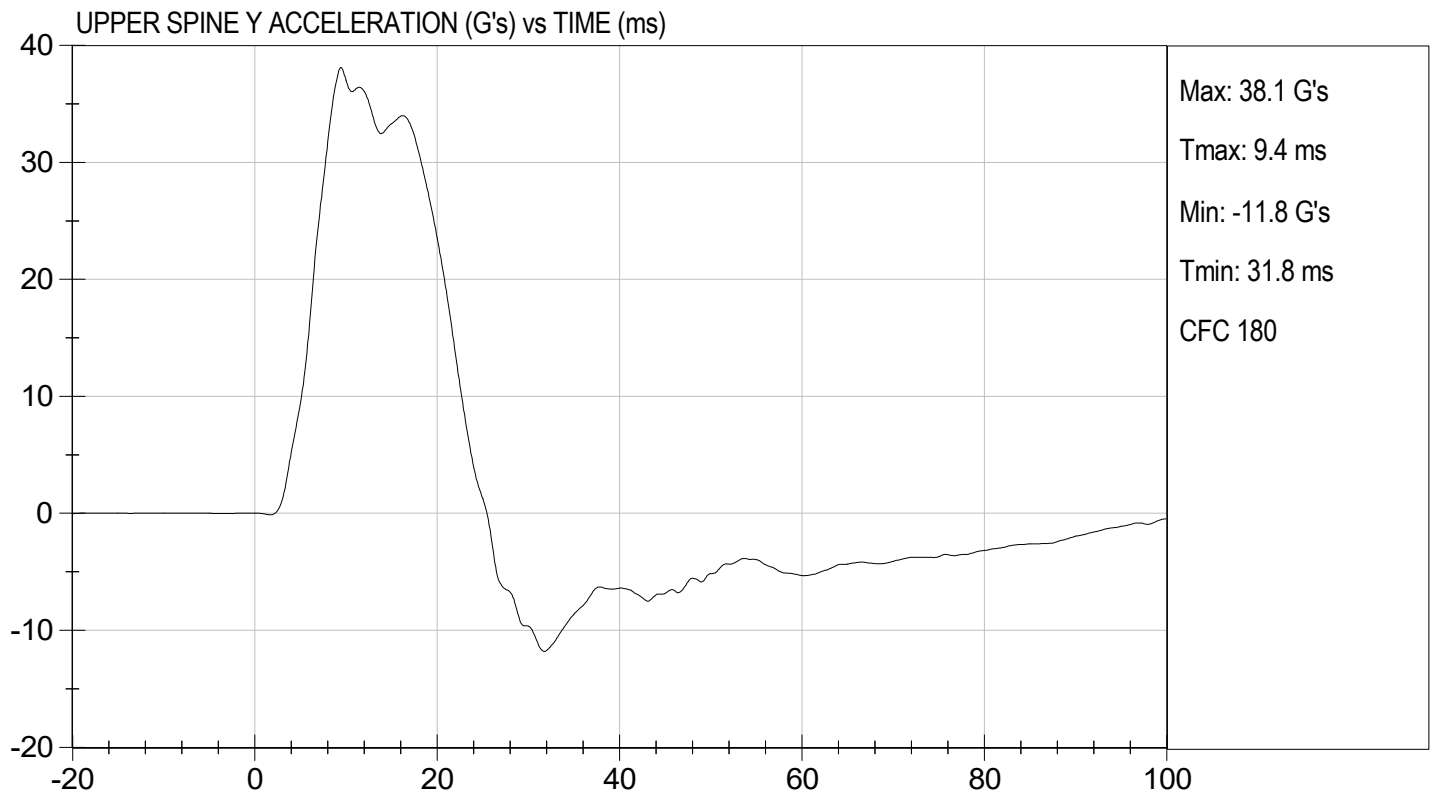
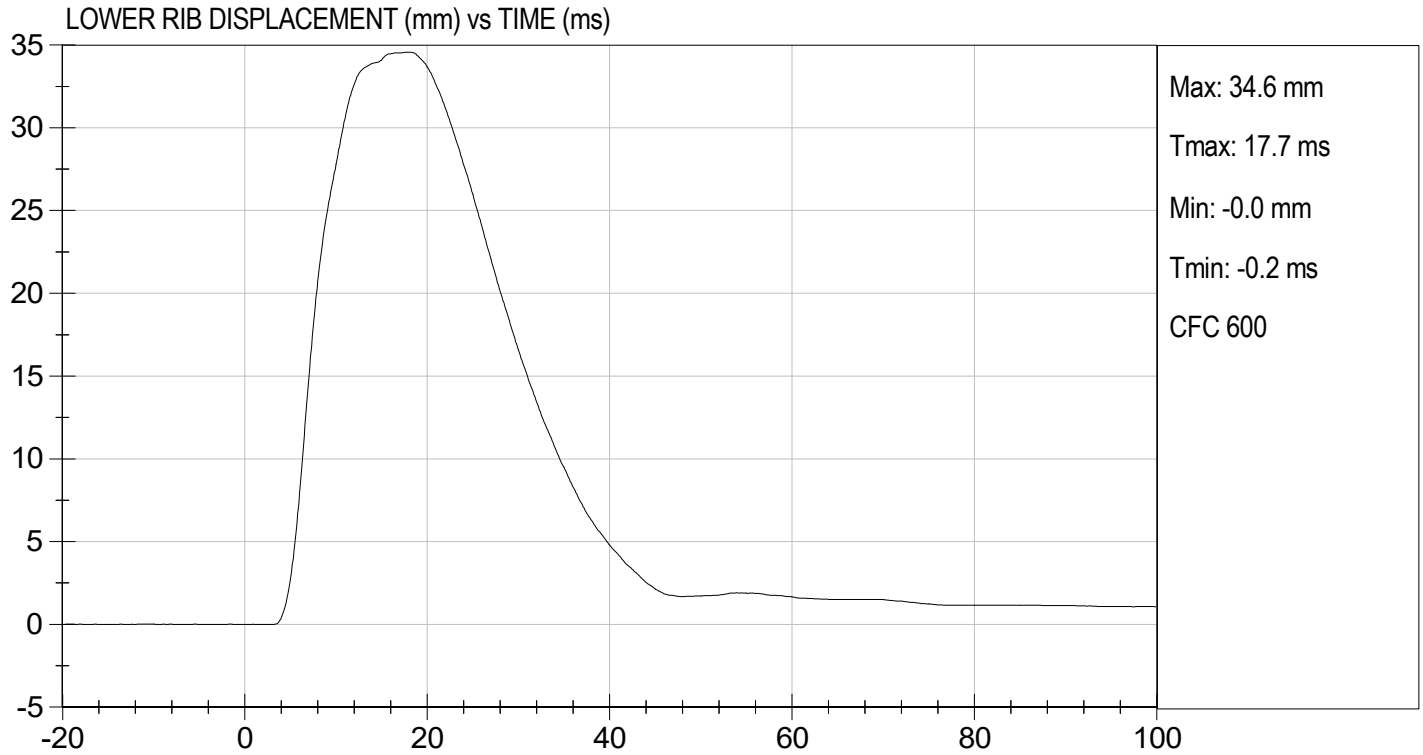
TEST DATE: 01/27/2023  
TEST #: D230254





TEST DESC: THORAX IMPACT WITH ARM  
VELOCITY: 21.93 ft/s, 6.68 m/s

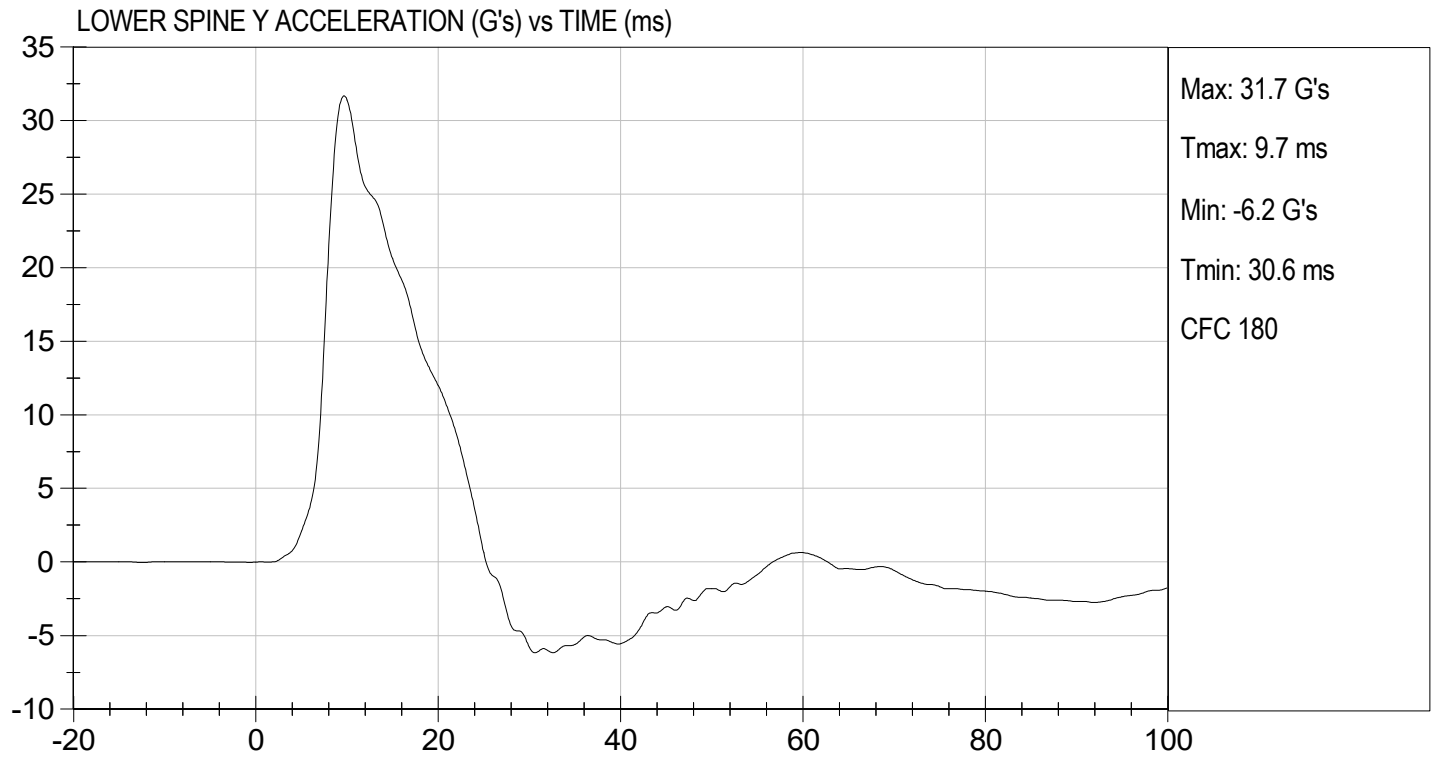
TEST DATE: 01/27/2023  
TEST #: D230254





TEST DESC: THORAX IMPACT WITH ARM  
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 01/27/2023  
TEST #: D230254



**MGA RESEARCH CORPORATION**  
**THORAX (WITHOUT ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

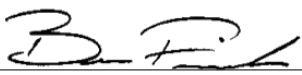
**Test I.D:** D230255

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.4   | Pass      |
| Humidity                         | %     | 10 to 70      | 21     | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.27   | Pass      |
| Maximum Probe Acceleration       | G's   | 14 to 18      | 16     | Pass      |
| Upper Rib Displacement           | mm    | 32 to 40      | 37     | Pass      |
| Middle Rib Displacement          | mm    | 39 to 45      | 42     | Pass      |
| Lower Rib Displacement           | mm    | 35 to 43      | 40     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 13 to 17      | 15     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 7 to 11       | 10     | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

01/27/2023

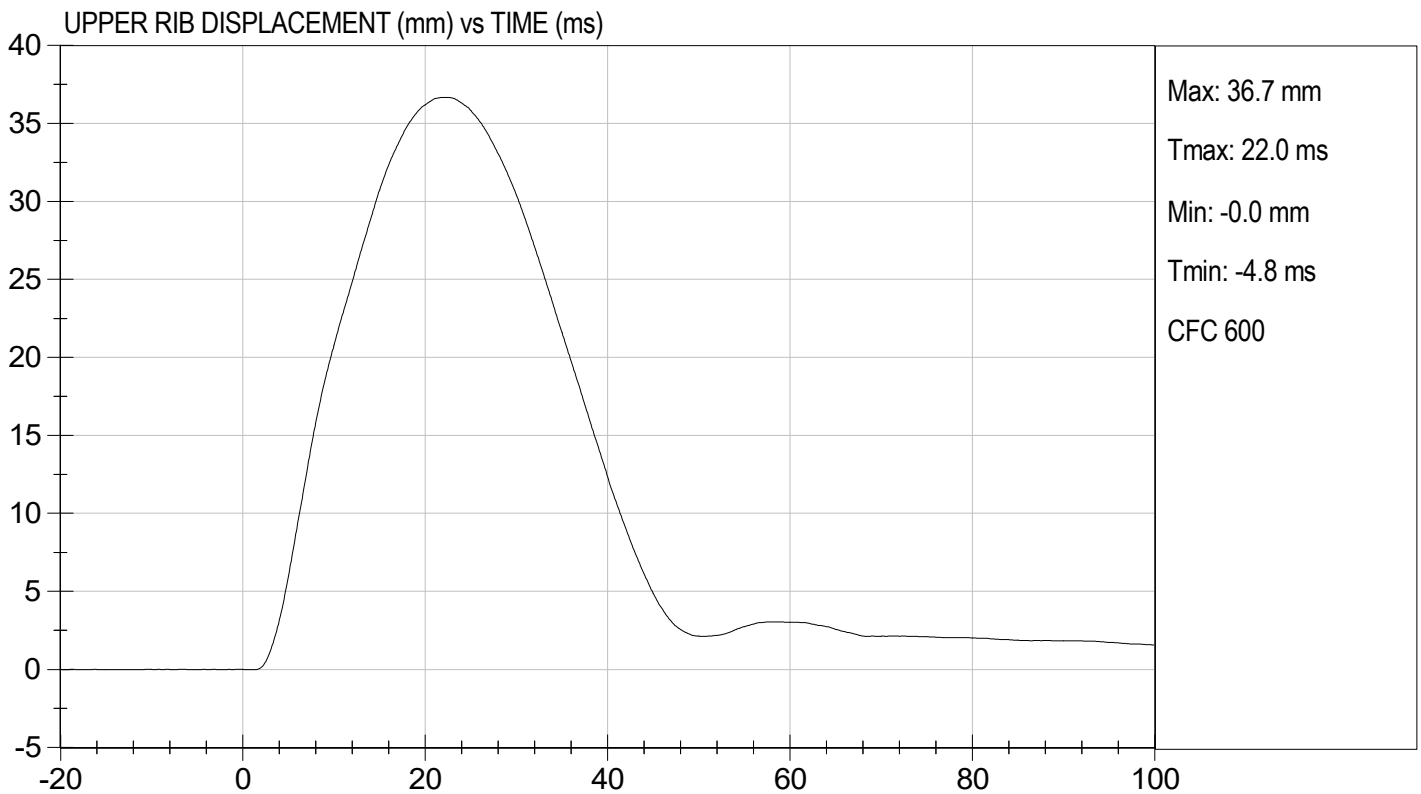
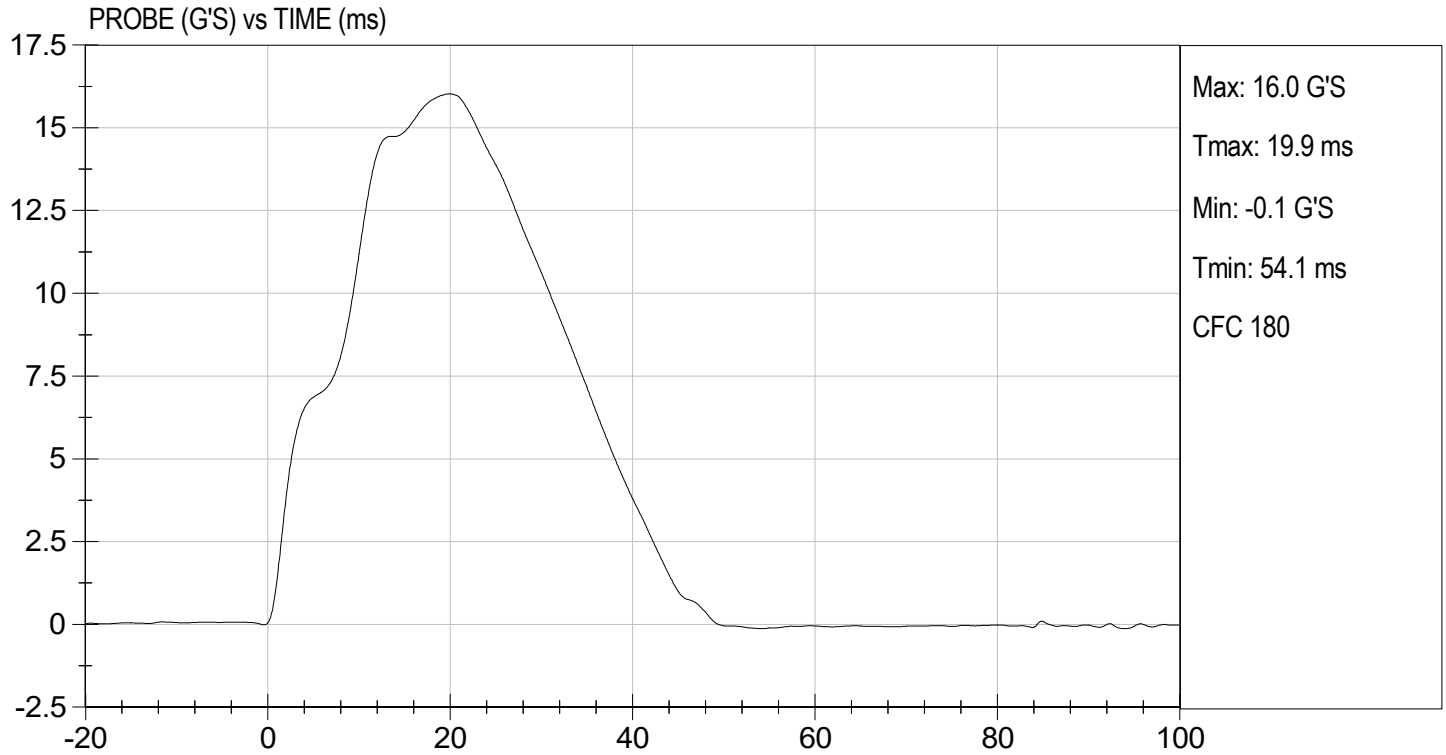
Test Date

  
Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM  
VELOCITY: 14.01 ft/s, 4.27 m/s

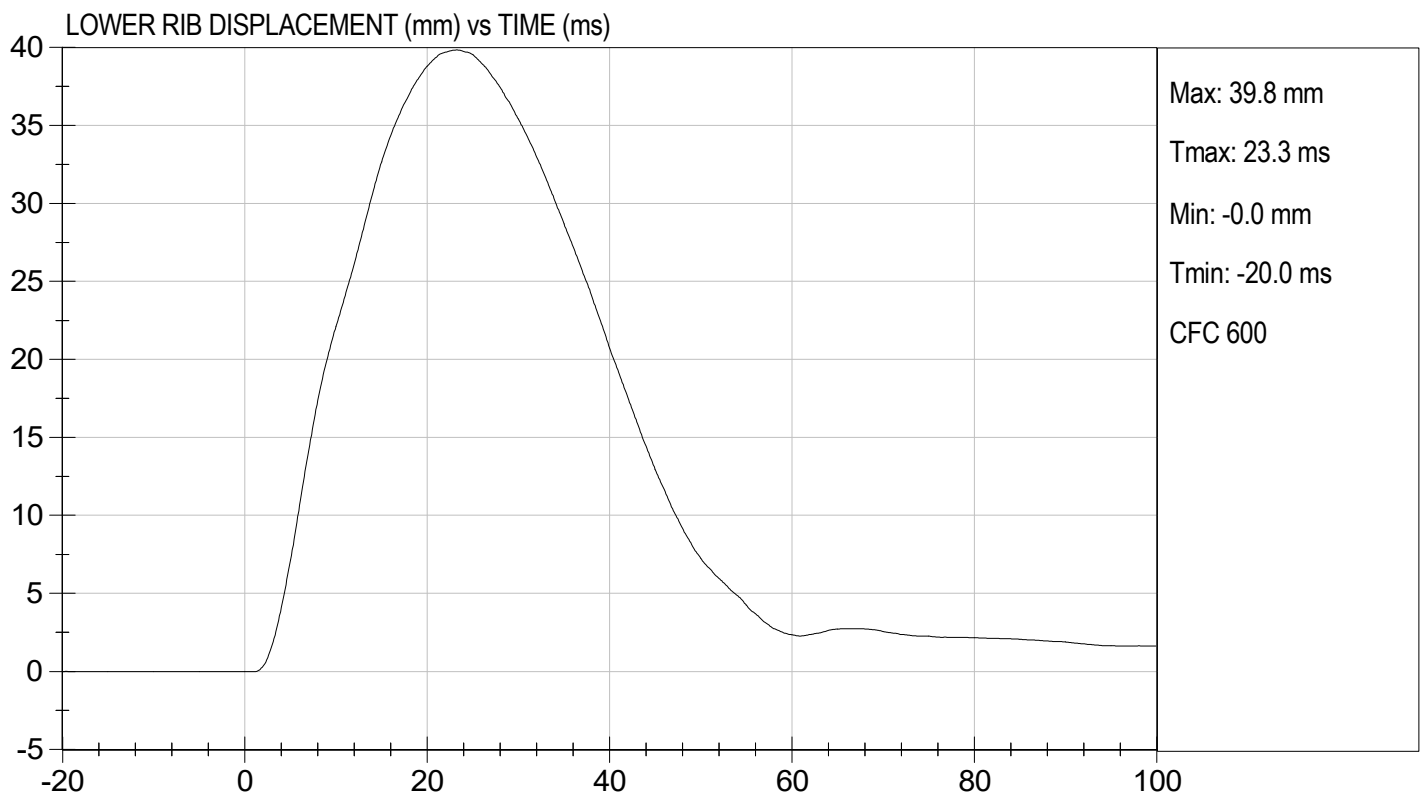
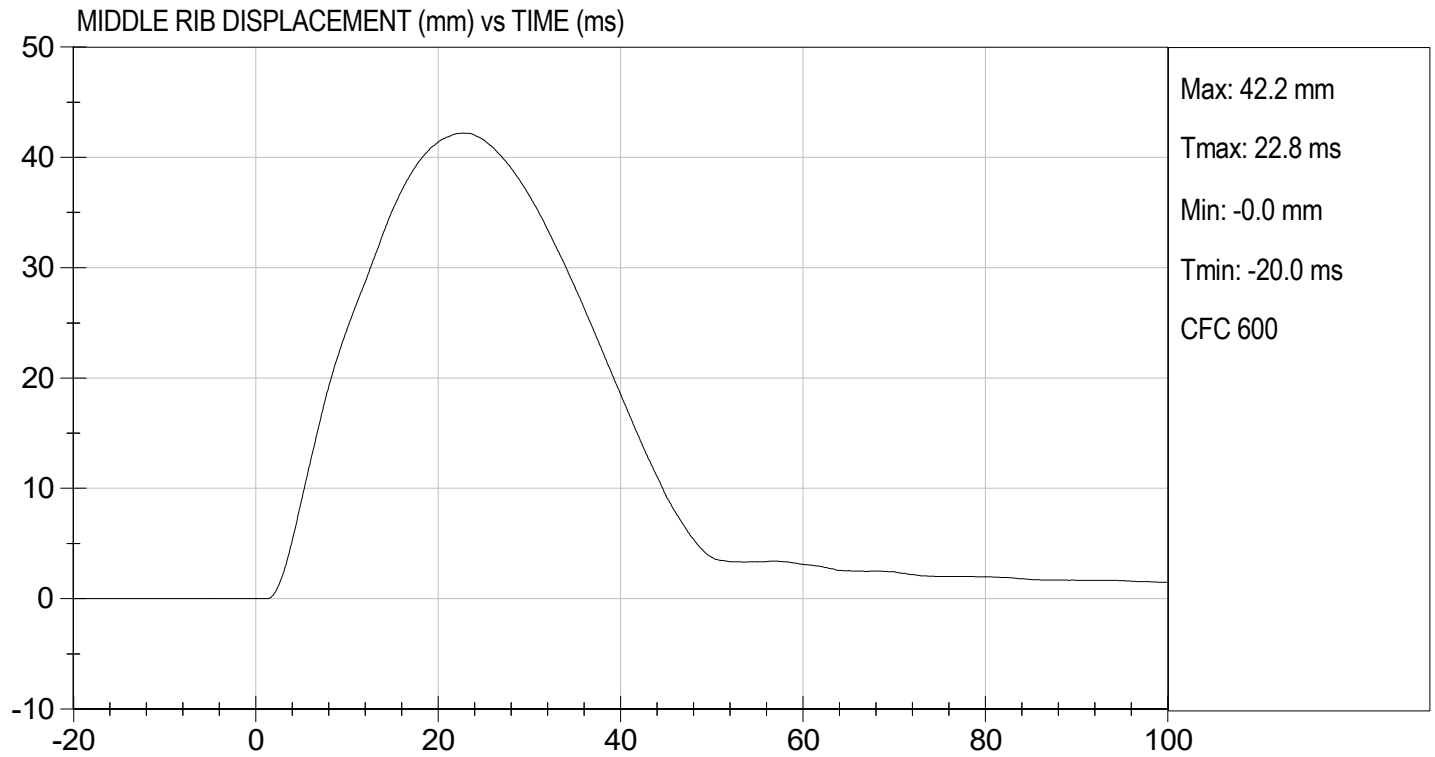
TEST DATE: 01/27/2023  
TEST #: D230255





TEST DESC: THORAX IMPACT WITHOUT ARM  
VELOCITY: 14.01 ft/s, 4.27 m/s

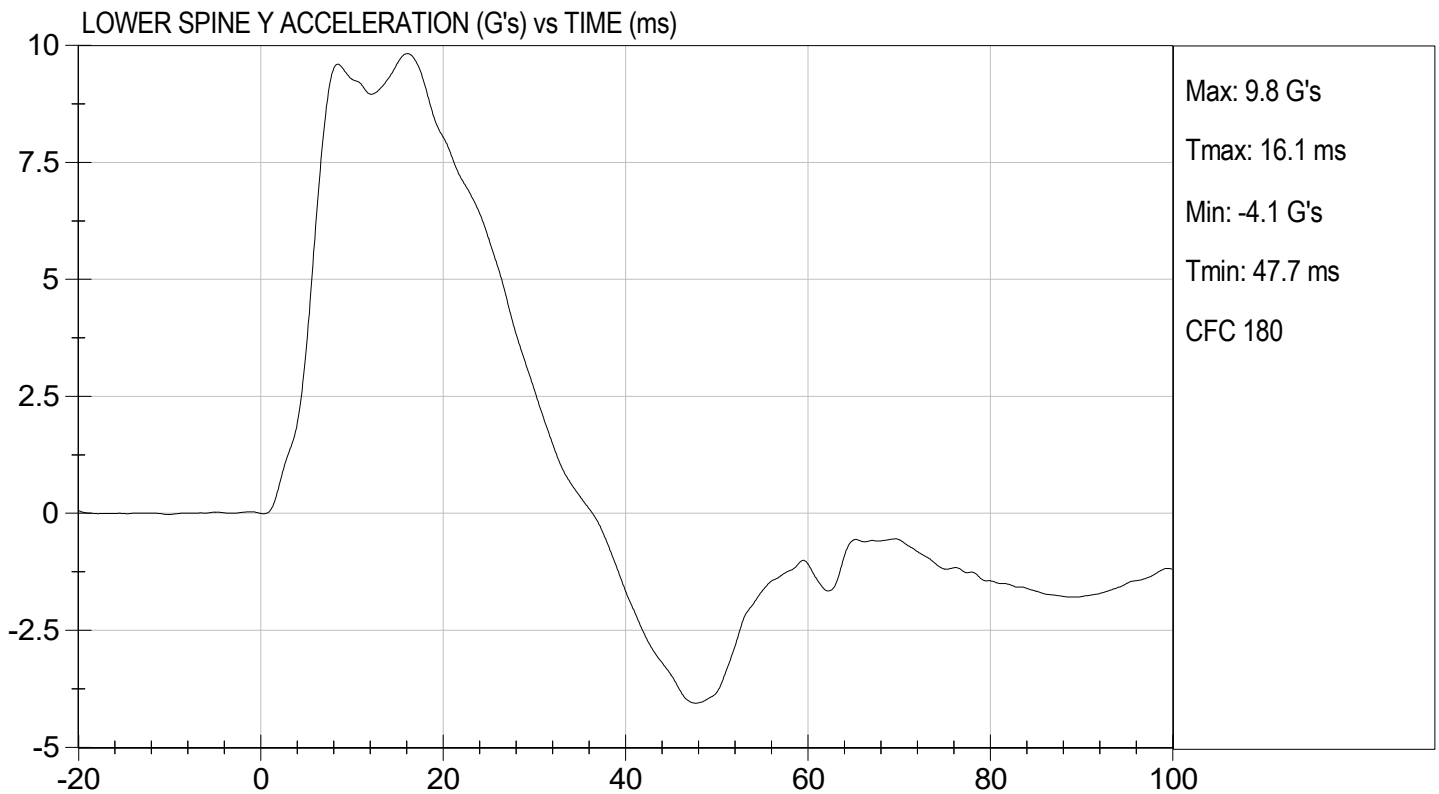
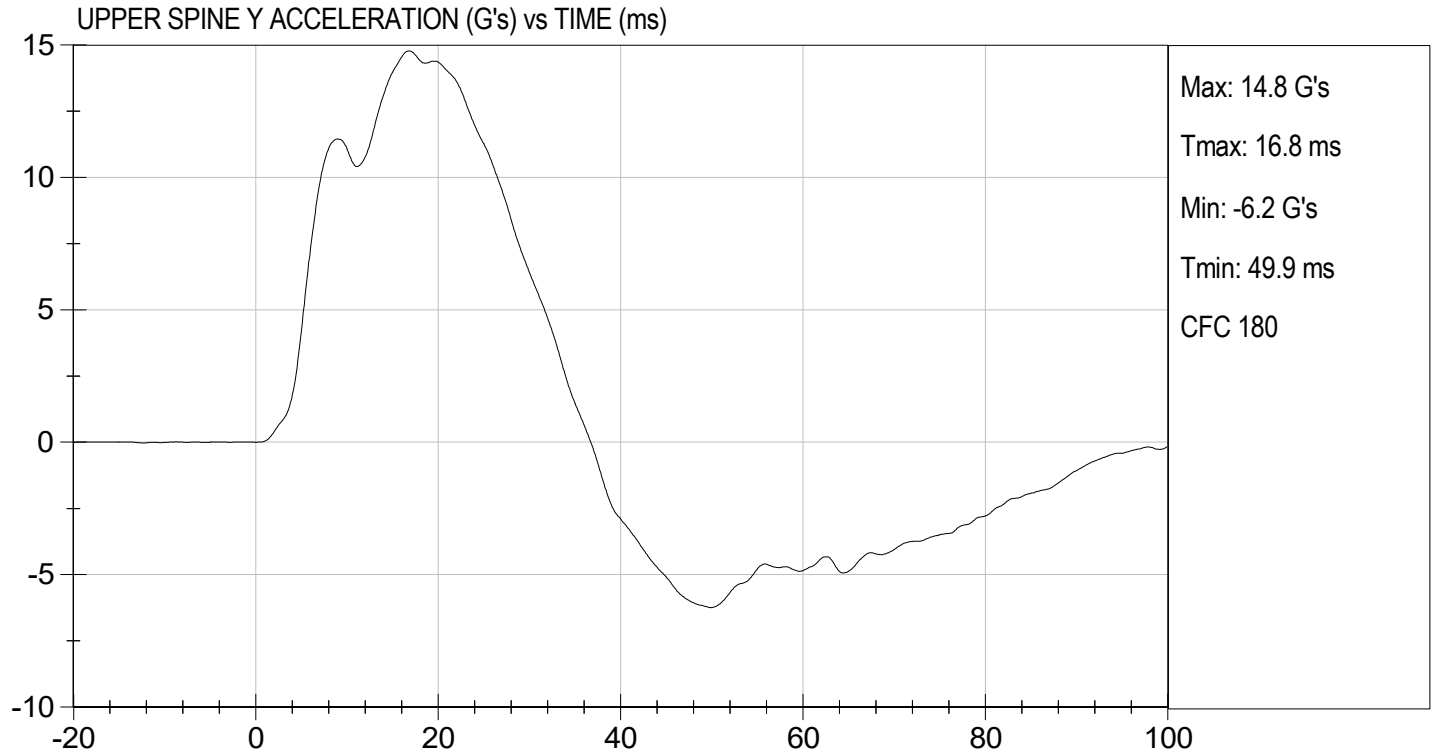
TEST DATE: 01/27/2023  
TEST #: D230255





TEST DESC: THORAX IMPACT WITHOUT ARM  
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 01/27/2023  
TEST #: D230255



**MGA RESEARCH CORPORATION**  
**ABDOMINAL IMPACT TEST**  
**SID-11s BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

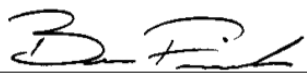
**Test I.D:** D230256

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 22     | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.34   | Pass      |
| Maximum Probe Acceleration       | G's   | 12 to 16      | 14     | Pass      |
| Upper Abdomen Rib Displacement   | mm    | 36 to 47      | 40     | Pass      |
| Lower Abdomen Rib Displacement   | mm    | 33 to 44      | 37     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 9 to 14       | 11     | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

01/27/2023

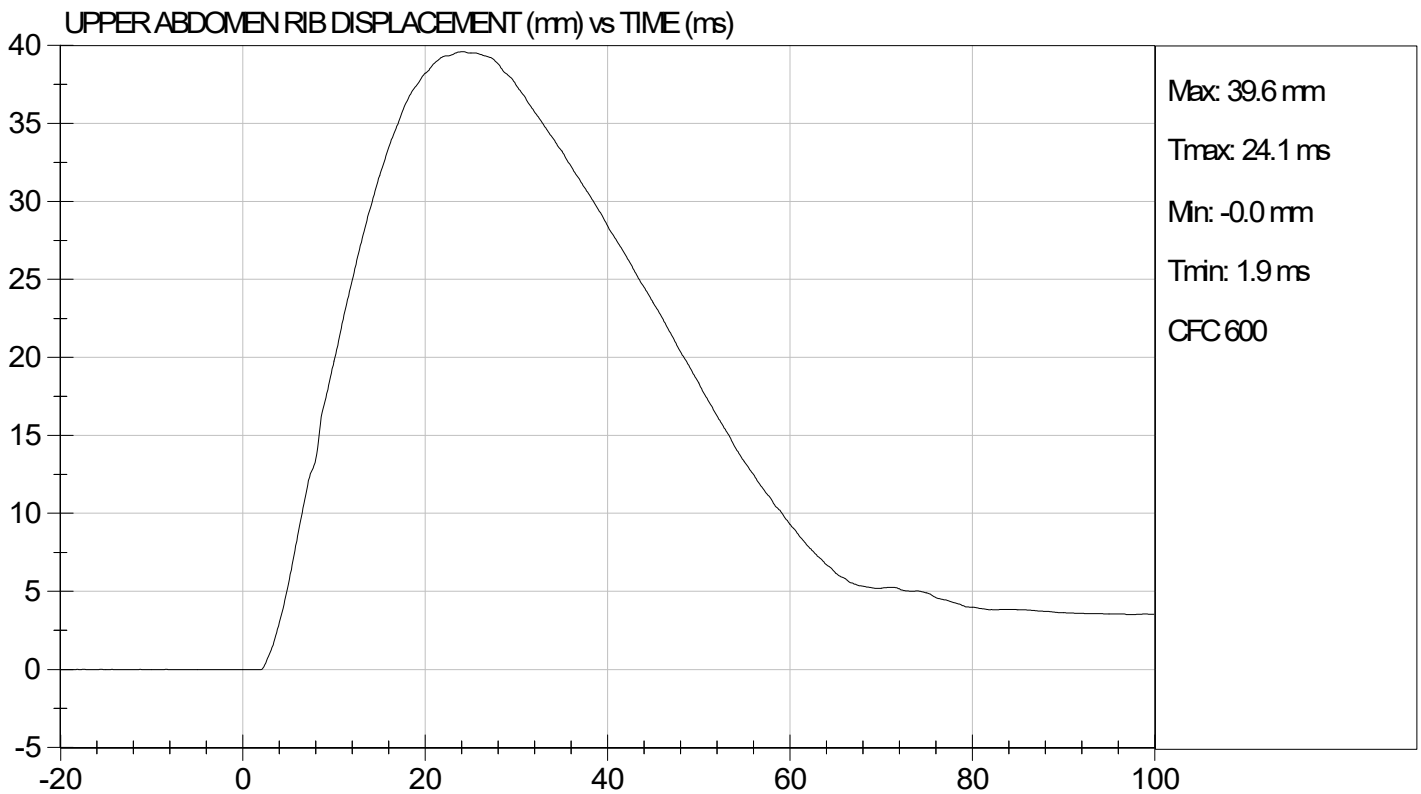
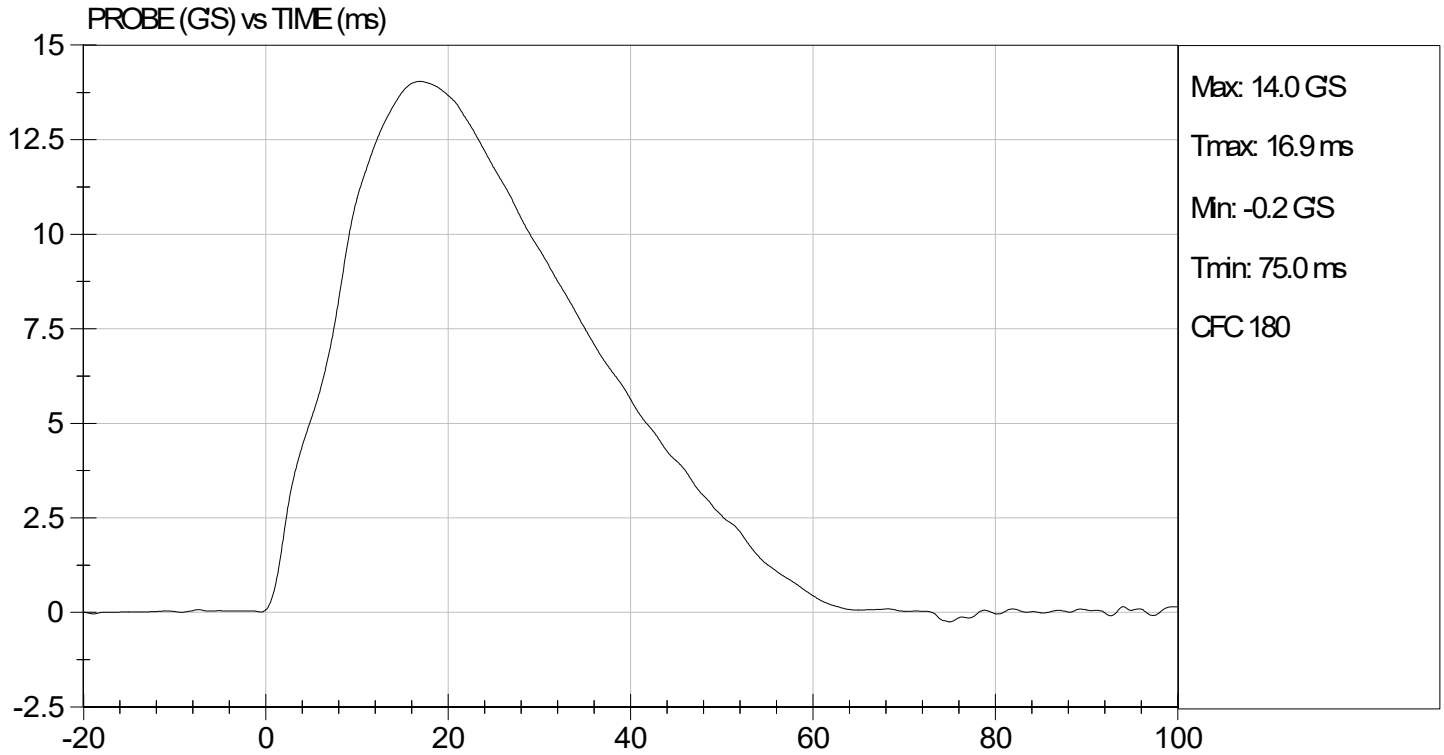
Test Date

  
Approved By



TEST DESC: ABDOMEN IMPACT  
VELOCITY: 14.25 ft/s, 4.34 m/s

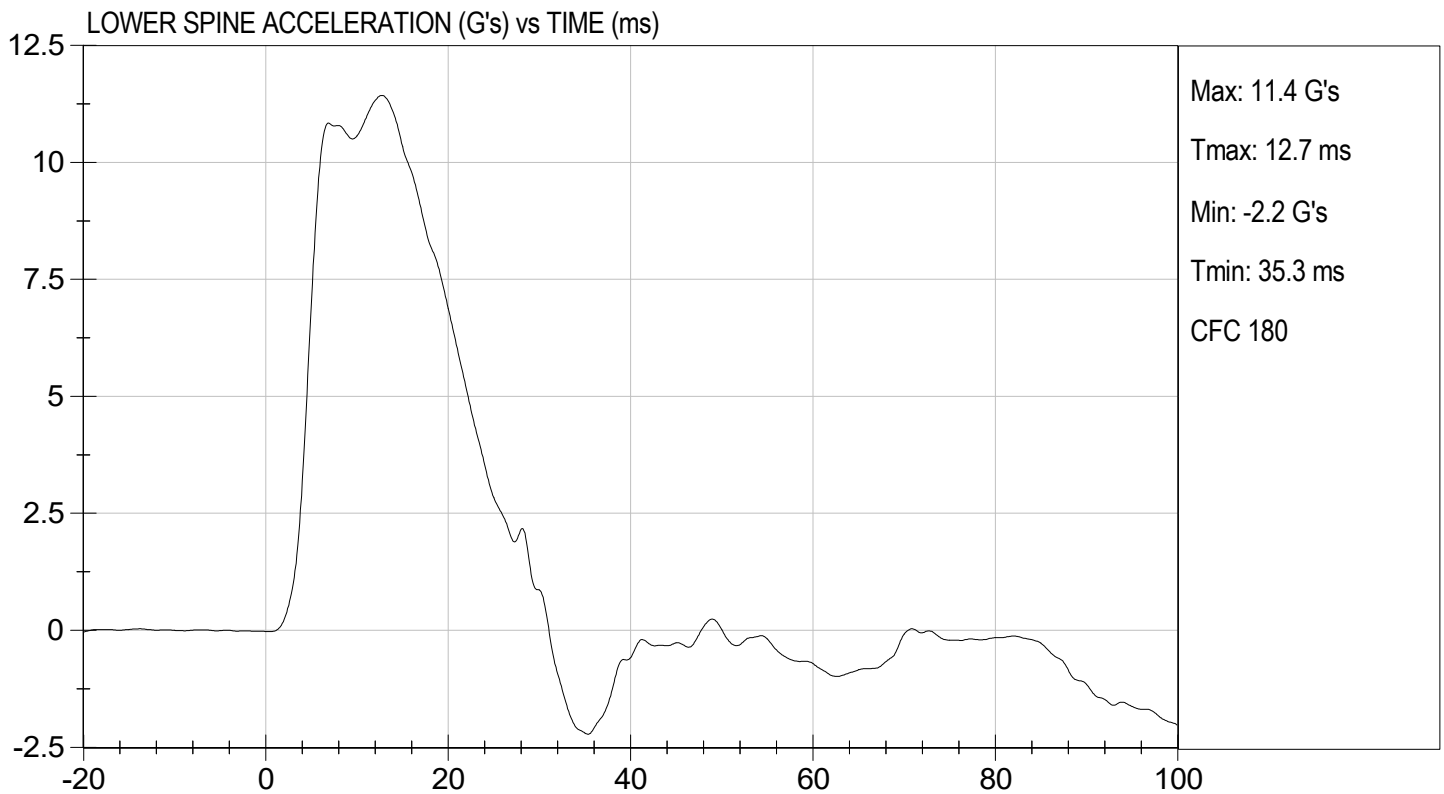
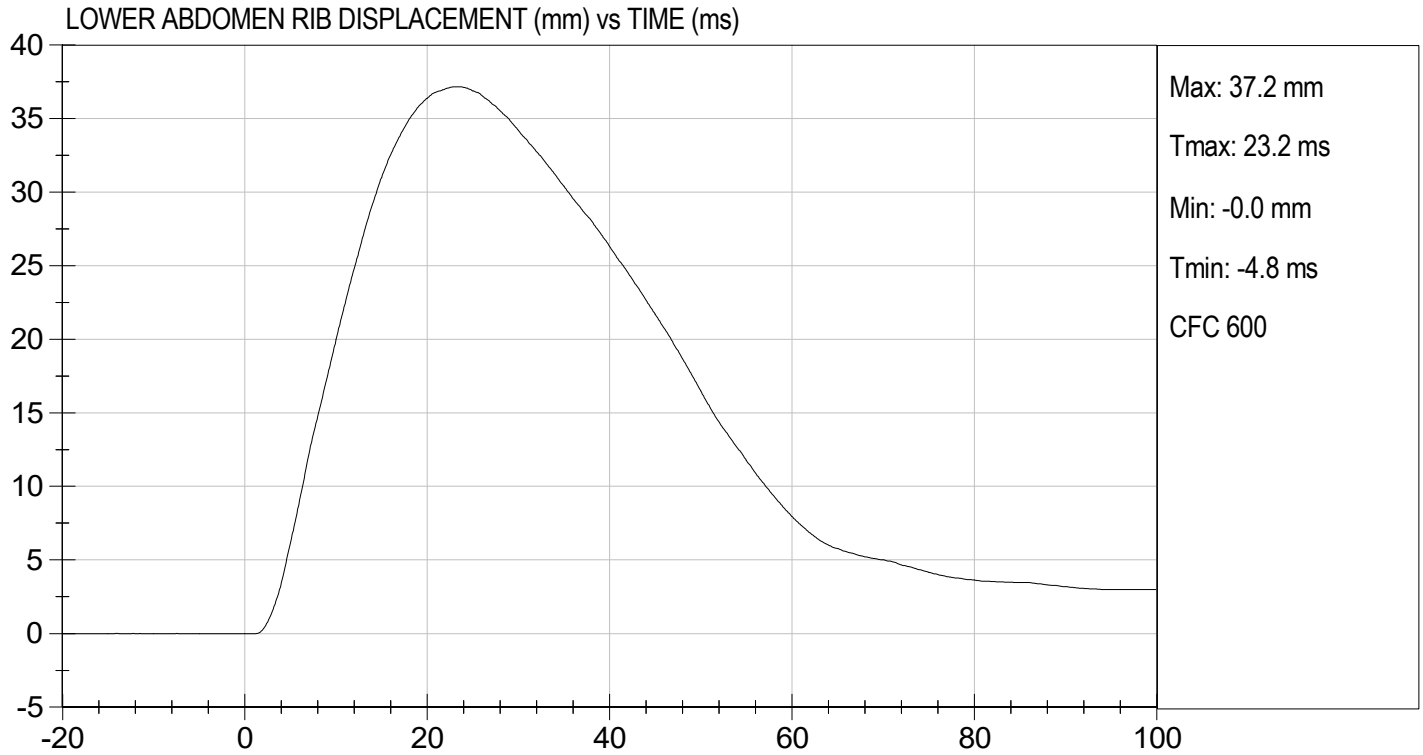
TEST DATE: 01/27/2023  
TEST #: D230256





TEST DESC: ABDOMEN IMPACT  
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 01/27/2023  
TEST #: D230256



**MGA RESEARCH CORPORATION**

**PELVIS IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

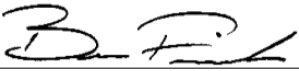
**Test I.D:** D230257

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.5   | Pass      |
| Humidity                         | %     | 10 to 70      | 23     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.68   | Pass      |
| Maximum Probe Acceleration       | G's   | 38 to 47      | 42     | Pass      |
| Pelvis Y Acceleration After 6 ms | G's   | 34 to 42      | 41     | Pass      |
| Peak Acetabulum Force            | N     | 3600 to 4300  | 3,928  | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

01/27/2023

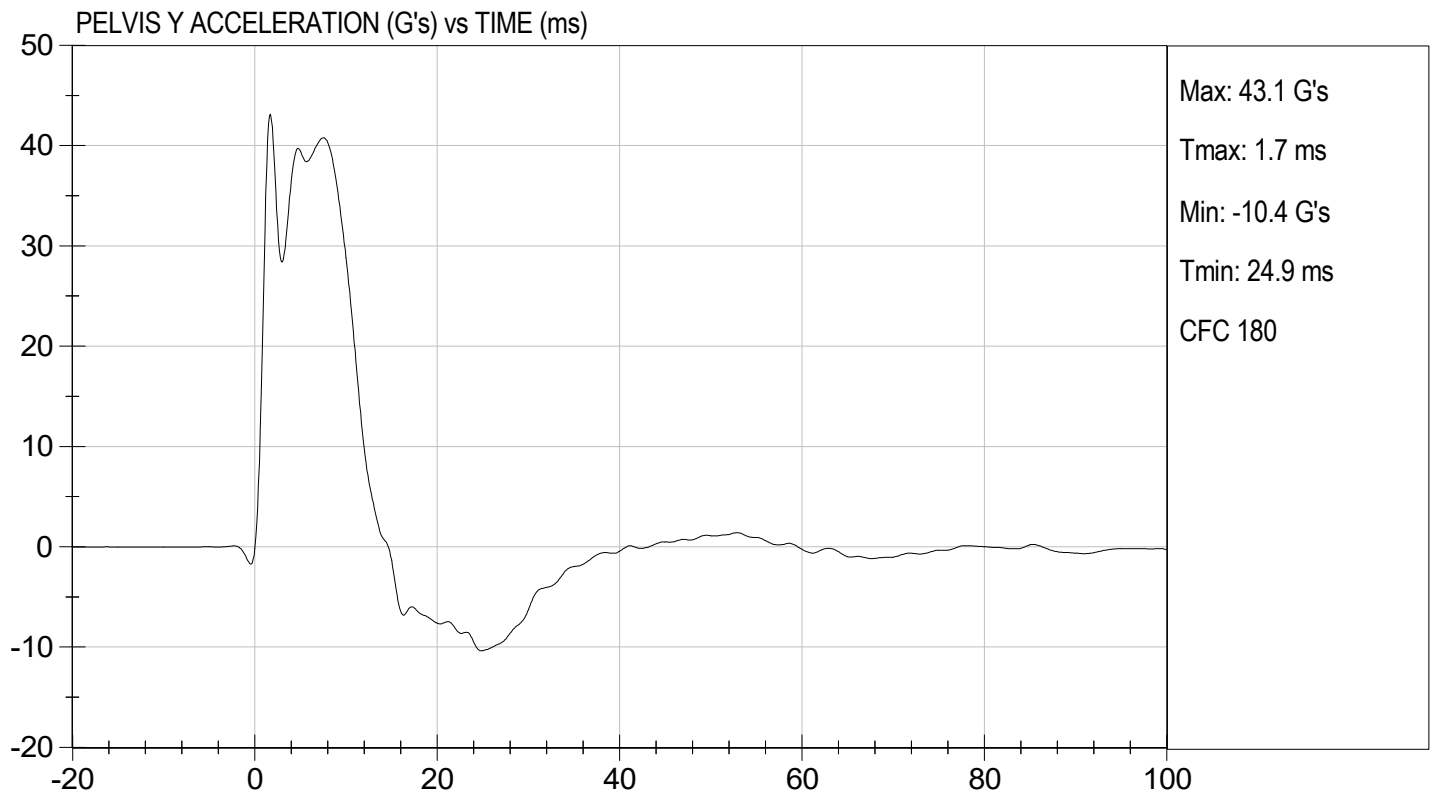
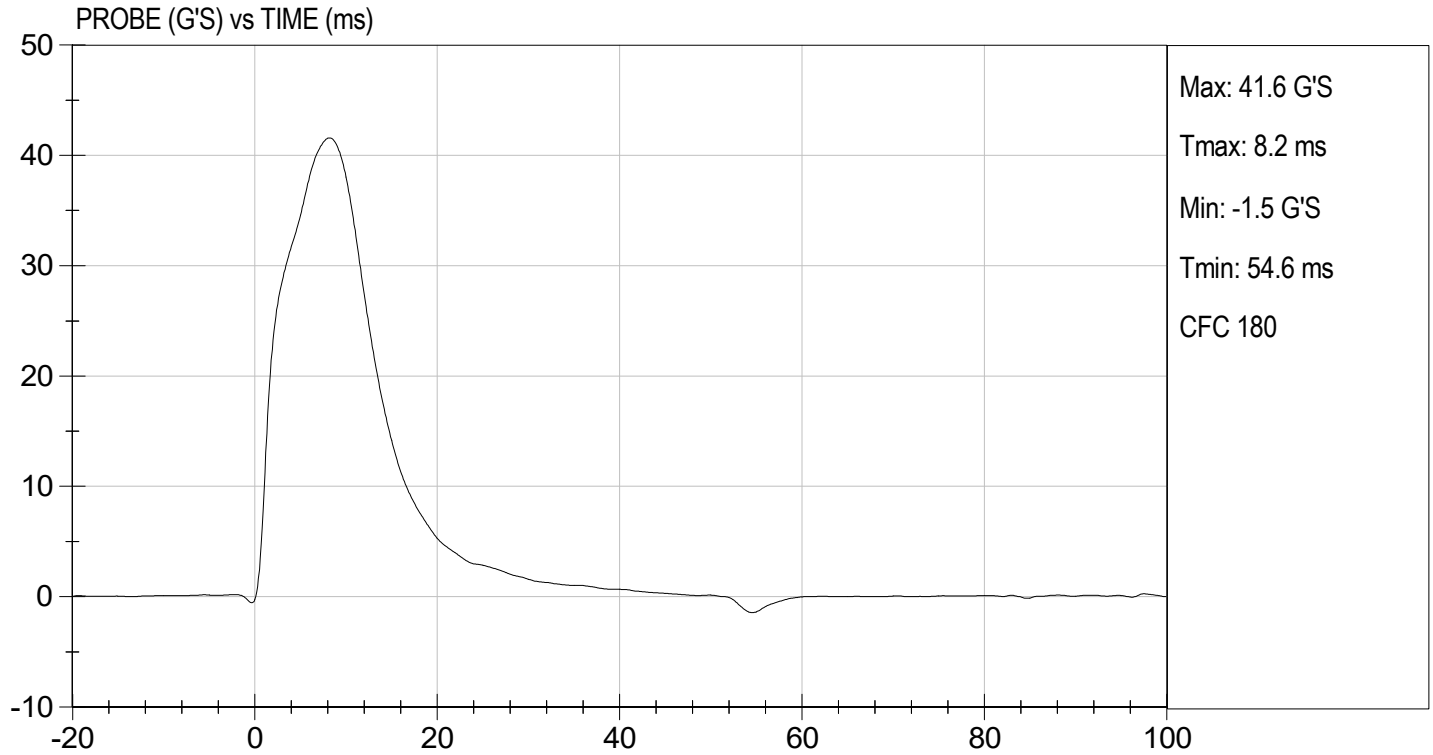
Test Date

  
Approved By



TEST DESC: PELVIS IMPACT  
VELOCITY: 21.93 ft/s, 6.68 m/s

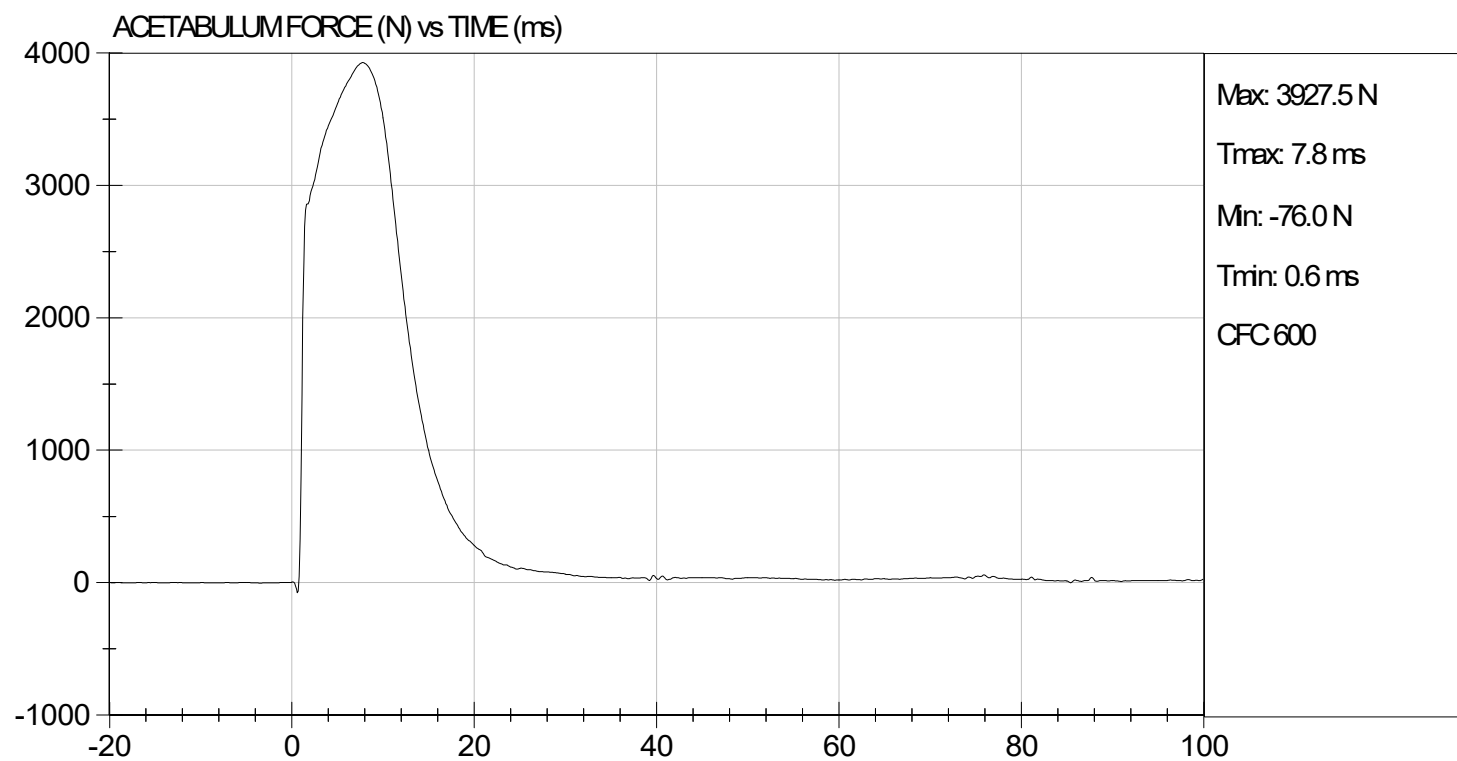
TEST DATE: 01/27/2023  
TEST #: D230257





TEST DESC: PELVIS IMPACT  
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 01/27/2023  
TEST #: D230257



**MGA RESEARCH CORPORATION**

**ILIAC IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

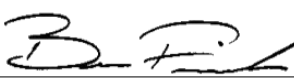
**Test I.D:** D230258

| Tested Parameter           | Units | Specification | Result | Pass/Fail |
|----------------------------|-------|---------------|--------|-----------|
| Temperature                | deg C | 20.6 to 22.2  | 21.6   | Pass      |
| Humidity                   | %     | 10 to 70      | 23     | Pass      |
| Impact Velocity            | m/s   | 4.20 to 4.40  | 4.20   | Pass      |
| Maximum Probe Acceleration | G's   | 36 to 45      | 39     | Pass      |
| Pelvis Y Acceleration      | G's   | 28 to 39      | 31     | Pass      |
| Peak Pelvis Iliac Force    | N     | 4100 to 5100  | 4,546  | Pass      |
| Overall Test Results       |       |               |        | Pass      |

  
Laboratory Technician

01/27/2023

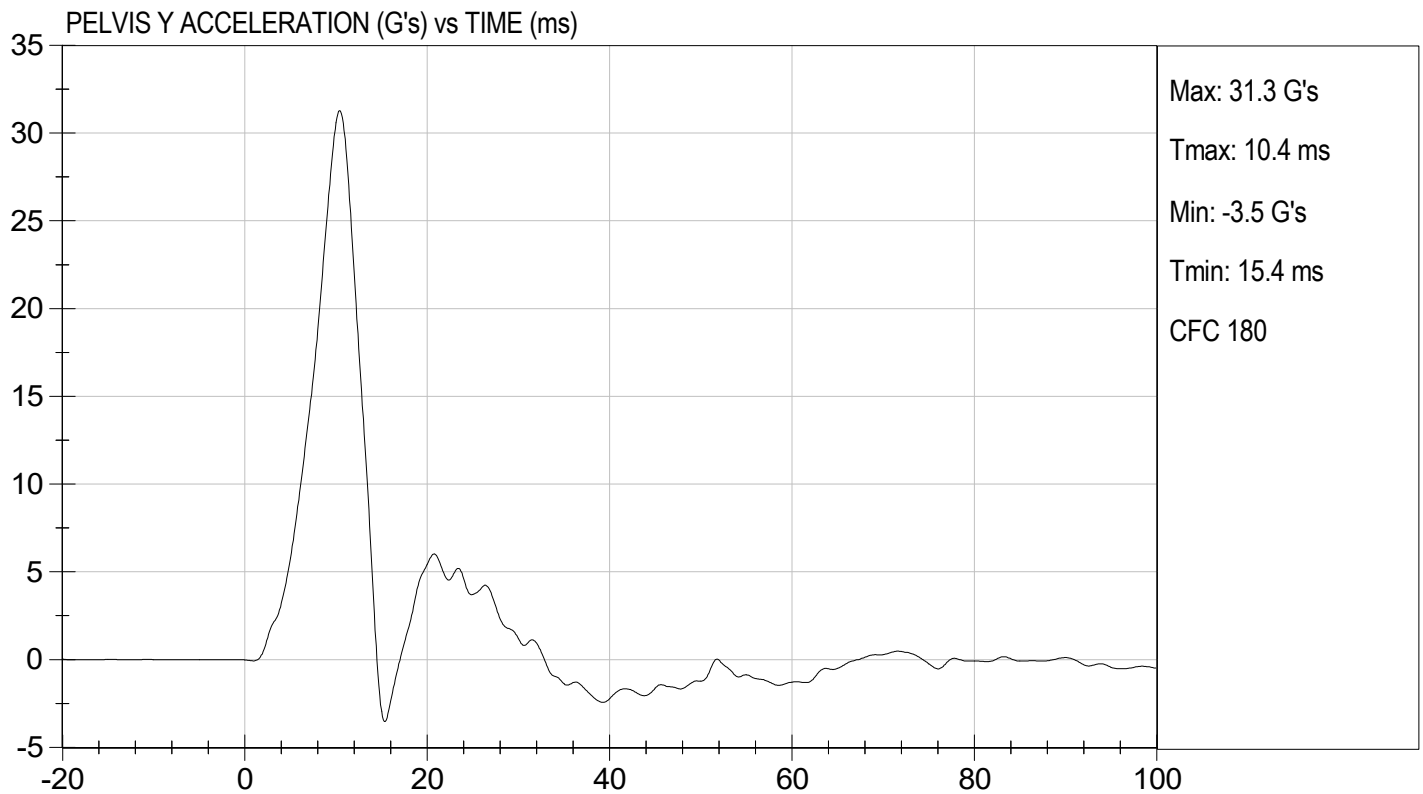
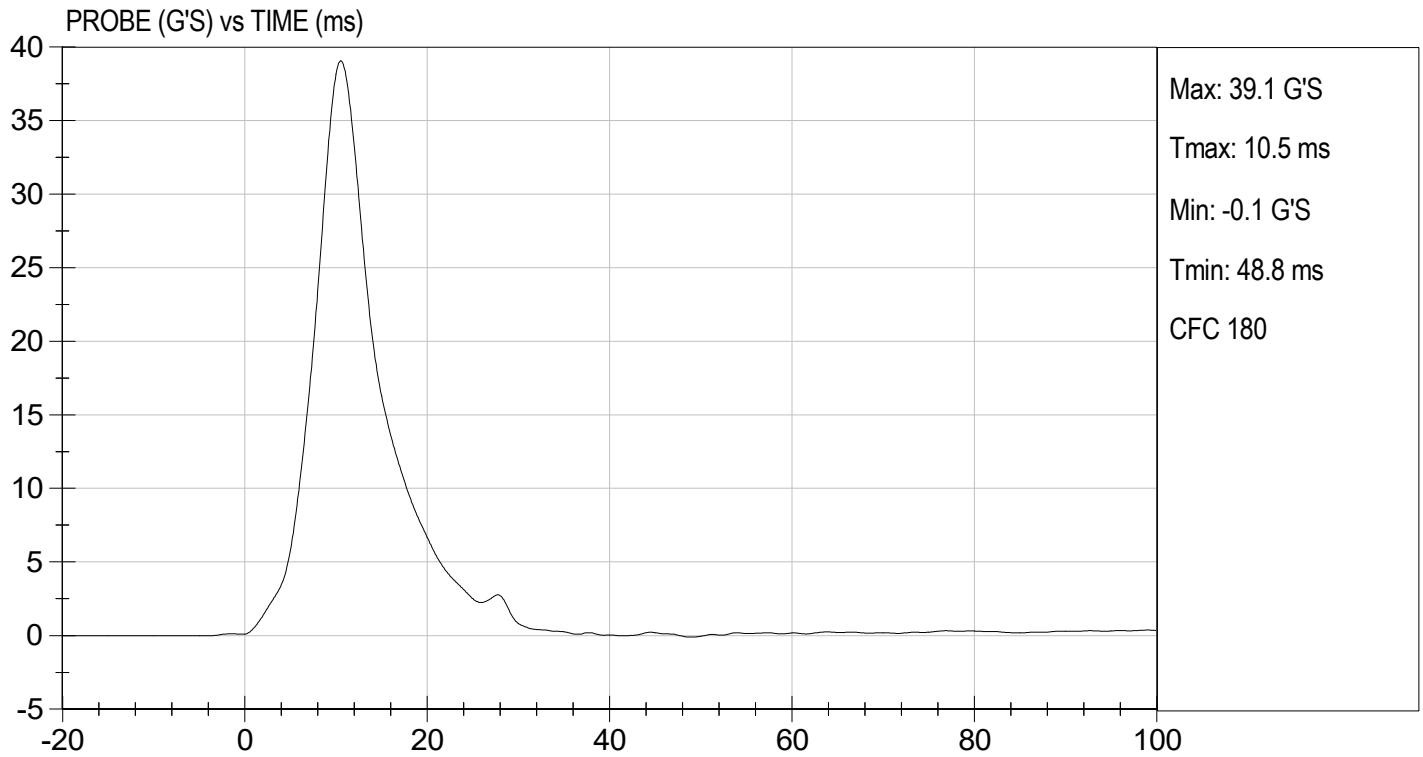
Test Date

  
Approved By



TEST DESC: ILLIAC  
VELOCITY: 13.77 ft/s, 4.20 m/s

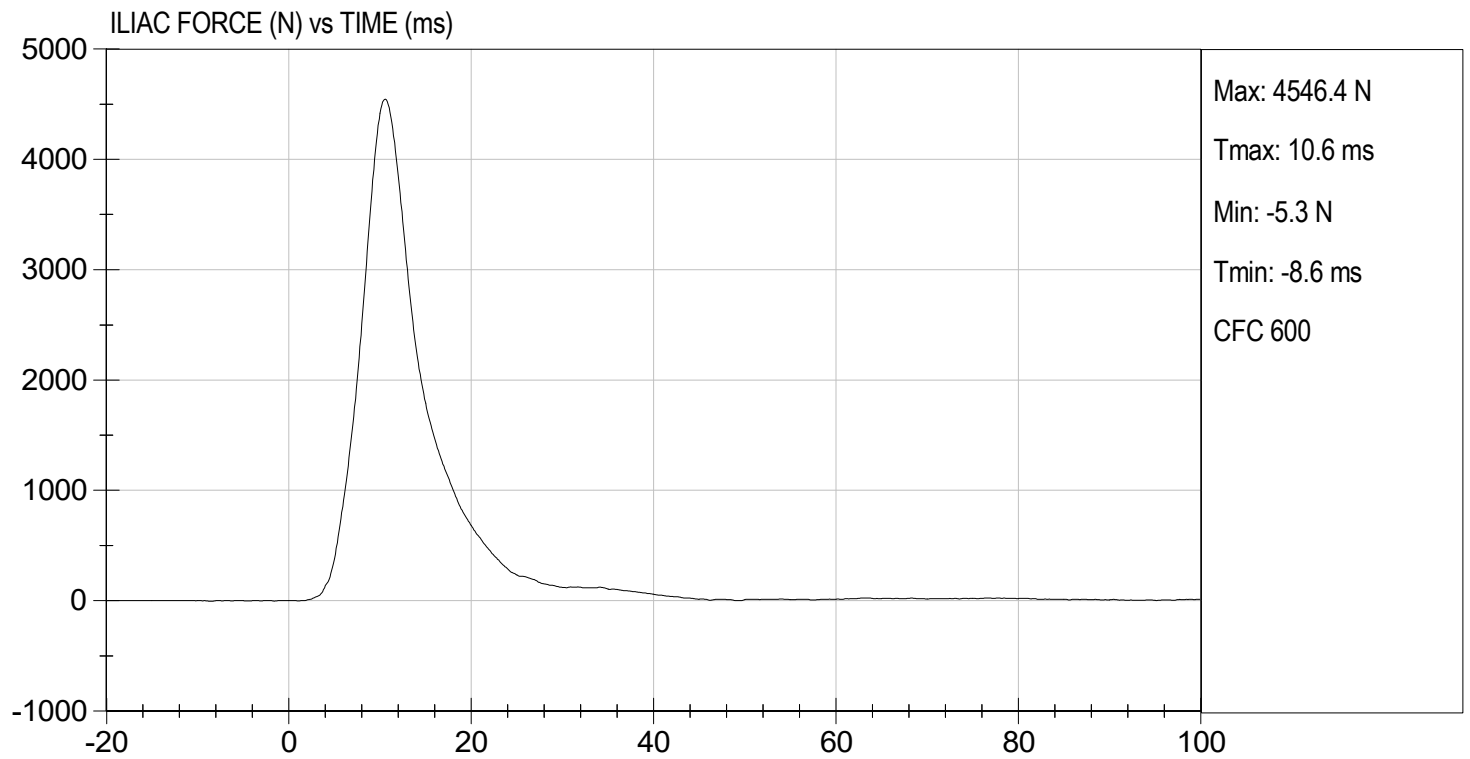
TEST DATE: 01/27/2023  
TEST #: D230258





TEST DESC: ILLIAC  
VELOCITY: 13.77 ft/s, 4.20 m/s

TEST DATE: 01/27/2023  
TEST #: D230258



**QUALIFICATION TEST RESULTS**

**POST-TEST**

**SID-IIS 5<sup>TH</sup> PERCENTILE FEMALE - DRIVER ATD**

**SID-IIsD External Measurements**  
**SN: 296**

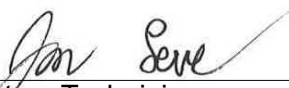
| <b>No.</b> | <b>Name</b>                   | <b>Spec. (mm)</b> | <b>Result</b> | <b>Pass/Fail</b> |
|------------|-------------------------------|-------------------|---------------|------------------|
| <b>A</b>   | Sitting Height                | 772 - 788         | 784           | Pass             |
| <b>B</b>   | Shoulder Pivot Height         | 437 - 453         | 442           | Pass             |
| <b>C</b>   | H-point Height                | 79 - 89           | 83            | Pass             |
| <b>D</b>   | H-point from Seatback         | 141 - 151         | 145           | Pass             |
| <b>E</b>   | Shoulder Pivot from Backline  | 97 - 107          | 99            | Pass             |
| <b>F</b>   | Thigh Clearance               | 119 -135          | 121           | Pass             |
| <b>G</b>   | Head Breadth                  | 140 - 148         | 142           | Pass             |
| <b>H</b>   | Head Back from Backline       | 40 - 46           | 45            | Pass             |
| <b>I</b>   | Head Depth                    | 178 - 188         | 180           | Pass             |
| <b>J</b>   | Head Circumference            | 541 - 551         | 548           | Pass             |
| <b>K</b>   | Buttock to Knee Length        | 514 - 540         | 535           | Pass             |
| <b>L</b>   | Popliteal Height              | 343 - 369         | 358           | Pass             |
| <b>M</b>   | Knee Pivot to Floor Height    | 392 - 409         | 404           | Pass             |
| <b>N</b>   | Buttock Popliteal Length      | 416 - 442         | 435           | Pass             |
| <b>O</b>   | Chest Depth w/o Jacket        | 195 - 211         | 206           | Pass             |
| <b>P</b>   | Foot Length                   | 216 - 232         | 219           | Pass             |
| <b>Q</b>   | Hip Breadth (w/ pelvic plugs) | 313 - 323         | 316           | Pass             |
| <b>R</b>   | Arm Length                    | 249 - 259         | 250           | Pass             |
| <b>S</b>   | Knee Joint to Seatback        | 477 - 493         | 481           | Pass             |
| <b>V</b>   | Shoulder Width                | 341 - 357         | 346           | Pass             |
| <b>W</b>   | Foot Width                    | 78 - 94           | 85            | Pass             |
| <b>Y</b>   | Chest Circumference w/ jacket | 851 - 881         | 870           | Pass             |
| <b>Z</b>   | Waist Circumference           | 761 - 791         | 772           | Pass             |

**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

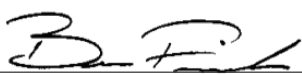
**ATD Serial No:** 296

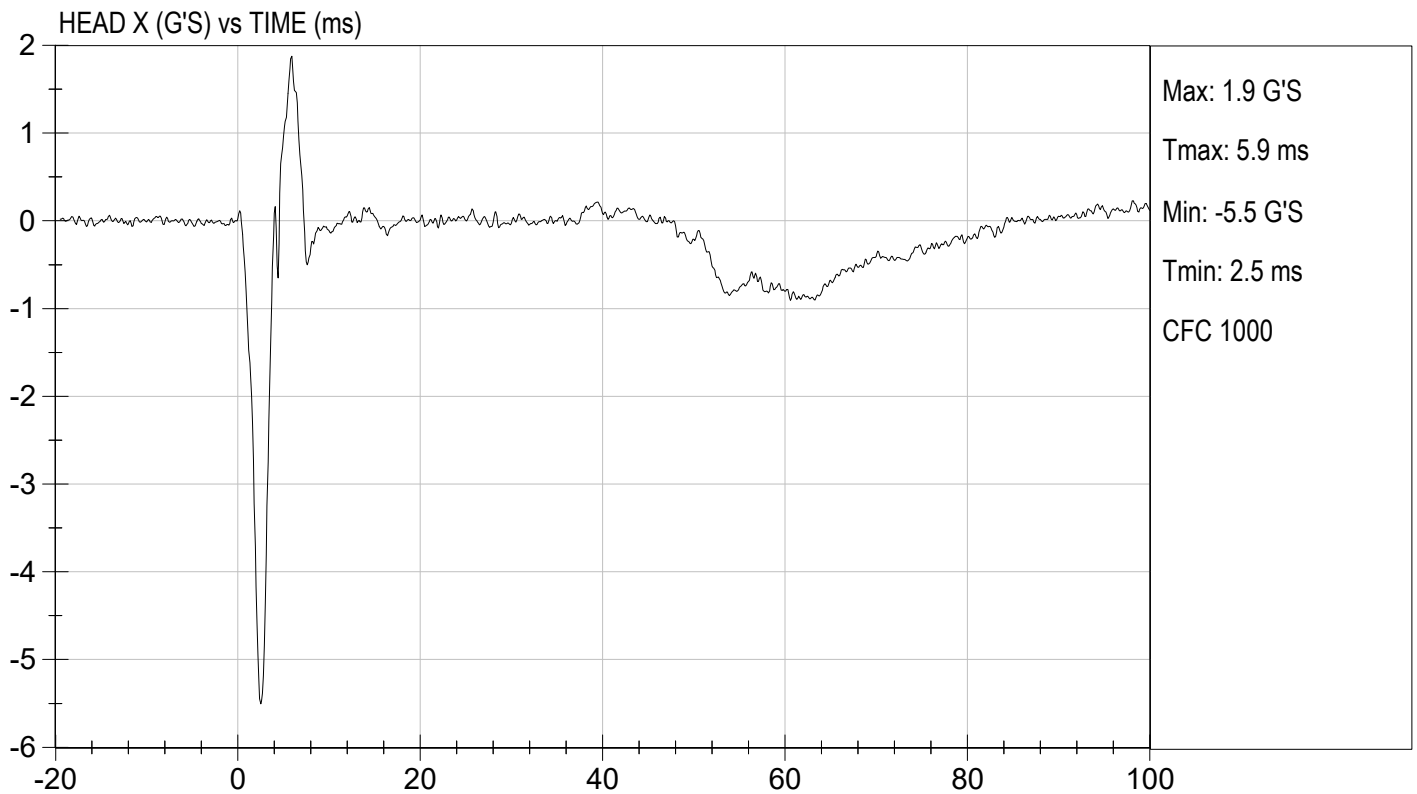
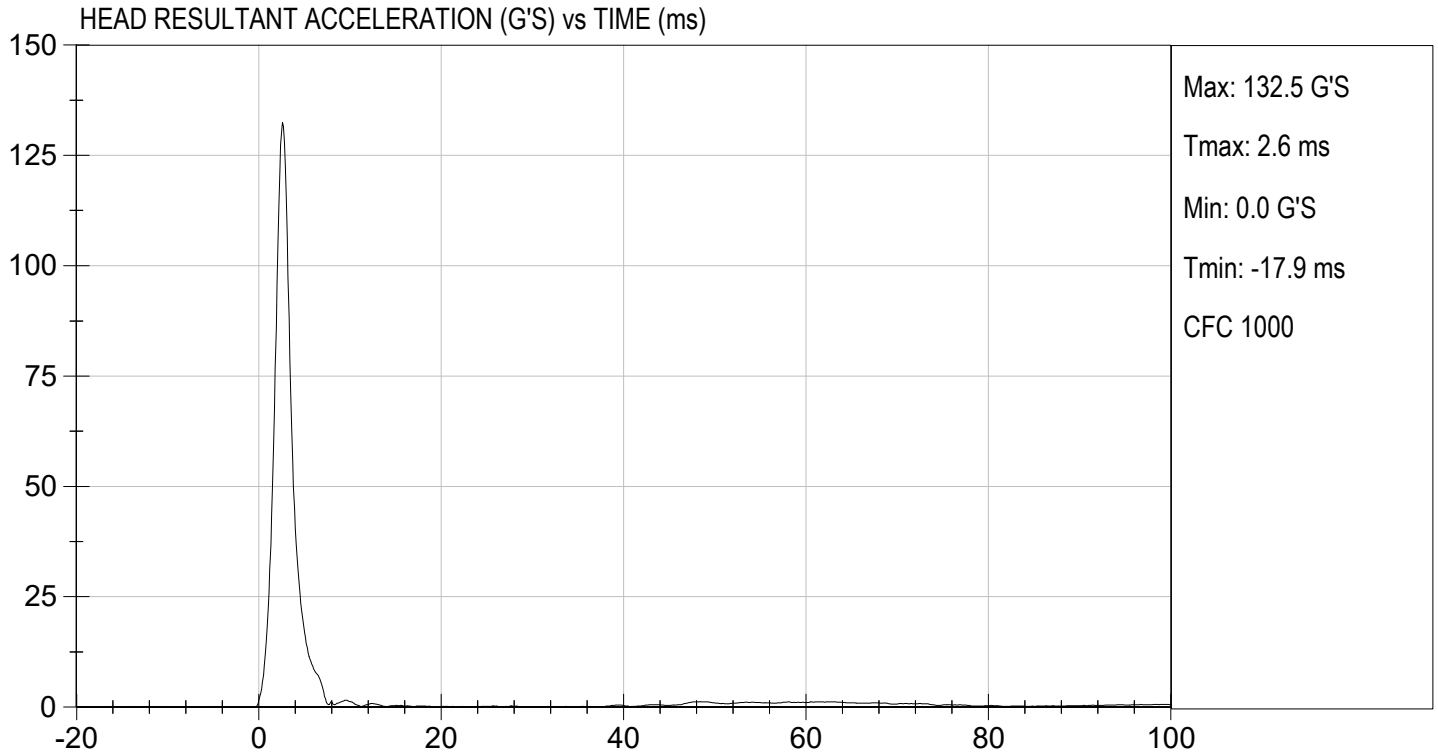
**Test ID:** D230581

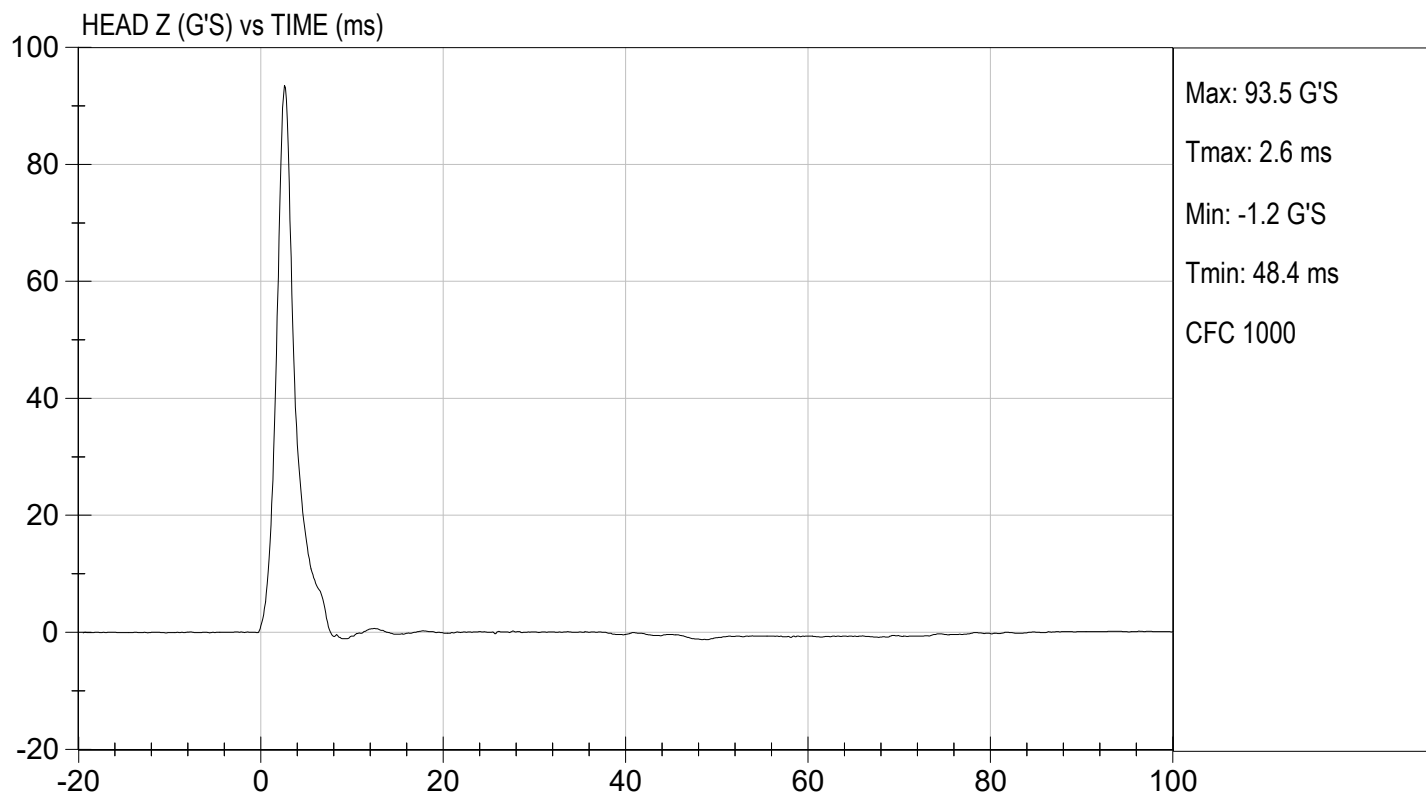
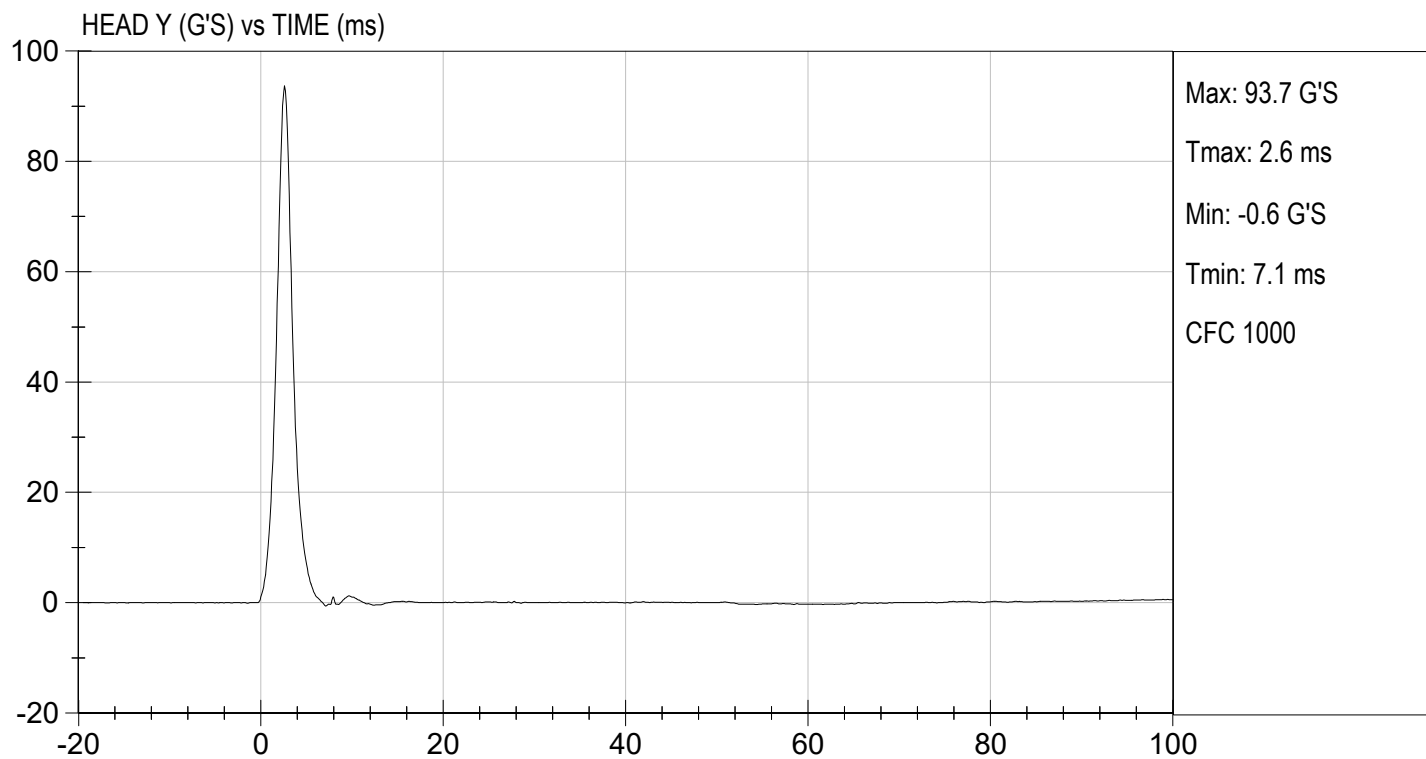
| Tested Parameter               | Units | Specification | Result               | Pass/Fail |
|--------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature         | deg C | 20.6 to 22.2  | 21.7                 | Pass      |
| Laboratory Relative Humidity   | %     | 10 to 70      | 27                   | Pass      |
| Peak Resultant Acceleration    | G's   | 115 to 137    | 132                  | Pass      |
| Peak Longitudinal Acceleration | G's   | +/- 15        | -5.5                 | Pass      |
| Unimodal                       | N/A   | Yes           | Yes                  | Pass      |
| Oscillations                   | N/A   | <15%          | Yes                  | Pass      |
|                                |       |               | Overall Test Results | Pass      |

  
Laboratory Technician

03/06/2023  
Test Date

  
Approved By





**MGA RESEARCH CORPORATION**  
**LATERAL NECK PENDULUM TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

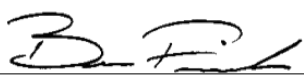
**Test I.D:** D230582

| Tested Parameter                 |           | Units | Specification | Result | Pass/Fail |
|----------------------------------|-----------|-------|---------------|--------|-----------|
| Temperature                      |           | deg C | 20.6 to 22.2  | 21.7   | Pass      |
| Humidity                         |           | %     | 10 to 70      | 27     | Pass      |
| Impact Velocity                  |           | m/s   | 5.51 to 5.63  | 5.61   | Pass      |
| Pendulum Velocity                | 10 ms     | m/s   | 2.20 to 2.80  | 2.33   | Pass      |
|                                  | 15 ms     | m/s   | 3.30 to 4.10  | 3.51   | Pass      |
|                                  | 20 ms     | m/s   | 4.40 to 5.40  | 5.03   | Pass      |
|                                  | 25 ms     | m/s   | 5.40 to 6.10  | 5.66   | Pass      |
|                                  | 25-100 ms | m/s   | 5.50 to 6.20  | 5.69   | Pass      |
| Maximum D-Plane Rotation         |           | deg   | 71 to 81      | 74     | Pass      |
| Time of Maximum D-Plane Rotation |           | ms    | 50 to 70      | 67     | Pass      |
| Maximum Occipital Condyle Moment |           | Nm    | -44 to -36    | -37    | Pass      |
| Time of Moment Decay to 0 Nm     |           | ms    | 102 to 126    | 120    | Pass      |
| Overall Test Results             |           |       |               | Pass   |           |

  
 Laboratory Technician

03/06/2023

Test Date

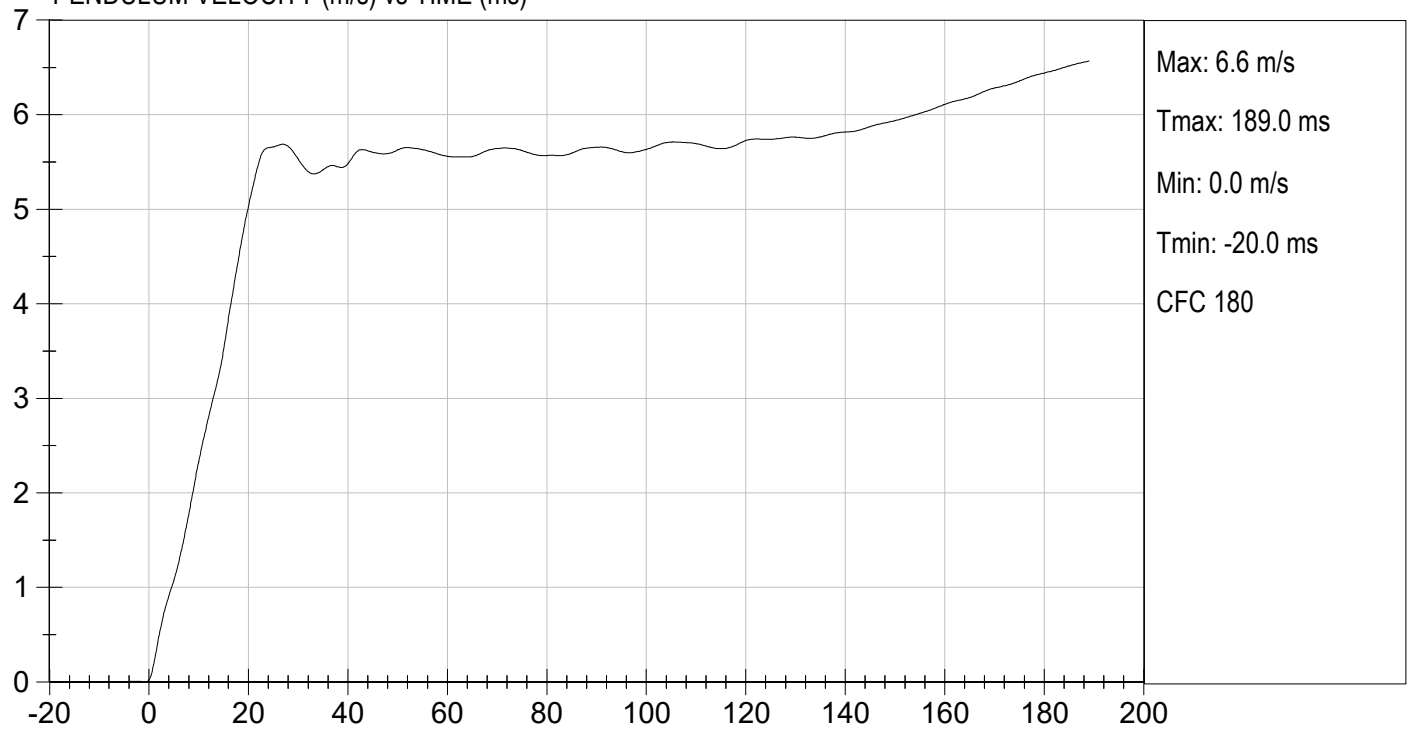
  
 Approved By



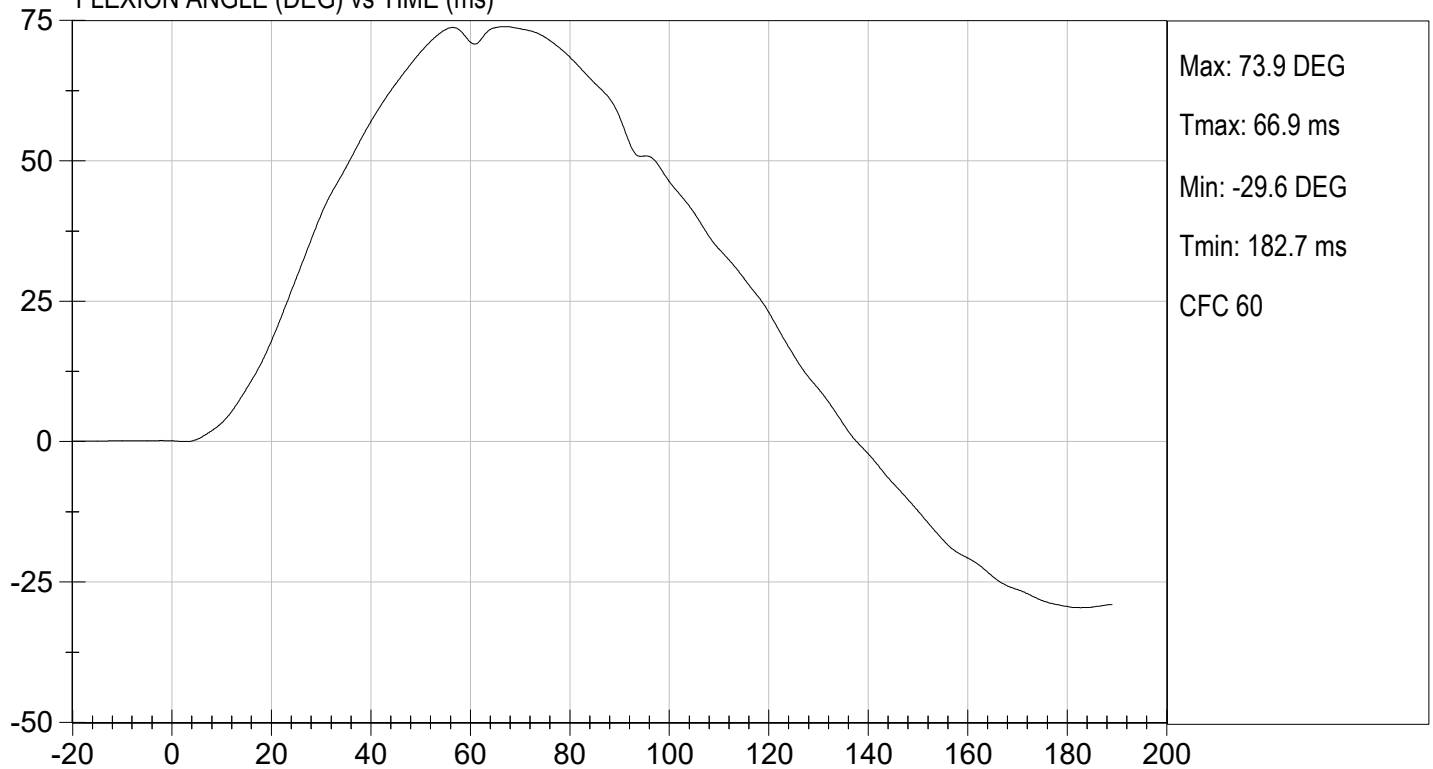
TEST DESC: NECK BENDING  
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 03/06/2023  
TEST #: D230582

PENDULUM VELOCITY (m/s) vs TIME (ms)



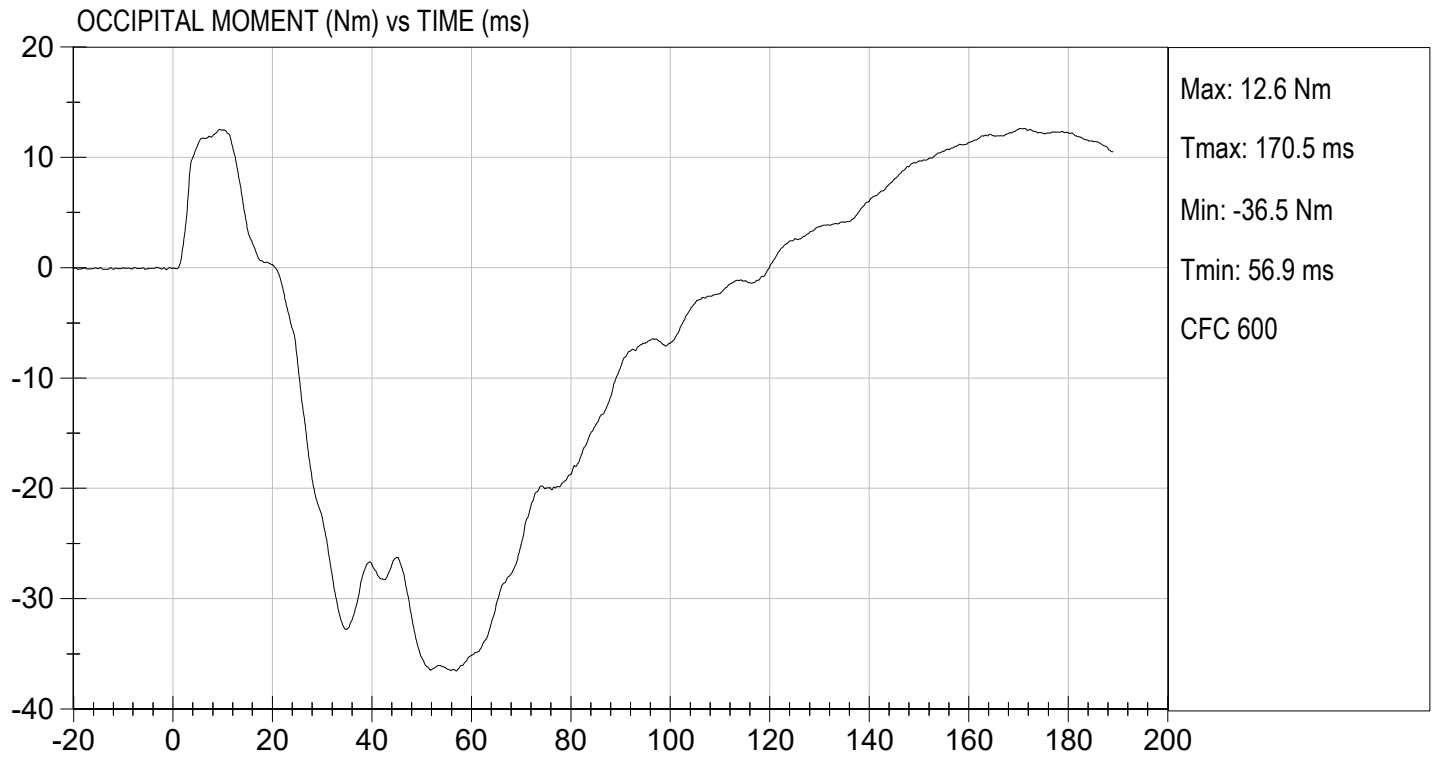
FLEXION ANGLE (DEG) vs TIME (ms)





TEST DESC: NECK BENDING  
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 03/06/2023  
TEST #: D230582



**MGA RESEARCH CORPORATION**  
**SHOULDER IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

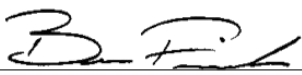
**ATD Serial No:** 296

**Test ID:** D230583

| Tested Parameter                | Units | Specification | Result               | Pass/Fail |
|---------------------------------|-------|---------------|----------------------|-----------|
| Laboratory Temperature          | deg C | 20.6 to 22.2  | 21.8                 | Pass      |
| Laboratory Relative Humidity    | %     | 10 to 70      | 23                   | Pass      |
| Impact Velocity                 | m/s   | 4.20 to 4.40  | 4.34                 | Pass      |
| Maximum Probe Acceleration      | G's   | 13 to 18      | 16                   | Pass      |
| Shoulder Displacement           | mm    | 28 to 37      | 30                   | Pass      |
| Upper Spine (T1) Y Acceleration | G's   | 17 to 22      | 21                   | Pass      |
|                                 |       |               | Overall Test Results | Pass      |

  
Laboratory Technician

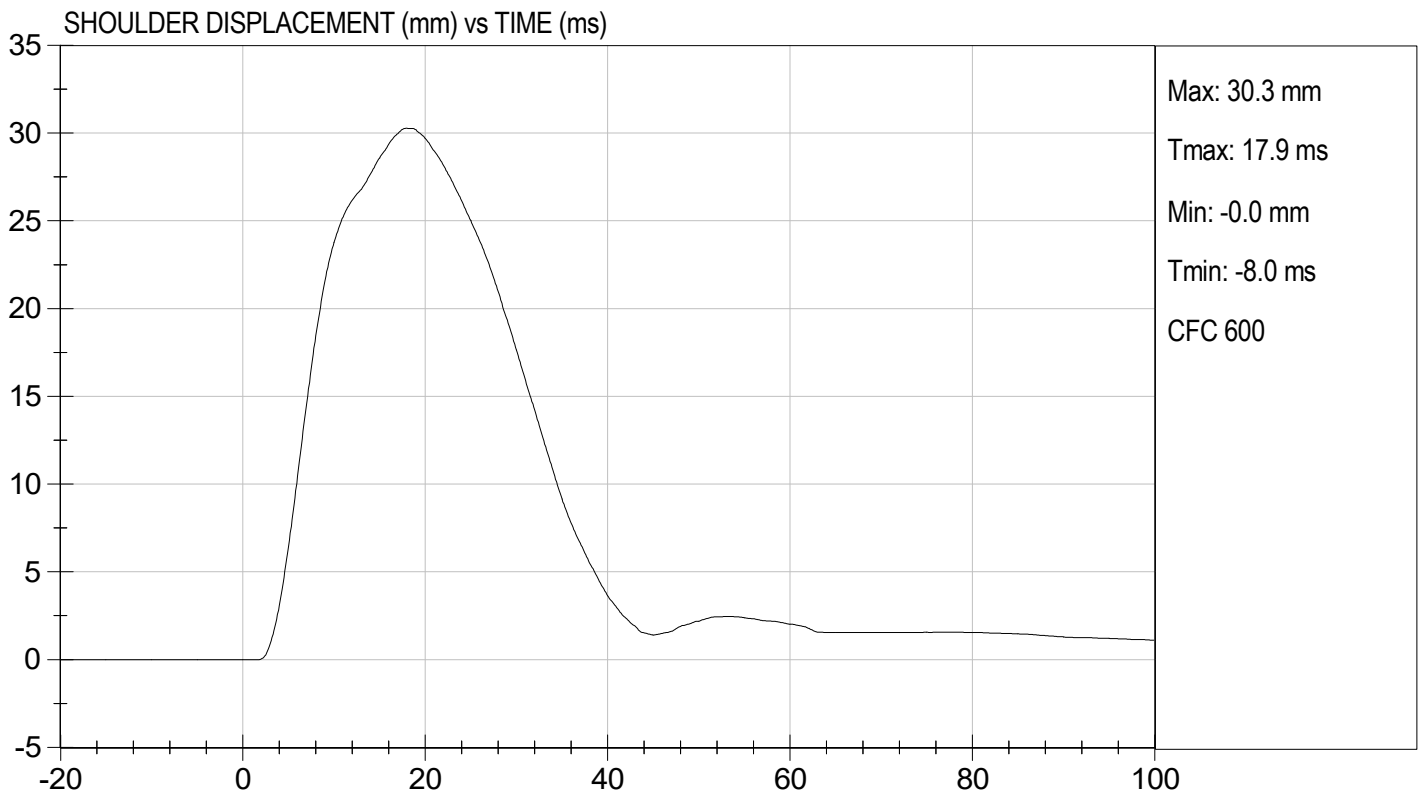
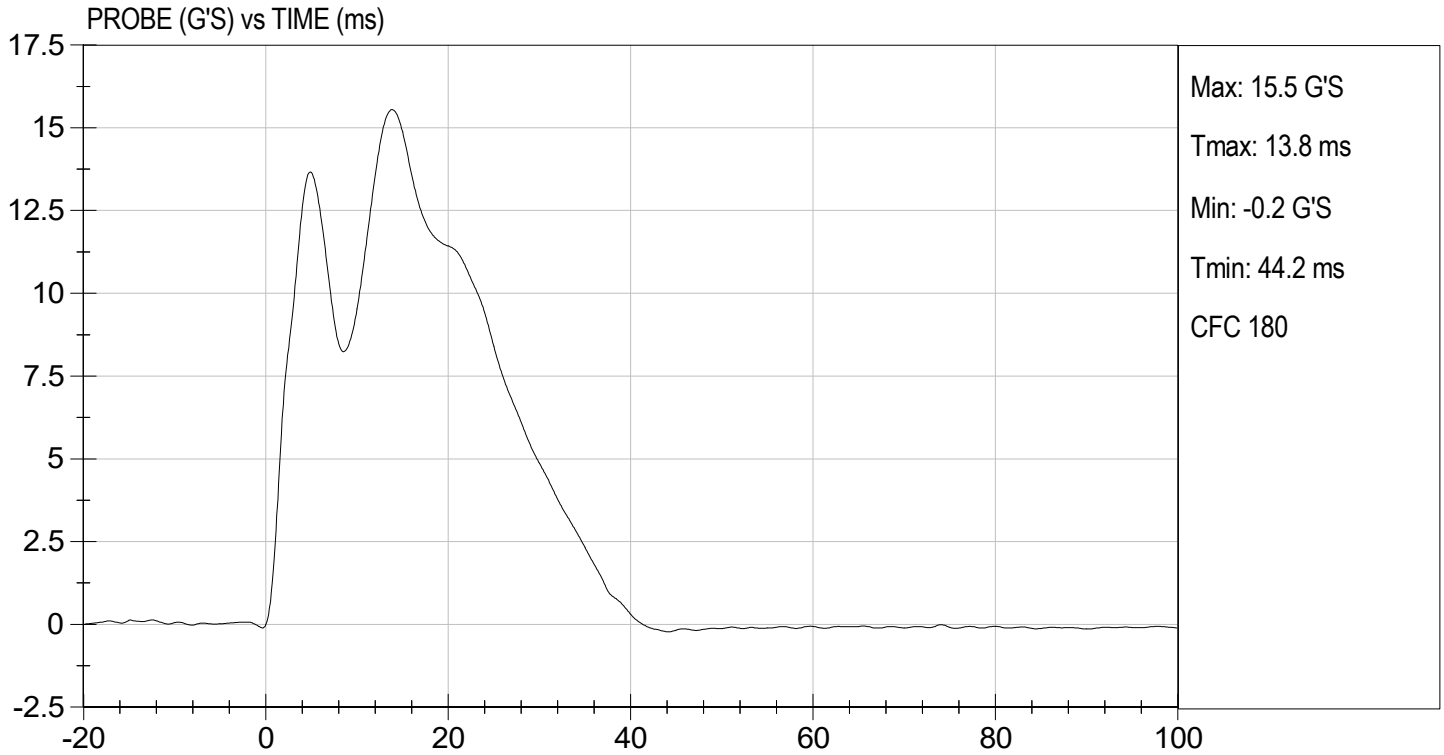
03/08/2023  
Test Date

  
Approved By



TEST DESC: SHOULDER IMPACT  
VELOCITY: 14.25 ft/s, 4.34 m/s

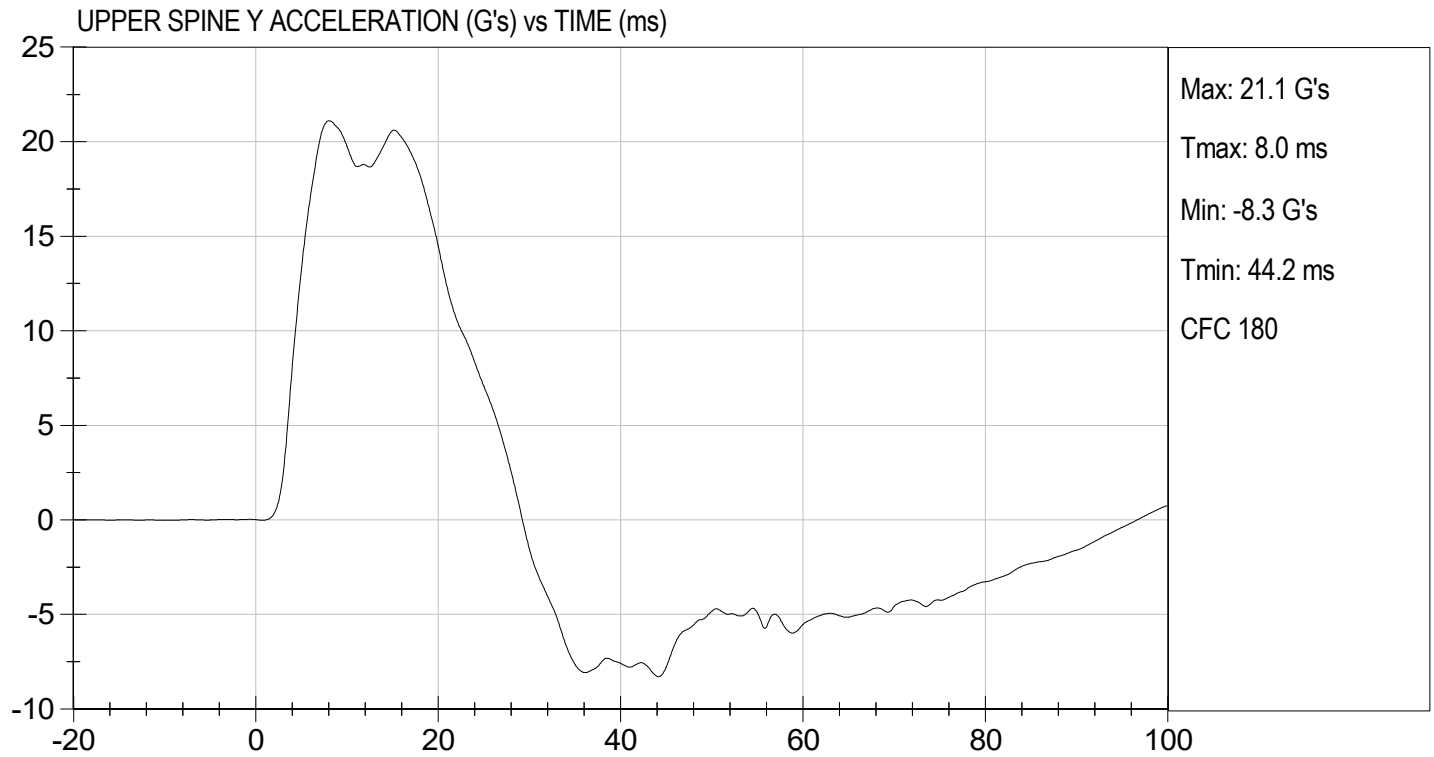
TEST DATE: 03/08/2023  
TEST #: D230583





TEST DESC: SHOULDER IMPACT  
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 03/08/2023  
TEST #: D230583



**MGA RESEARCH CORPORATION**  
**THORAX (WITH ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

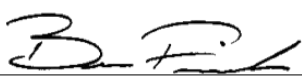
**ATD Serial No:** 296

**Test I.D:** D230584

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 24     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.77   | Pass      |
| Maximum Probe Acceleration       | G's   | 30 to 36      | 33     | Pass      |
| Shoulder Displacement            | mm    | 31 to 40      | 34     | Pass      |
| Upper Rib Displacement           | mm    | 25 to 32      | 28     | Pass      |
| Middle Rib Displacement          | mm    | 30 to 36      | 33     | Pass      |
| Lower Rib Displacement           | mm    | 32 to 38      | 35     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 34 to 43      | 39     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 29 to 37      | 33     | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

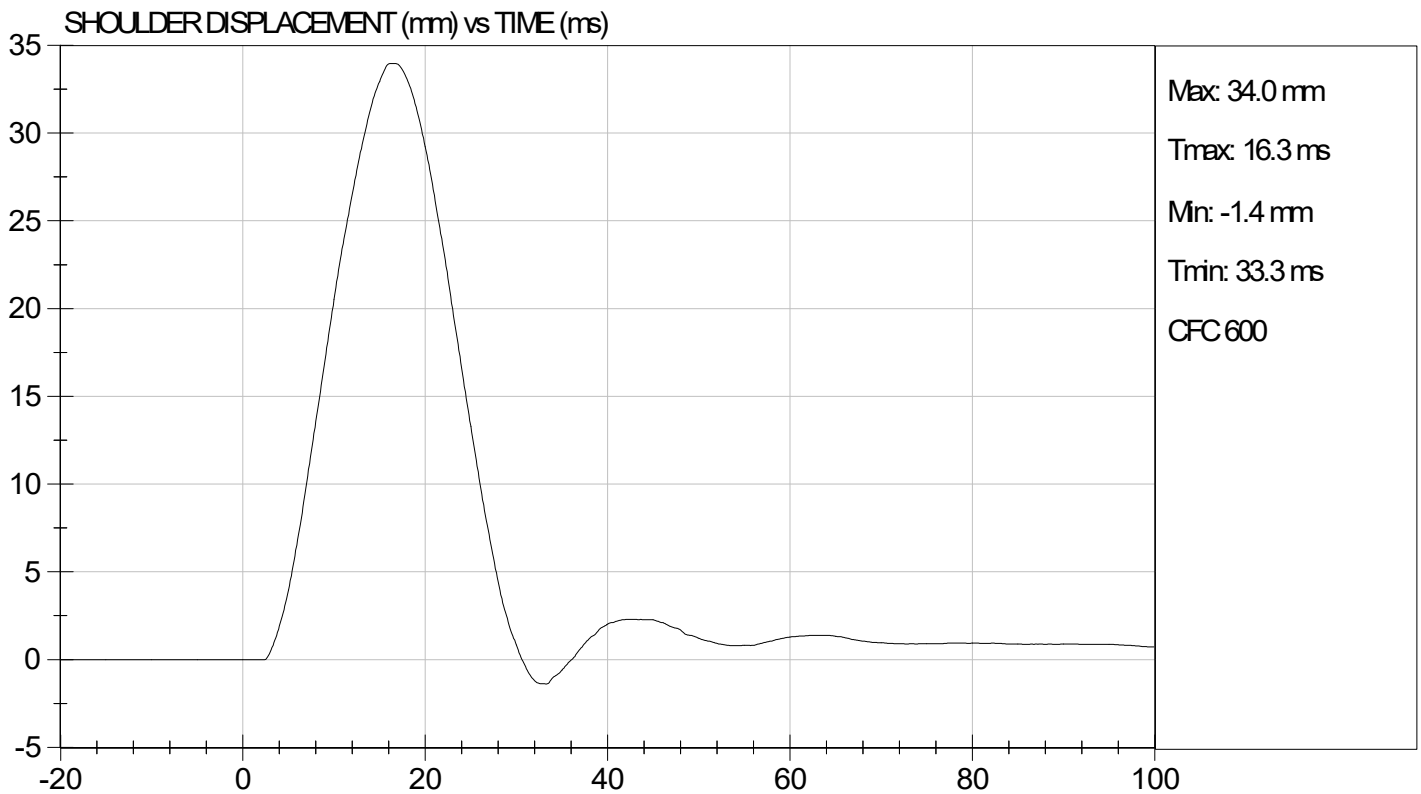
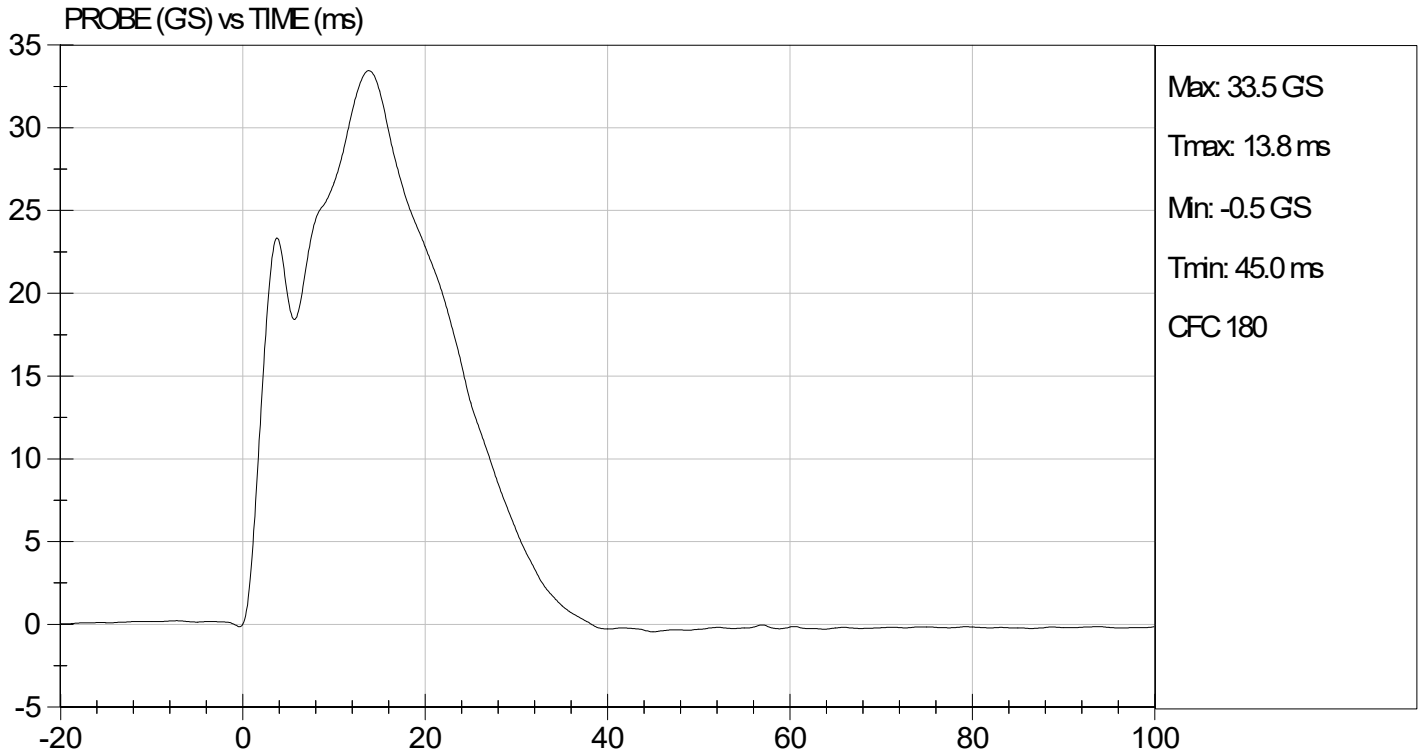
03/08/2023  
Test Date

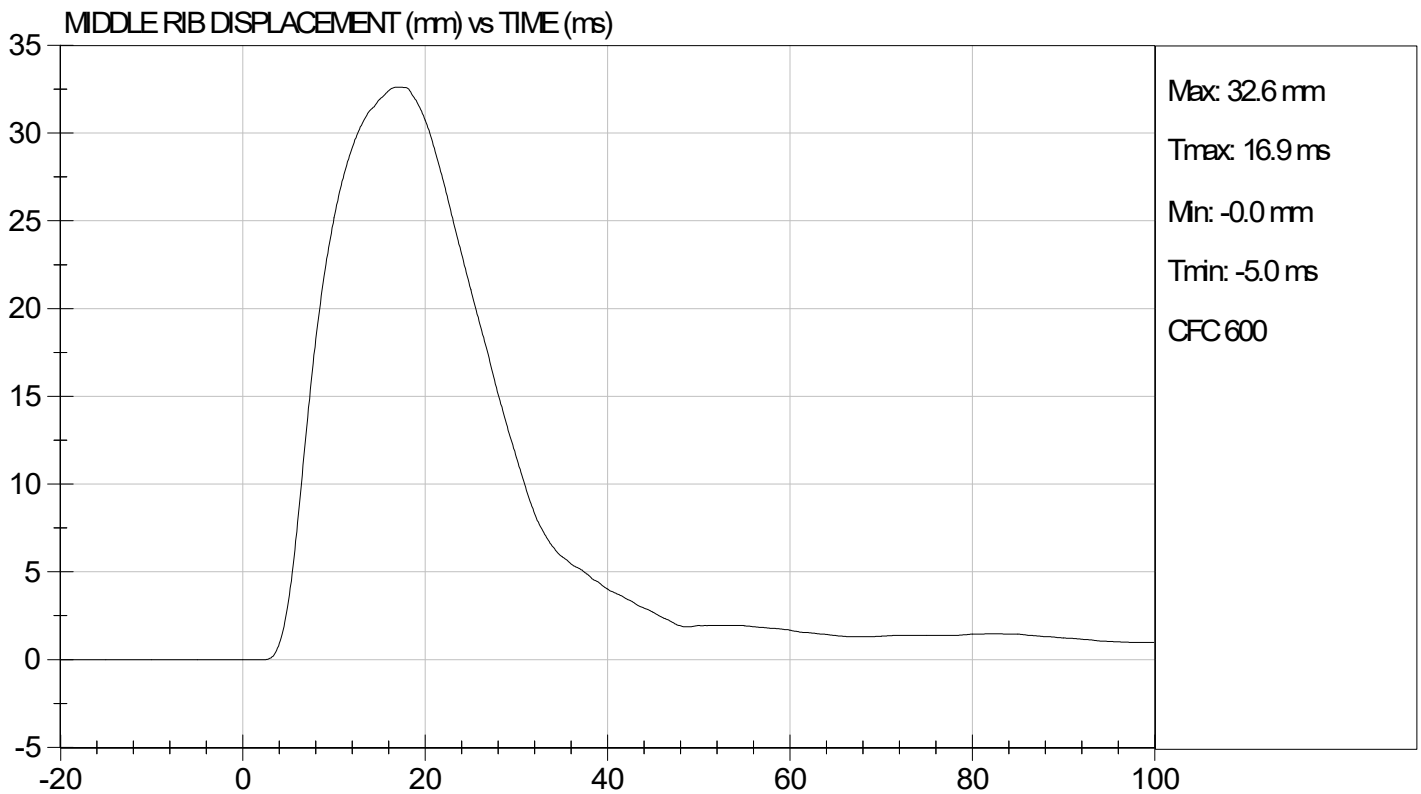
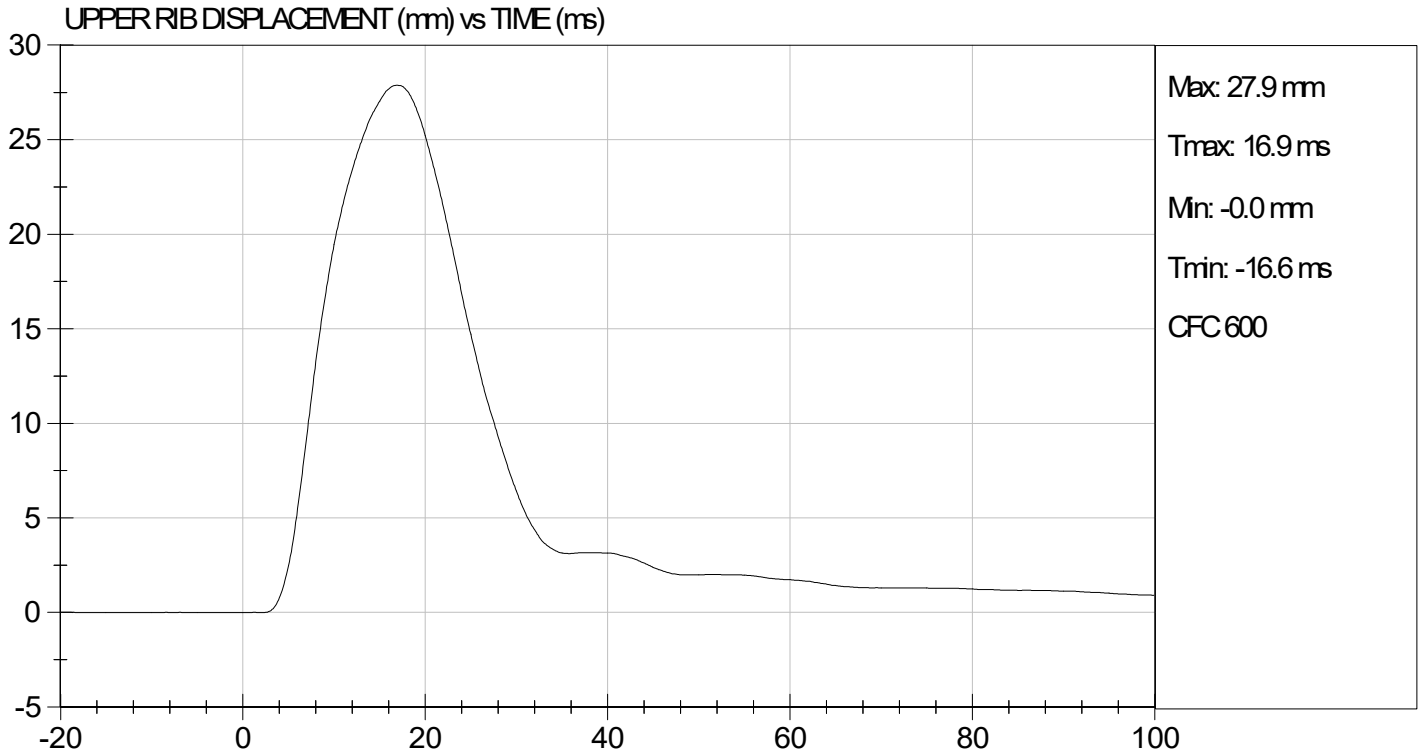
  
Approved By



TEST DESC: THORAX IMPACT WITH ARM  
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 03/08/2023  
TEST #: D230584

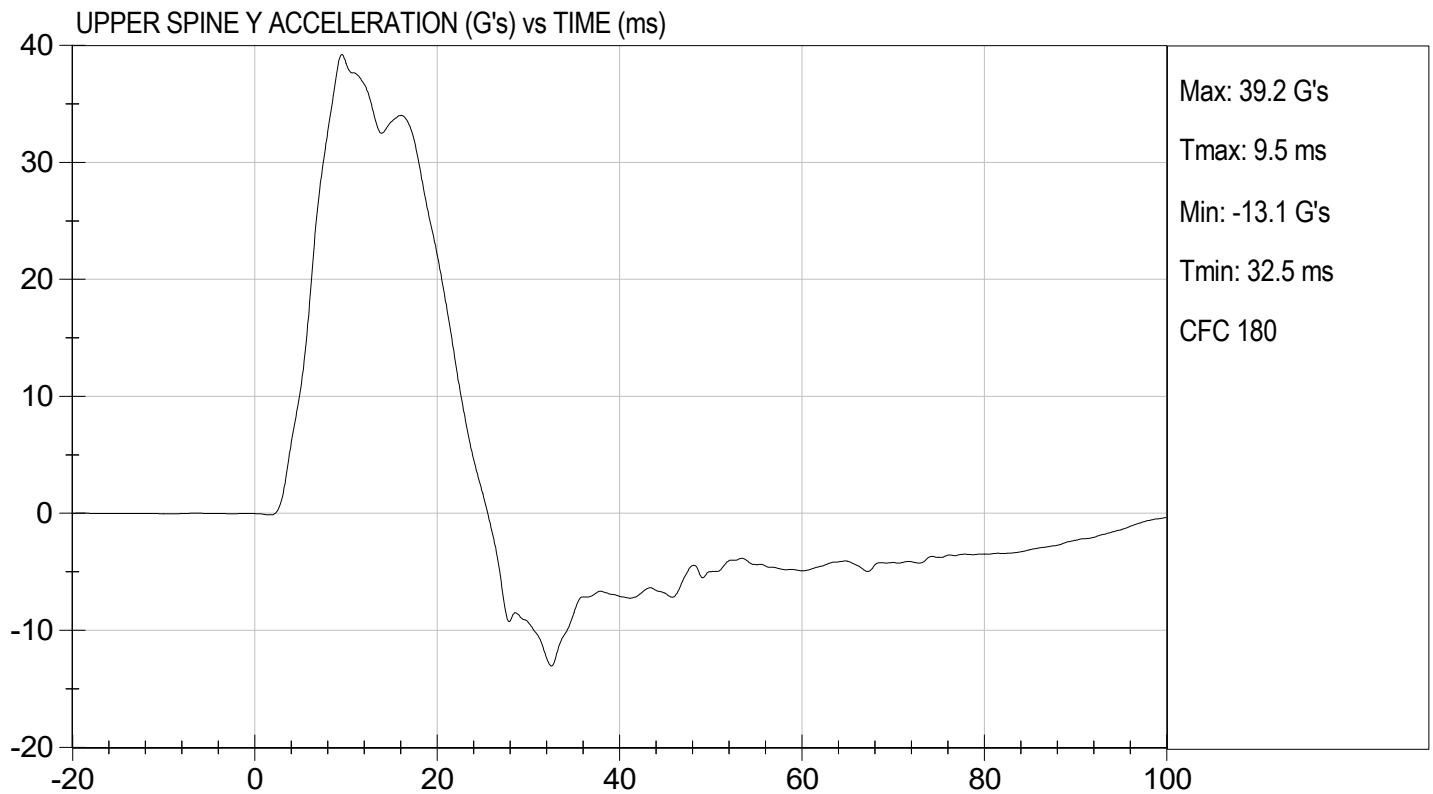
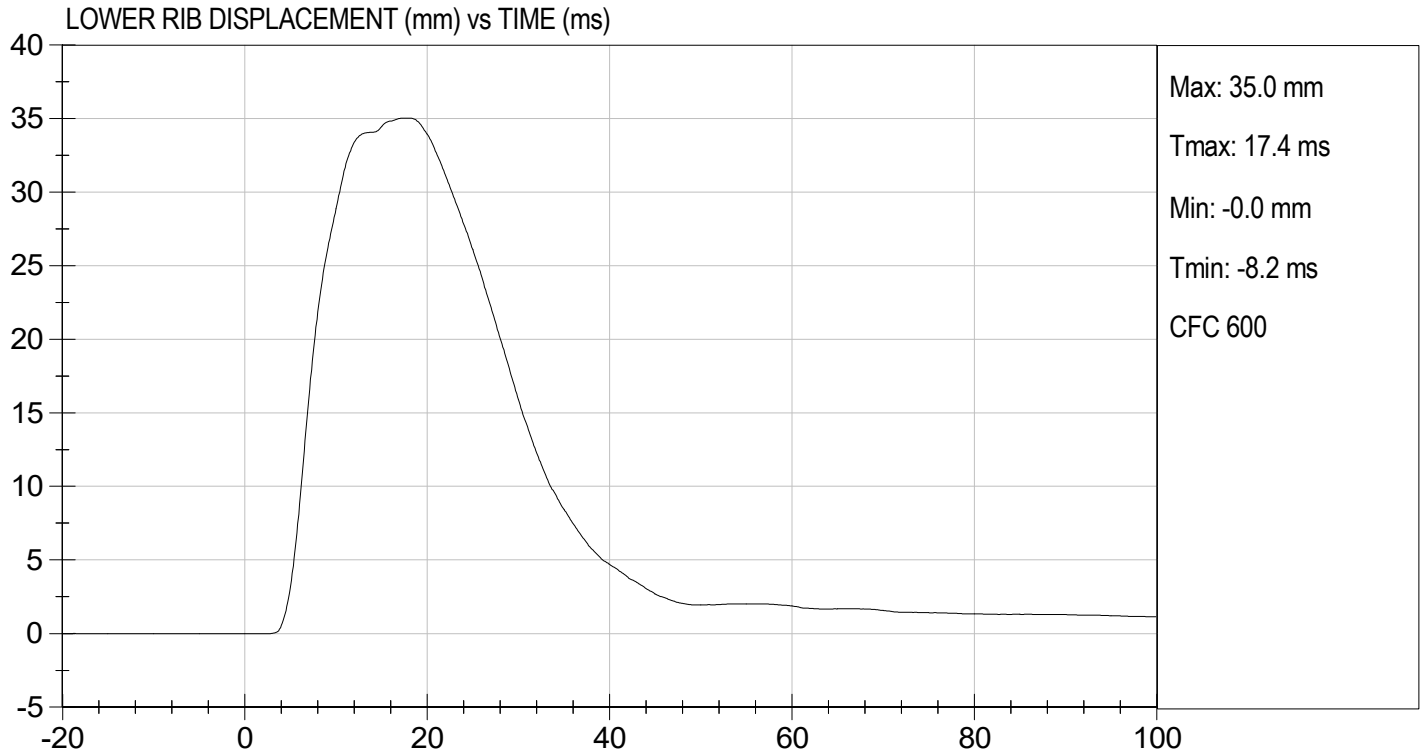






TEST DESC: THORAX IMPACT WITH ARM  
VELOCITY: 22.22 ft/s, 6.77 m/s

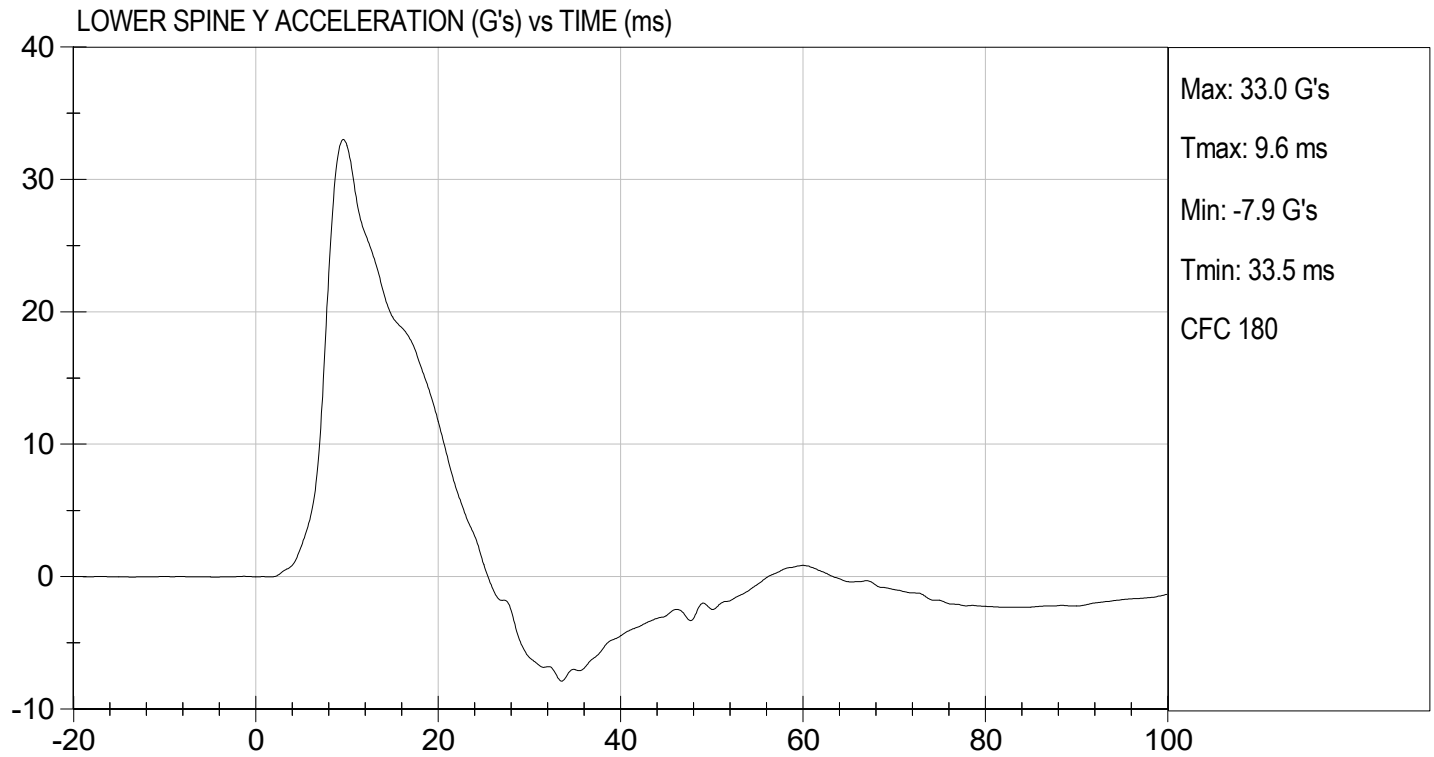
TEST DATE: 03/08/2023  
TEST #: D230584





TEST DESC: THORAX IMPACT WITH ARM  
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 03/08/2023  
TEST #: D230584



**MGA RESEARCH CORPORATION**  
**THORAX (WITHOUT ARM) IMPACT TEST**  
**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

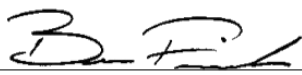
**Test I.D:** D230585

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 24     | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.30   | Pass      |
| Maximum Probe Acceleration       | G's   | 14 to 18      | 16     | Pass      |
| Upper Rib Displacement           | mm    | 32 to 40      | 36     | Pass      |
| Middle Rib Displacement          | mm    | 39 to 45      | 43     | Pass      |
| Lower Rib Displacement           | mm    | 35 to 43      | 42     | Pass      |
| Upper Spine (T1) Y Acceleration  | G's   | 13 to 17      | 16     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 7 to 11       | 9      | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

03/08/2023

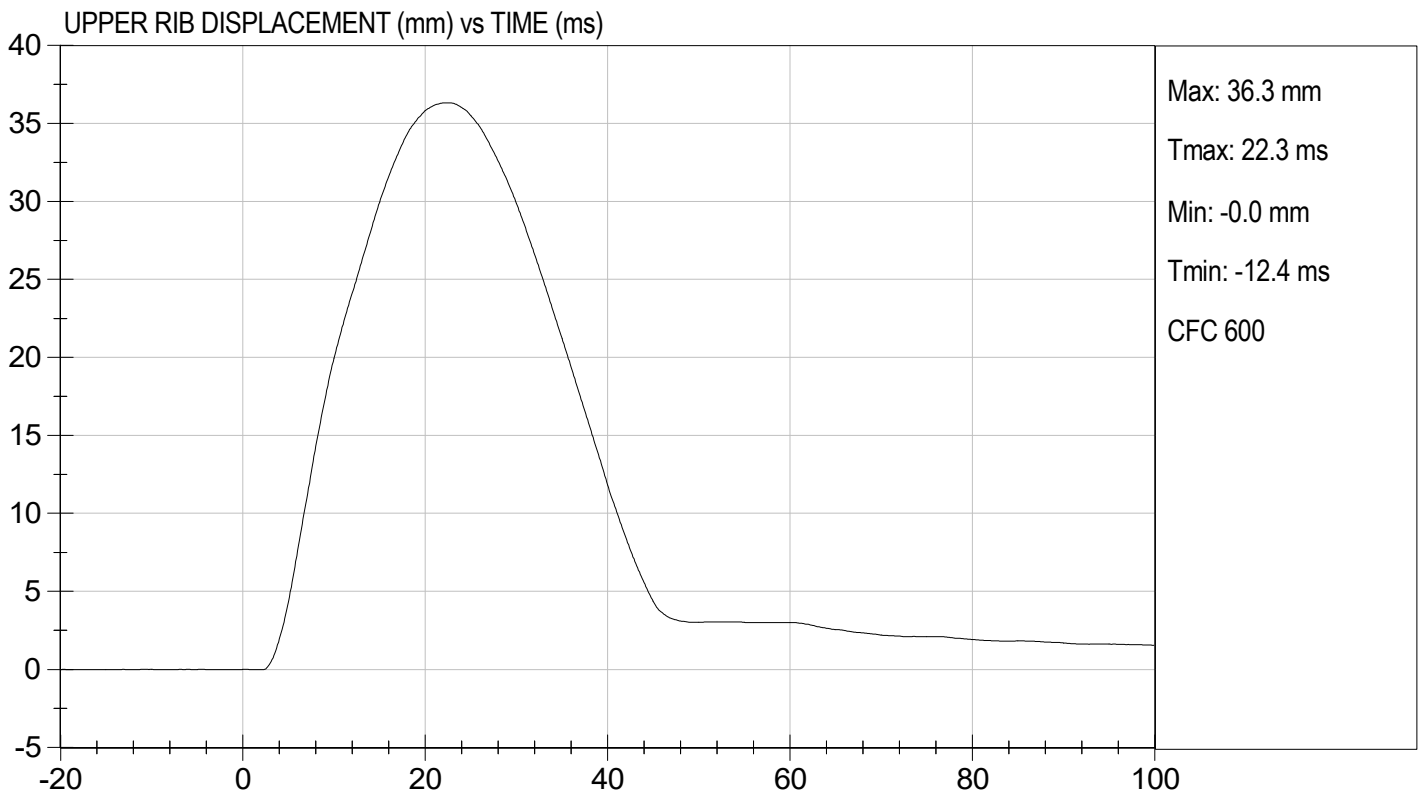
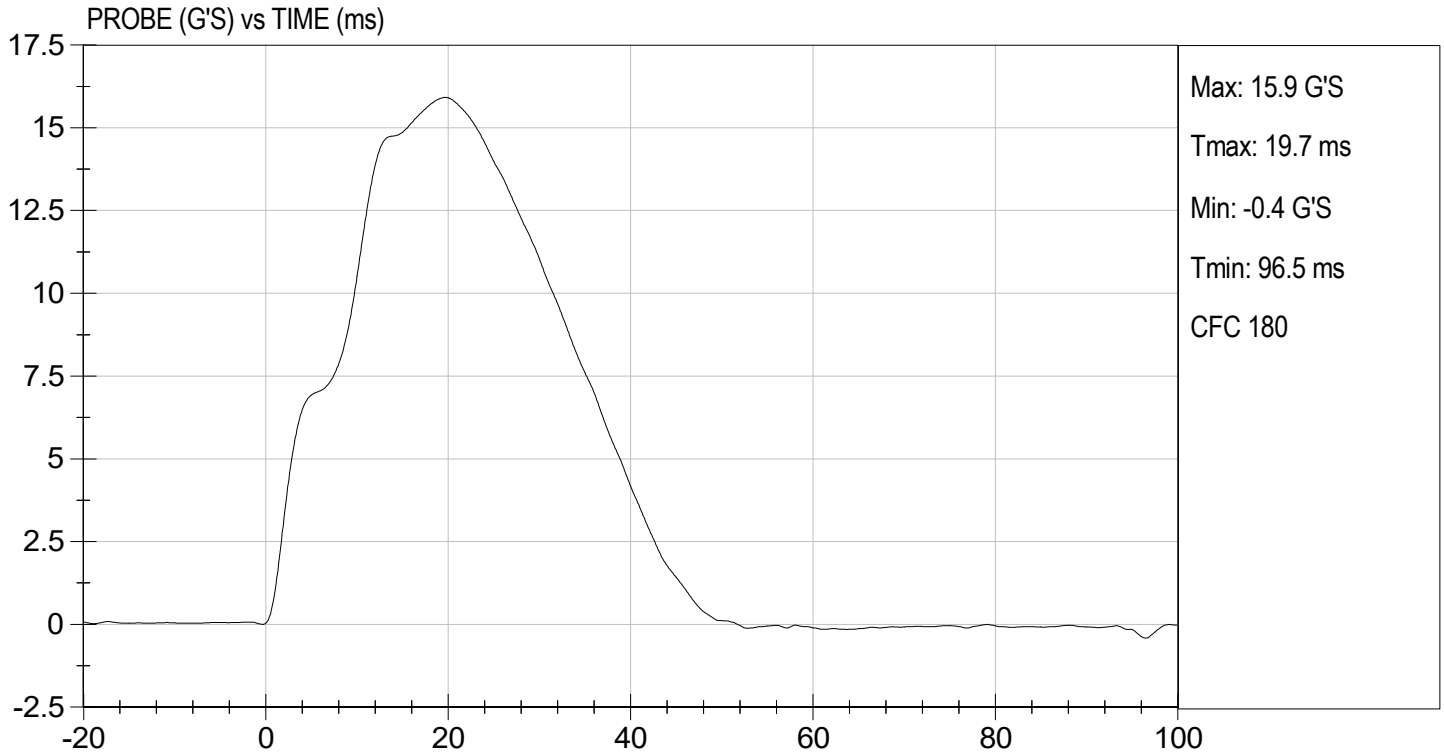
Test Date

  
Approved By



TEST DESC: THORAX IMPACT WITHOUT ARM  
VELOCITY: 14.12 ft/s, 4.30 m/s

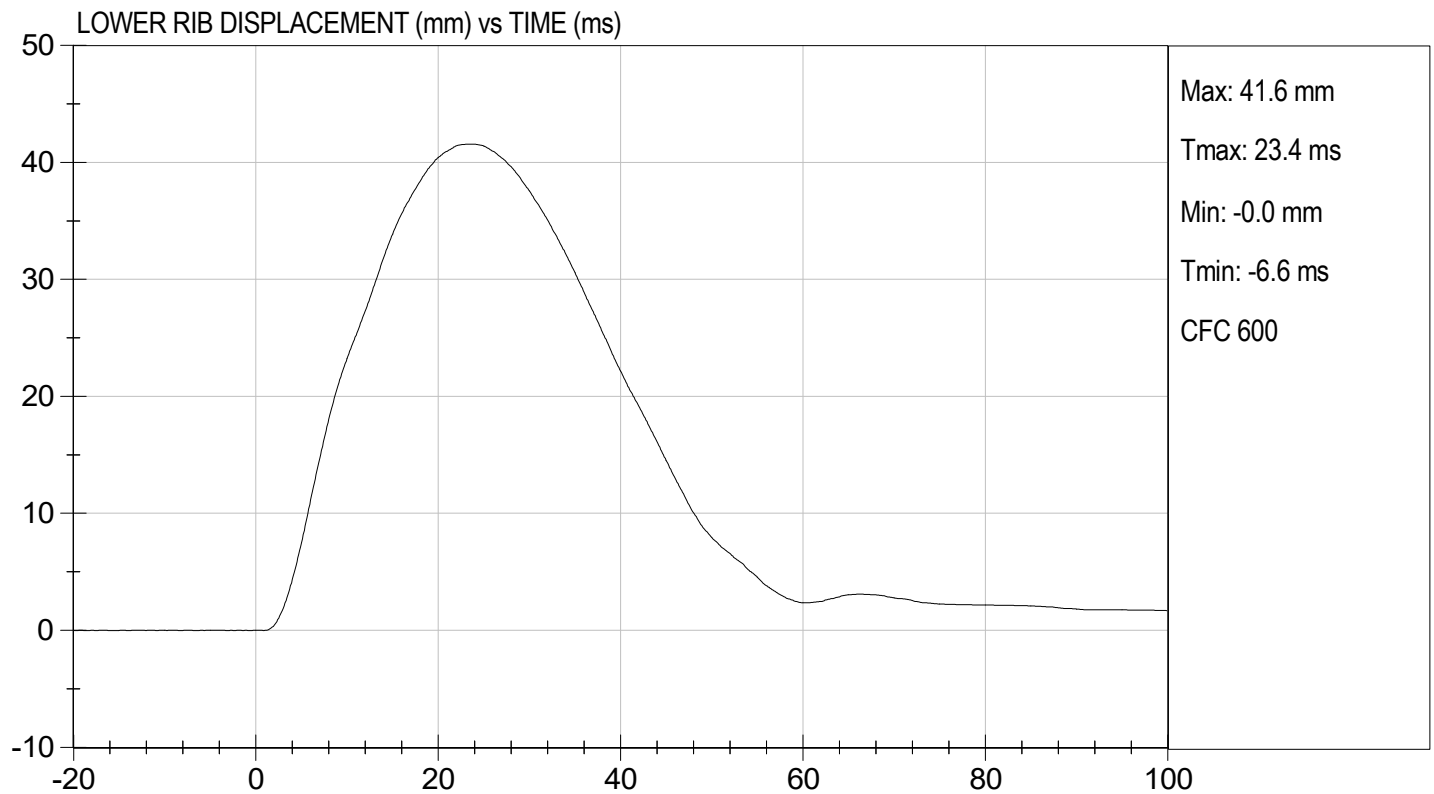
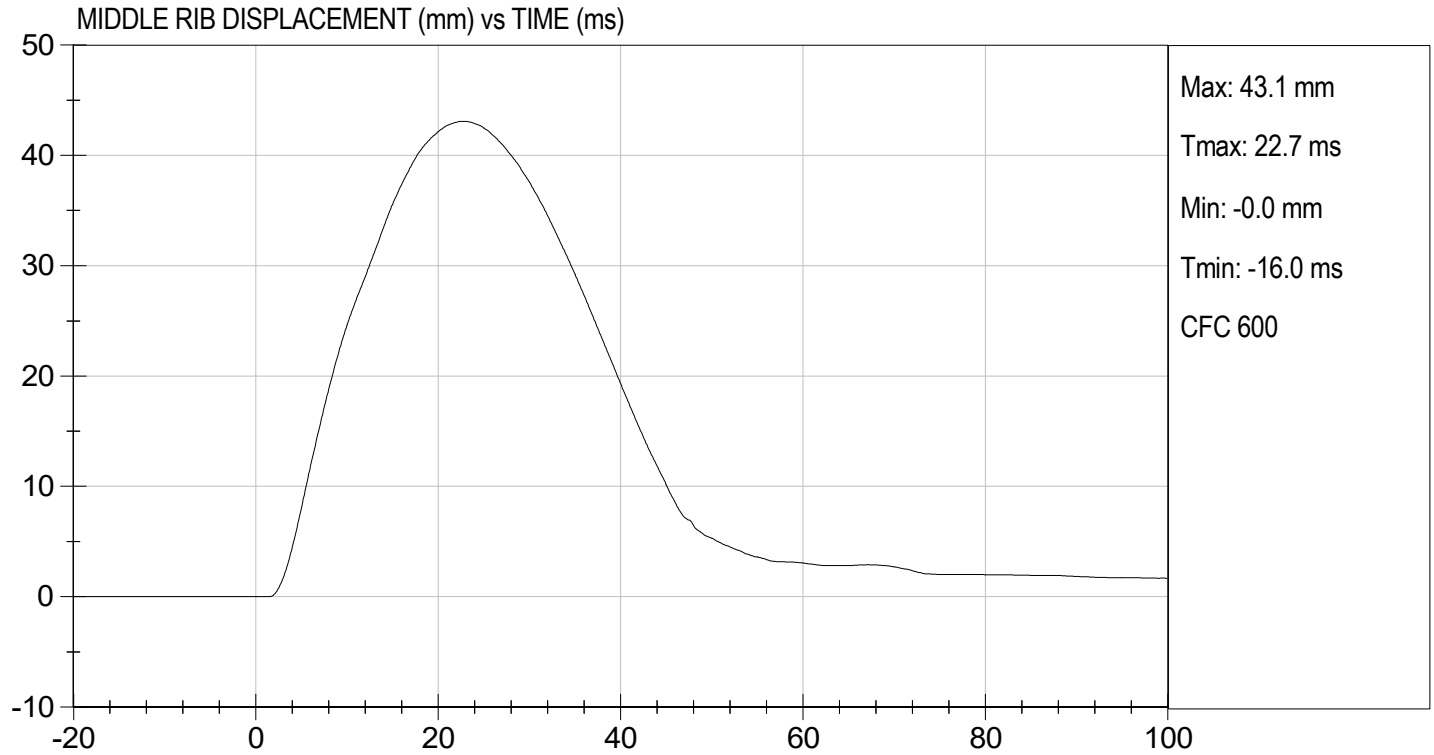
TEST DATE: 03/08/2023  
TEST #: D230585





TEST DESC: THORAX IMPACT WITHOUT ARM  
VELOCITY: 14.12 ft/s, 4.30 m/s

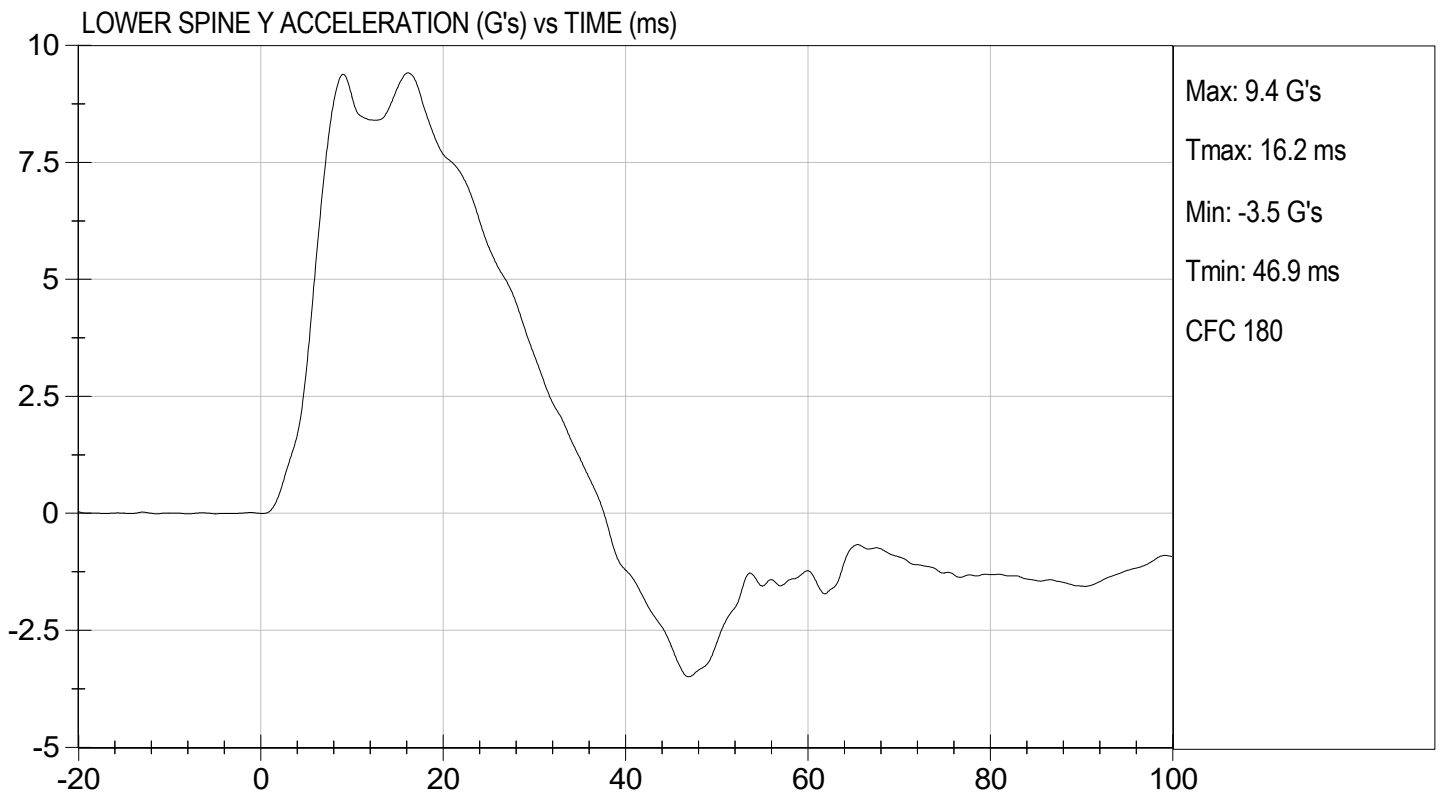
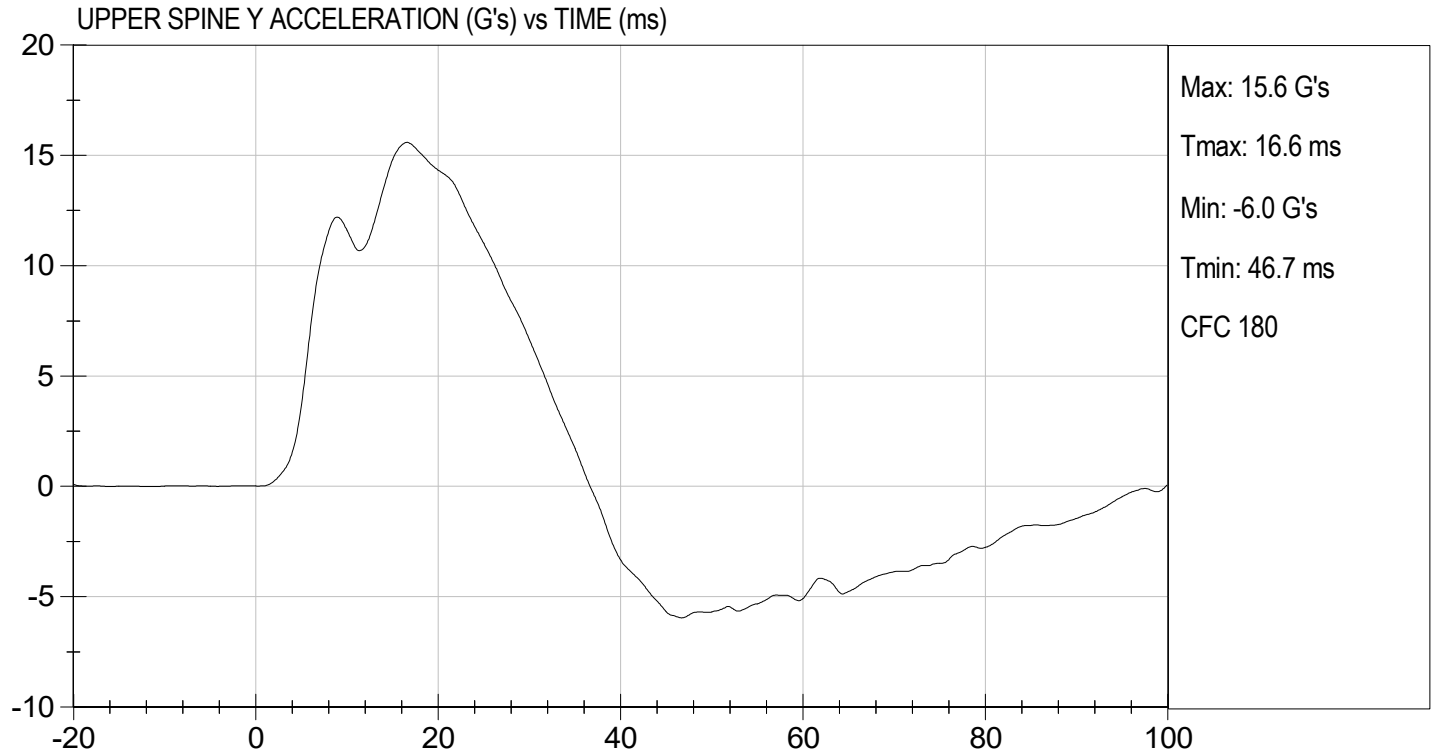
TEST DATE: 03/08/2023  
TEST #: D230585





TEST DESC: THORAX IMPACT WITHOUT ARM  
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 03/08/2023  
TEST #: D230585



**MGA RESEARCH CORPORATION**  
**ABDOMINAL IMPACT TEST**  
**SID-1Is BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

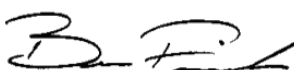
**Test I.D:** D230586

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.7   | Pass      |
| Humidity                         | %     | 10 to 70      | 24     | Pass      |
| Impact Velocity                  | m/s   | 4.20 to 4.40  | 4.38   | Pass      |
| Maximum Probe Acceleration       | G's   | 12 to 16      | 14     | Pass      |
| Upper Abdomen Rib Displacement   | mm    | 36 to 47      | 42     | Pass      |
| Lower Abdomen Rib Displacement   | mm    | 33 to 44      | 40     | Pass      |
| Lower Spine (T12) Y Acceleration | G's   | 9 to 14       | 12     | Pass      |
| Overall Test Results             |       |               |        | Pass      |

  
Laboratory Technician

03/08/2023

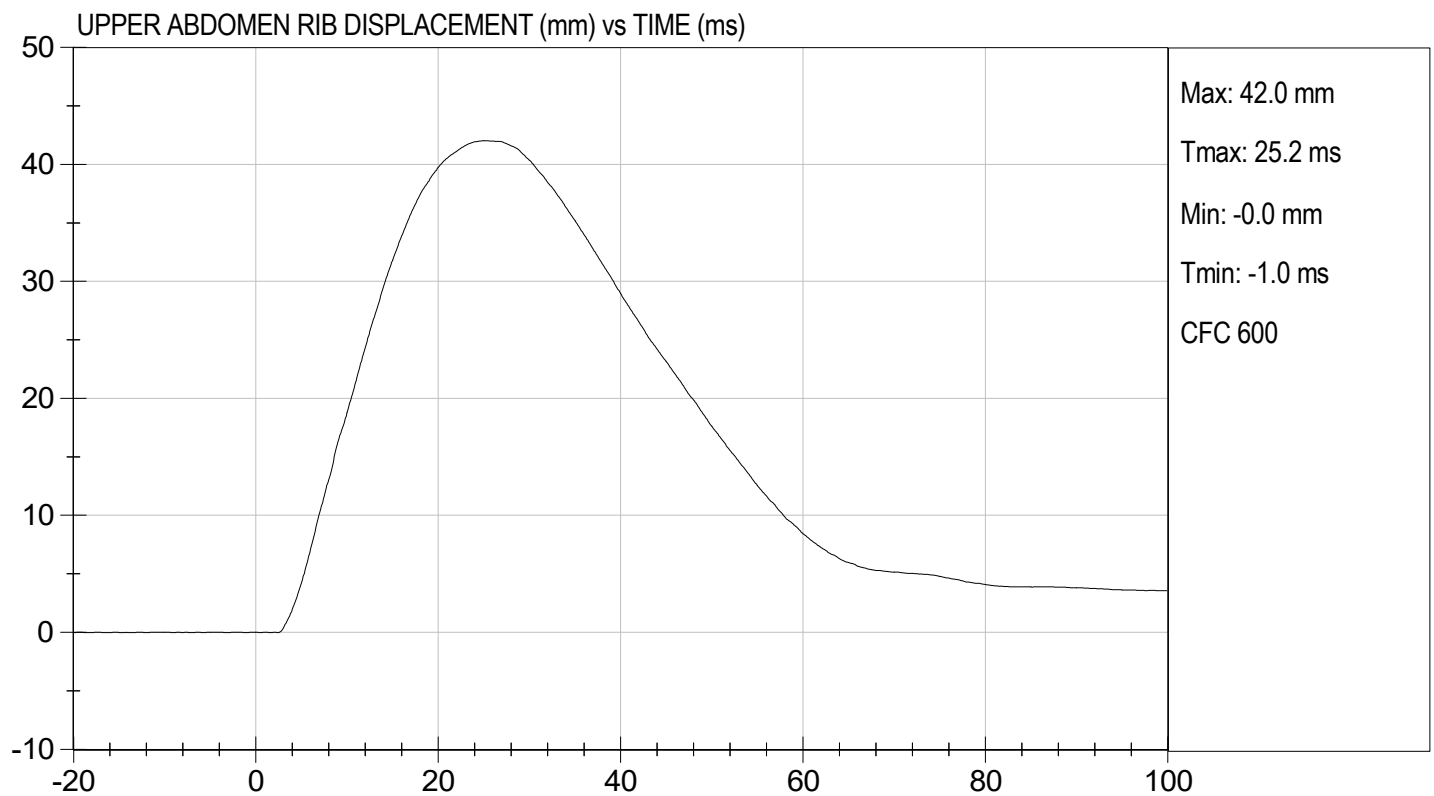
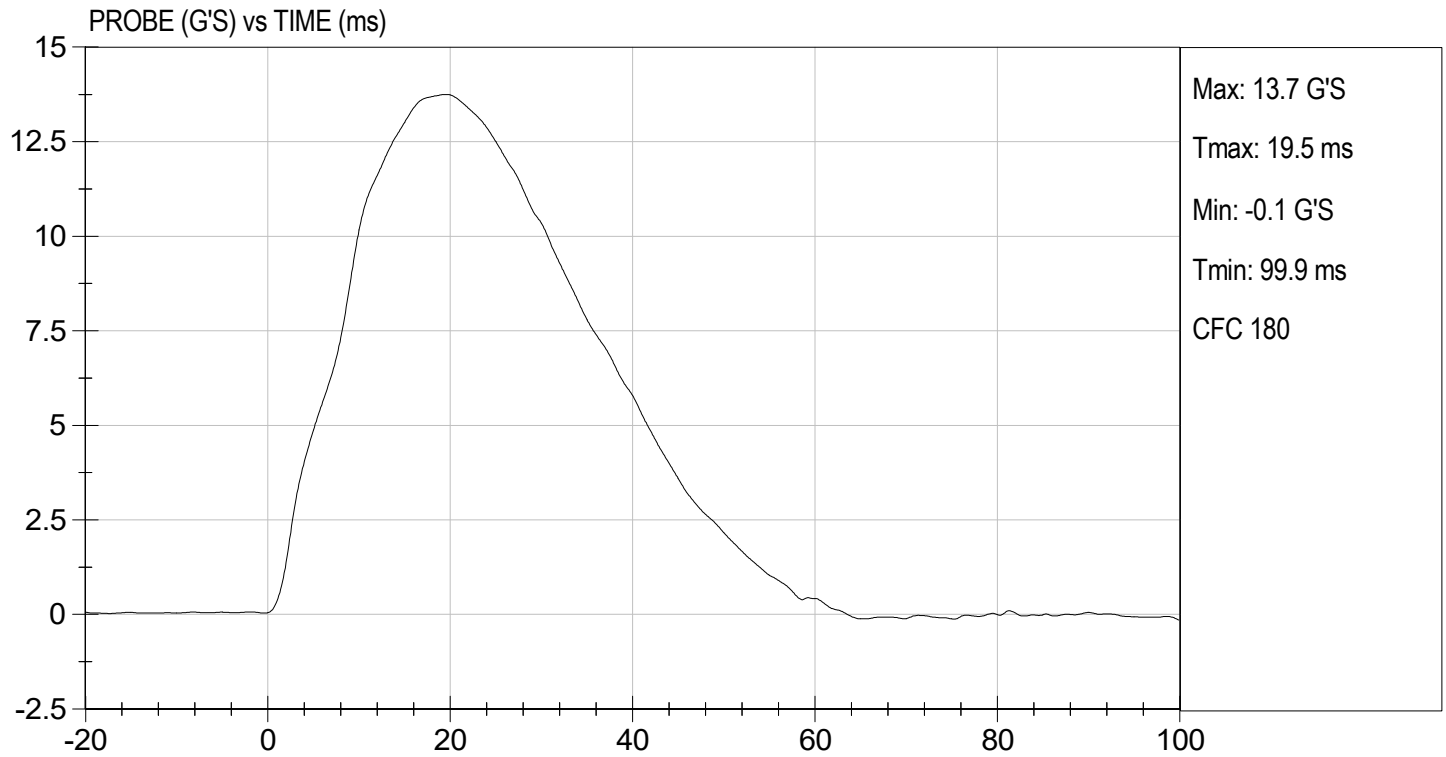
Test Date

  
Approved By



TEST DESC: ABDOMEN IMPACT  
VELOCITY: 14.37 ft/s, 4.38 m/s

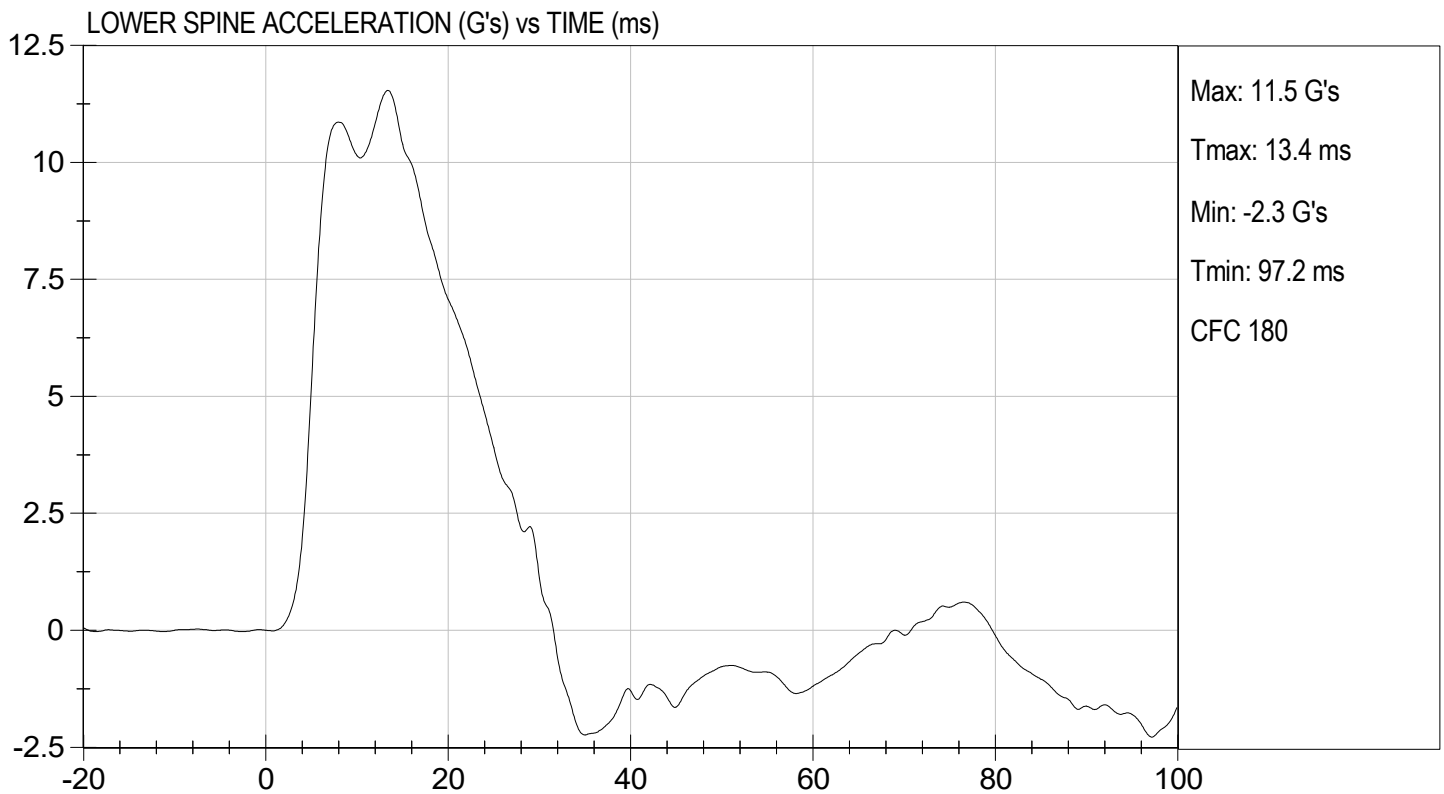
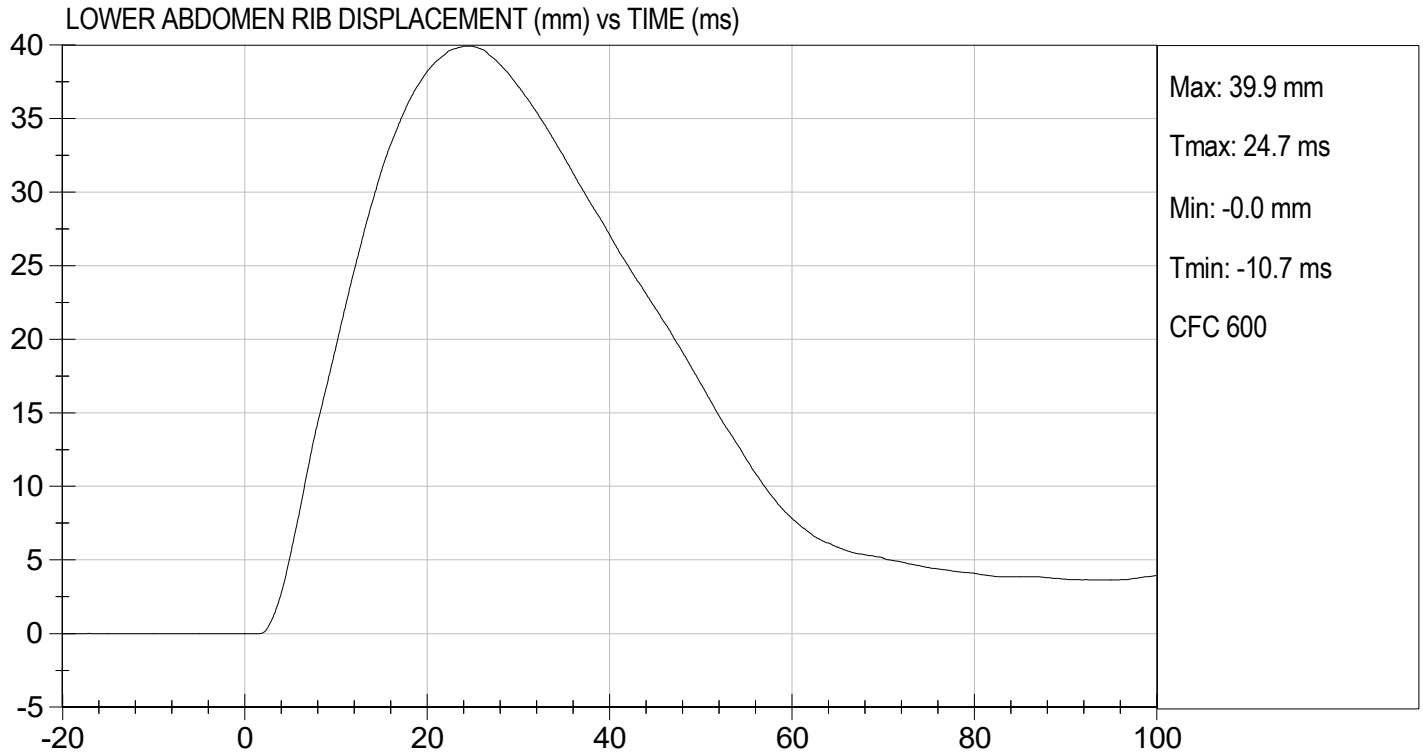
TEST DATE: 03/08/2023  
TEST #: D230586





TEST DESC: ABDOMEN IMPACT  
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 03/08/2023  
TEST #: D230586



**MGA RESEARCH CORPORATION**

**PELVIS IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

**Test I.D:** D230587

| Tested Parameter                 | Units | Specification | Result | Pass/Fail |
|----------------------------------|-------|---------------|--------|-----------|
| Temperature                      | deg C | 20.6 to 22.2  | 21.6   | Pass      |
| Humidity                         | %     | 10 to 70      | 23     | Pass      |
| Impact Velocity                  | m/s   | 6.60 to 6.80  | 6.68   | Pass      |
| Maximum Probe Acceleration       | G's   | 38 to 47      | 43     | Pass      |
| Pelvis Y Acceleration After 6 ms | G's   | 34 to 42      | 40     | Pass      |
| Peak Acetabulum Force            | N     | 3600 to 4300  | 4,122  | Pass      |
| Overall Test Results             |       |               |        | Pass      |



Laboratory Technician

03/08/2023

Test Date

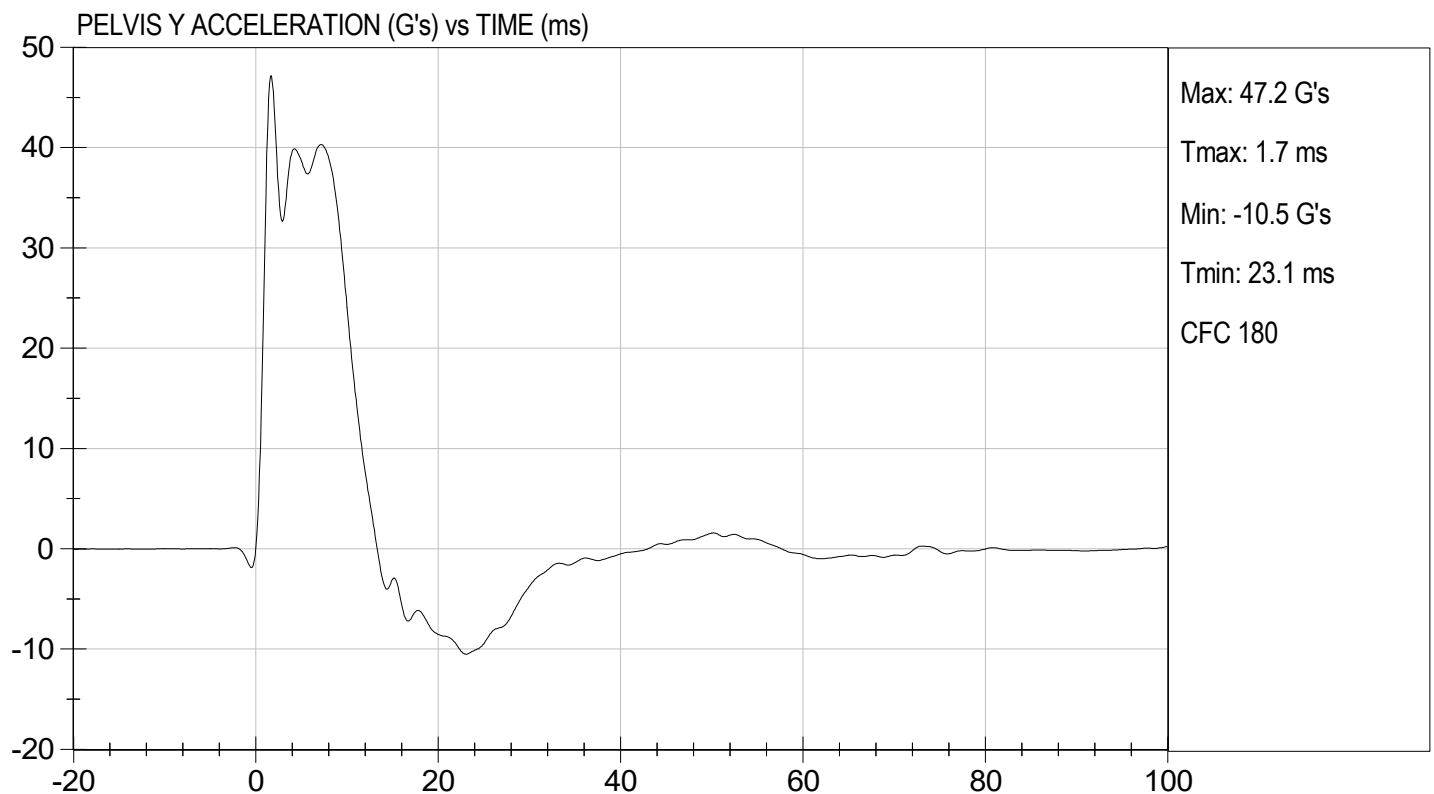
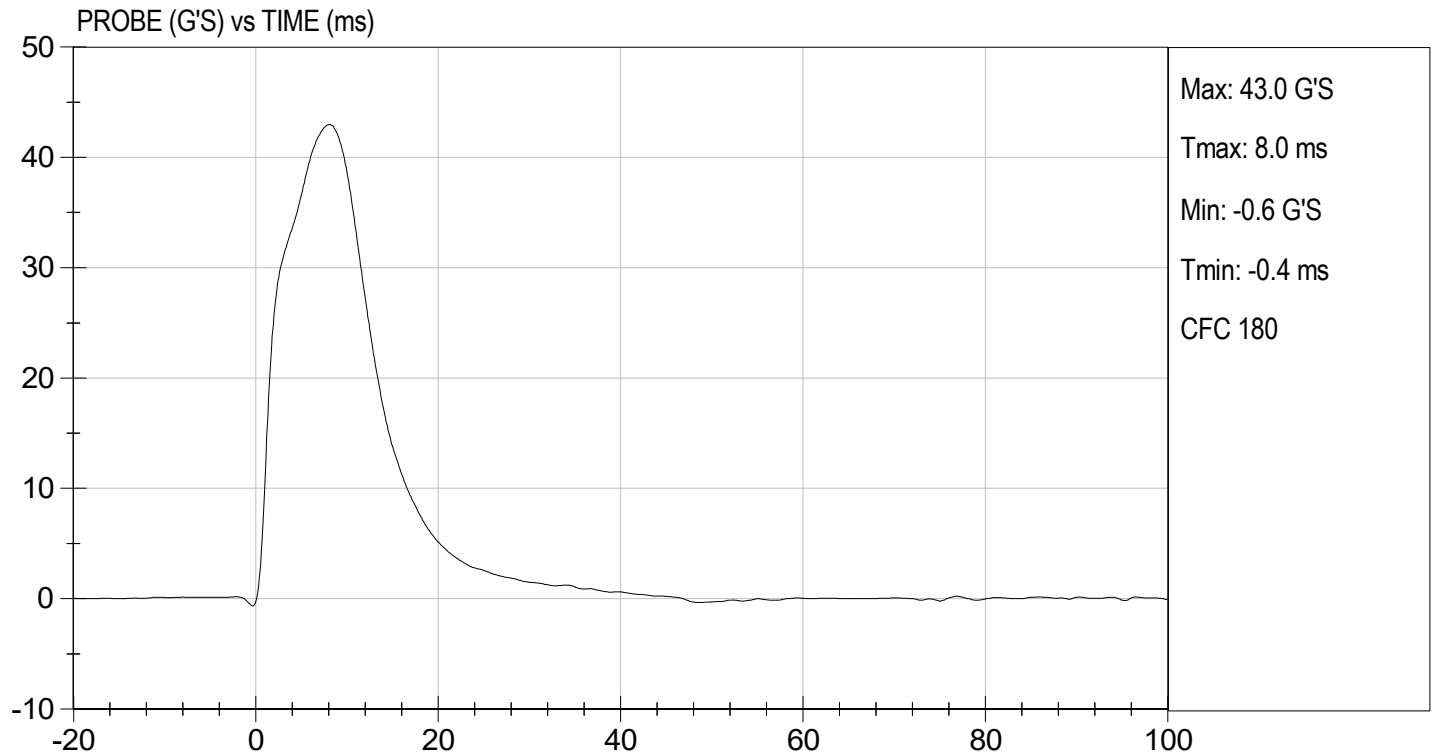


Approved By



TEST DESC: PELVIS IMPACT  
VELOCITY: 21.93 ft/s, 6.68 m/s

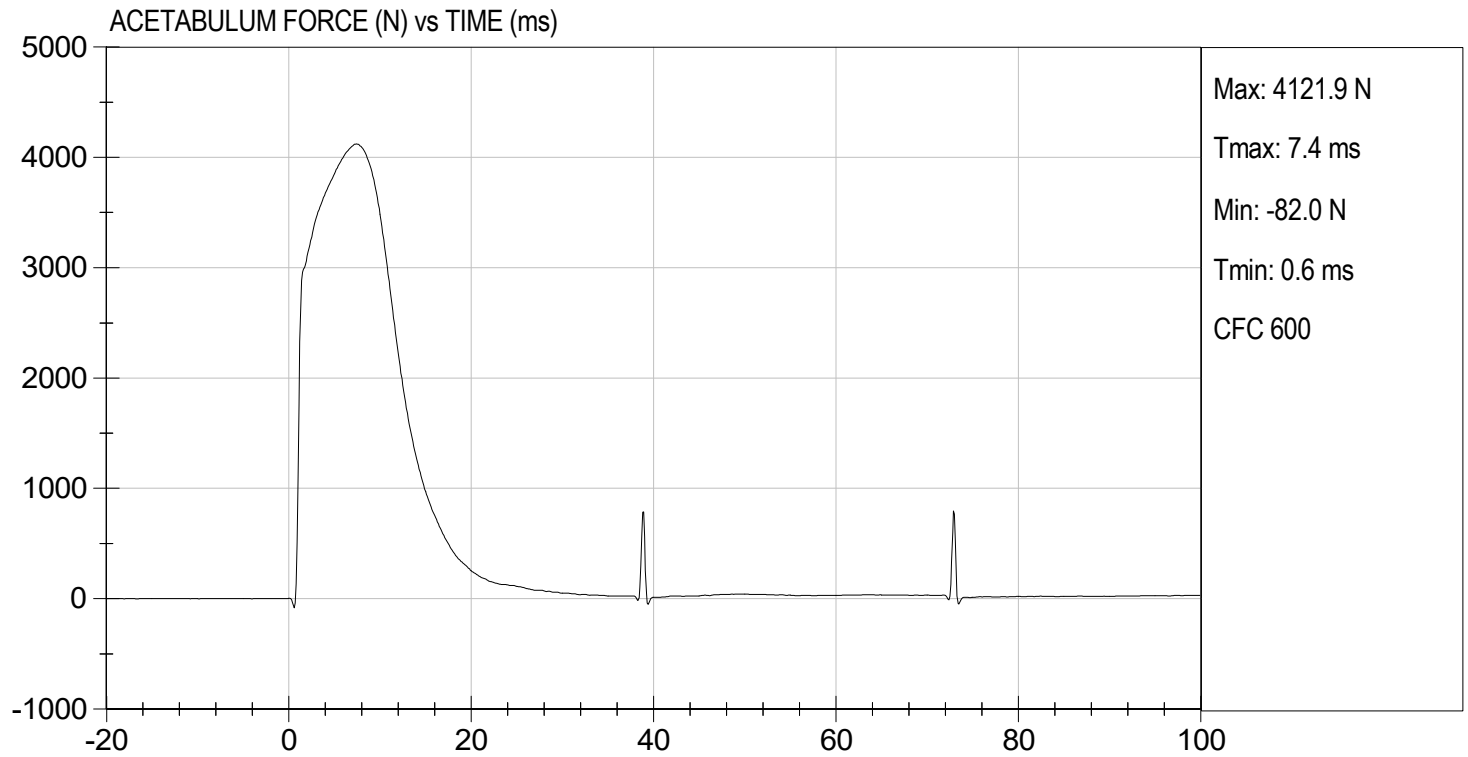
TEST DATE: 03/08/2023  
TEST #: D230587





TEST DESC: PELVIS IMPACT  
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 03/08/2023  
TEST #: D230587



**MGA RESEARCH CORPORATION**

**ILIAC IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 296

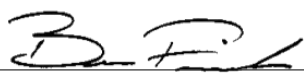
**Test I.D:** D230588

| Tested Parameter           | Units | Specification | Result | Pass/Fail |
|----------------------------|-------|---------------|--------|-----------|
| Temperature                | deg C | 20.6 to 22.2  | 21.8   | Pass      |
| Humidity                   | %     | 10 to 70      | 27     | Pass      |
| Impact Velocity            | m/s   | 4.20 to 4.40  | 4.27   | Pass      |
| Maximum Probe Acceleration | G's   | 36 to 45      | 37     | Pass      |
| Pelvis Y Acceleration      | G's   | 28 to 39      | 29     | Pass      |
| Peak Pelvis Iliac Force    | N     | 4100 to 5100  | 4,214  | Pass      |
| Overall Test Results       |       |               |        | Pass      |

  
Laboratory Technician

03/07/2023

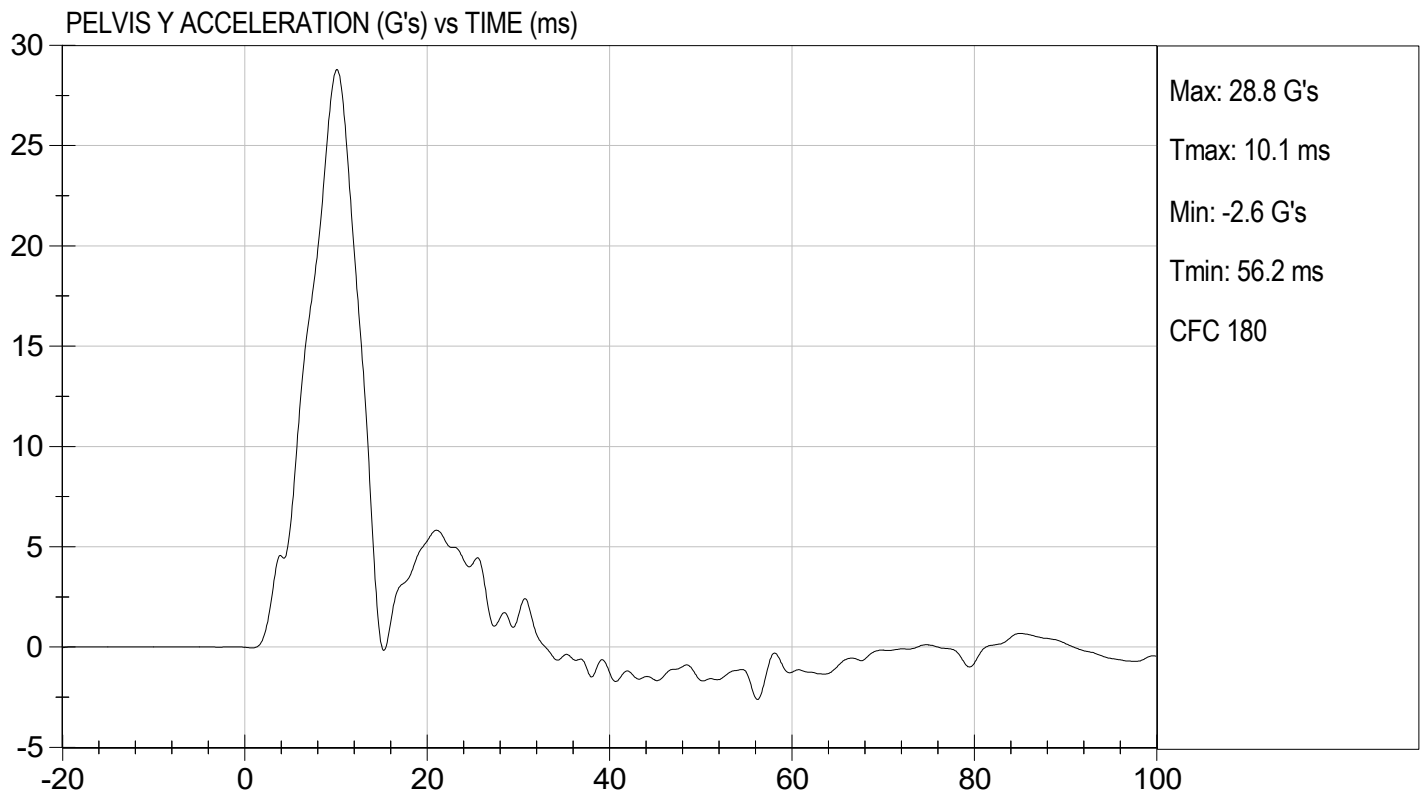
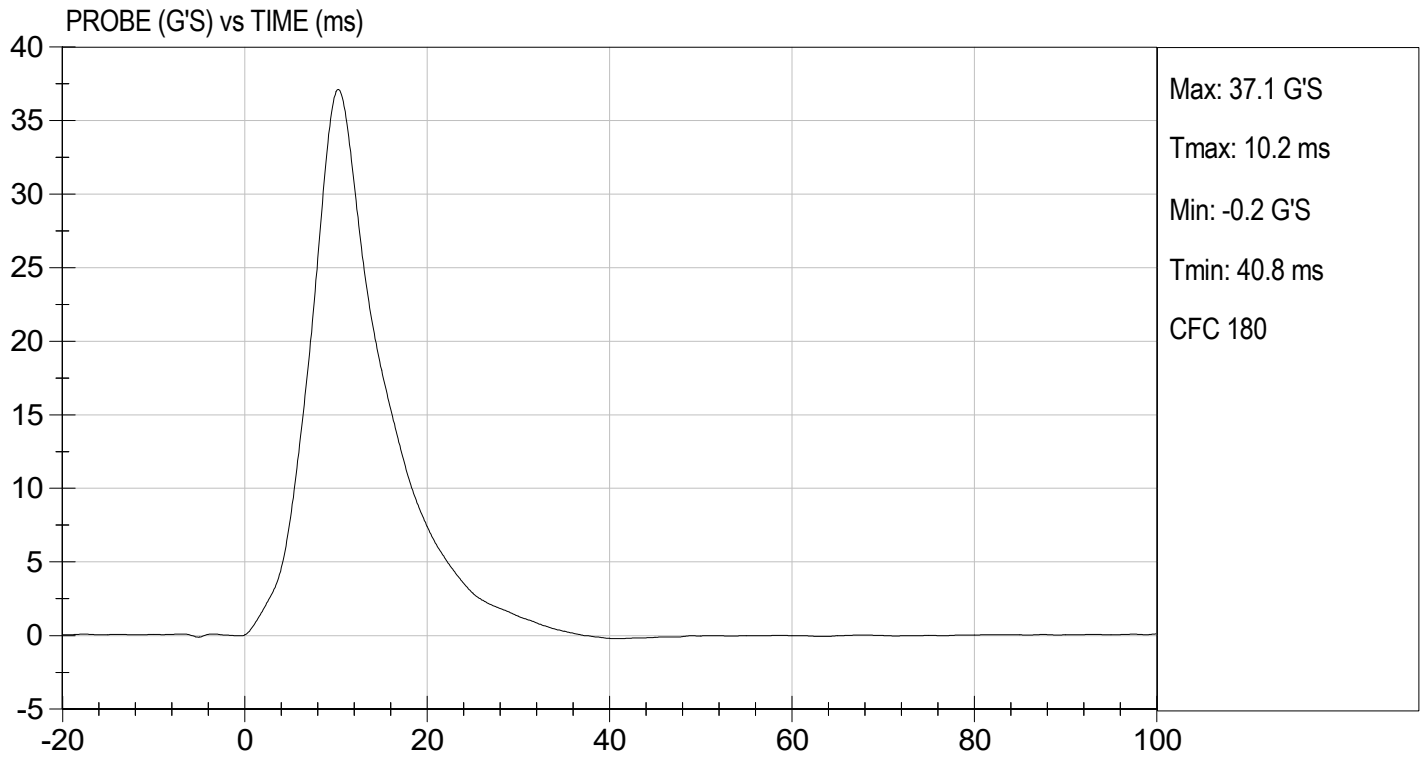
Test Date

  
Approved By



TEST DESC: ILLIAC  
VELOCITY: 14.01 ft/s, 4.27 m/s

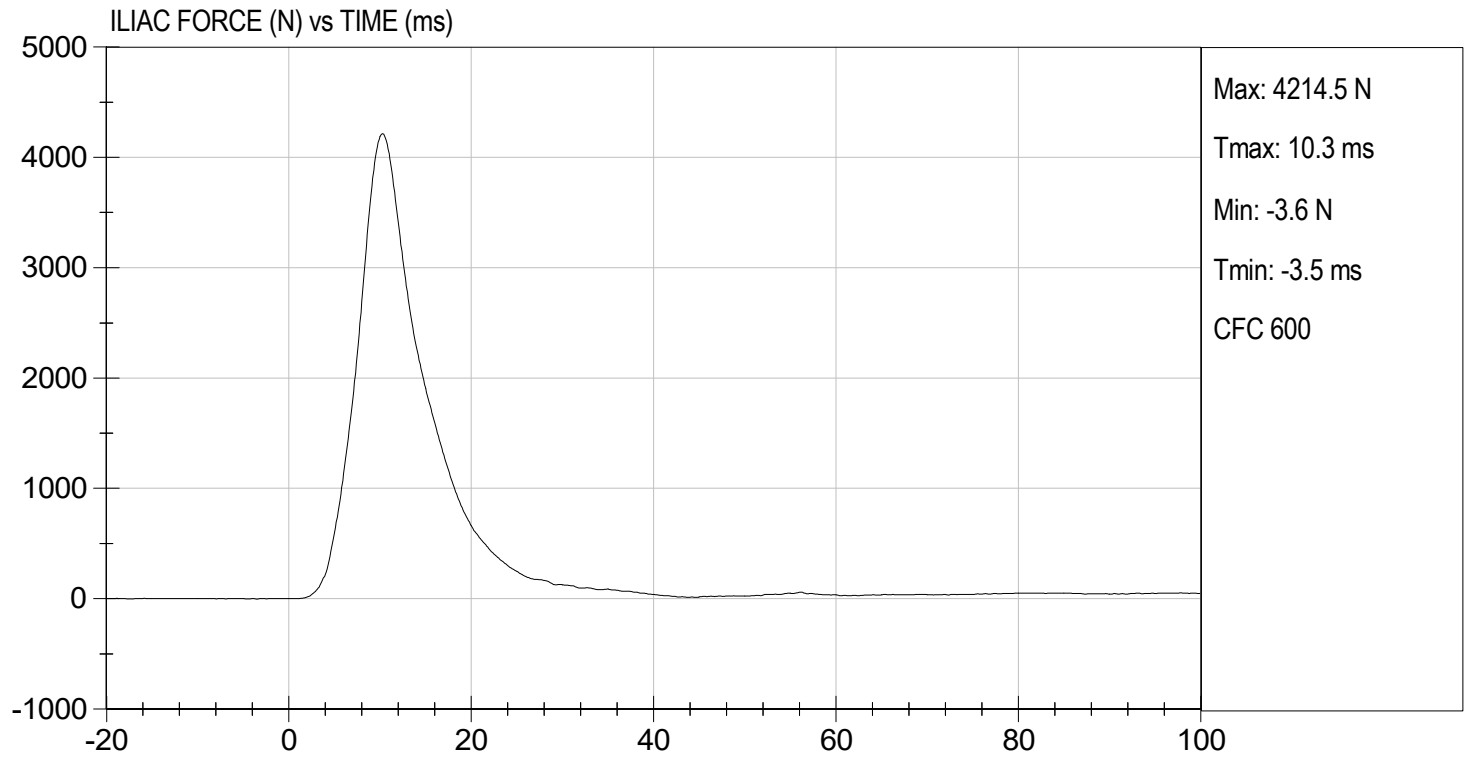
TEST DATE: 03/07/2023  
TEST #: D230588





TEST DESC: ILLIAC  
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 03/07/2023  
TEST #: D230588





## SID-IIs Pelvis Plug Certification Test

Plug S/N 15368

Test Number 19715

Report Number 19767

Test Date 7/20/2021 1:08:35 PM

|                    | Test Results | Spec Min | Spec Max |
|--------------------|--------------|----------|----------|
| Force @ 0.5 mm (N) | 262          | 50       | 600      |
| Force @ 1.5 mm (N) | 1,173        | 850      | 1,400    |
| Force @ 2.5 mm (N) | 1,474        | 1,306    | 1,618    |
| Force @ 3.0 mm (N) | 1,516        | 1,361    | 1,673    |

Testing Machine STM-20 5965542

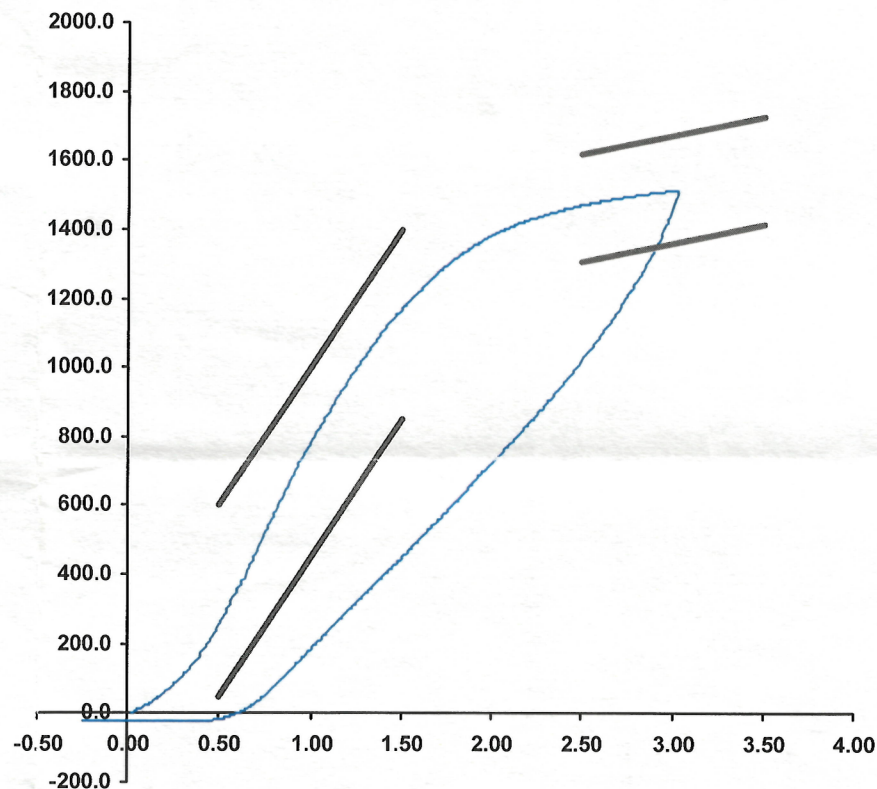
Load Cell S/N (FI360947), Units (LBS ) 1000

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

20-Jul-21

SACO Research

By : DC

Date : 7/20/2021



## SID-IIs Pelvis Plug Certification Test

Plug S/N 14834

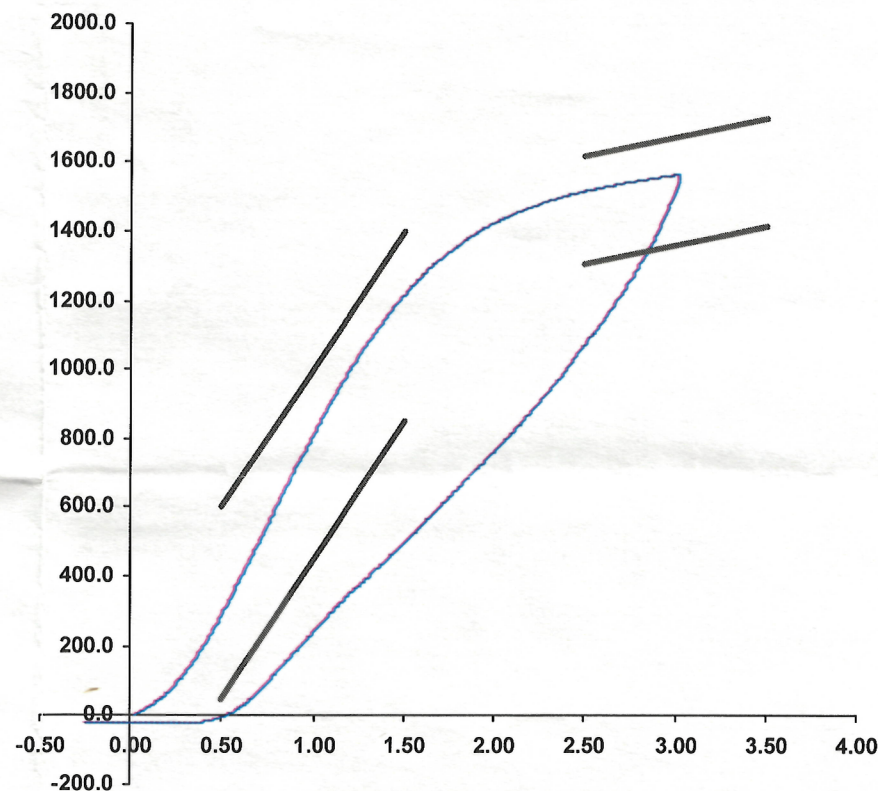
Test Number 17266

Report Number 17313

Test Date 1/28/2021 12:12:18 PM

Force (-N) vs Extension (-mm)

|                    | Test Results | Spec Min | Spec Max |
|--------------------|--------------|----------|----------|
| Force @ 0.5 mm (N) | 294          | 50       | 600      |
| Force @ 1.5 mm (N) | 1,217        | 850      | 1,400    |
| Force @ 2.5 mm (N) | 1,519        | 1,306    | 1,618    |
| Force @ 3.0 mm (N) | 1,566        | 1,361    | 1,673    |



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:

Operator

Part Number 180-4450

Template No 107  
SACO Research

28-Jan-21

By : DC Date : 1/28/2021

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

C-60

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

**Table 1 – Dummy Instrumentation**

|                                  |               |        |   | SID-IIs S/N 296 |              |                  |            |
|----------------------------------|---------------|--------|---|-----------------|--------------|------------------|------------|
|                                  |               |        |   | Serial Number   | Manufacturer | Calibration Date |            |
| Head CG Accelerometers           |               |        |   | X               | P82109       | Endevco          | 01/04/2023 |
|                                  |               |        |   | Y               | P94783       | Endevco          | 01/04/2023 |
|                                  |               |        |   | Z               | P94786       | Endevco          | 01/04/2023 |
|                                  |               |        |   | Xr              | P94938       | Endevco          | 01/04/2023 |
|                                  |               |        |   | Yr              | P96854       | Endevco          | 01/04/2023 |
|                                  |               |        |   | Zr              | P97386       | Endevco          | 01/04/2023 |
| Head Angular Rate Sensors        |               |        |   | X               | ARS7357      | DTS              | 09/06/2022 |
|                                  |               |        |   | Y               | ARS7366      | DTS              | 09/06/2022 |
|                                  |               |        |   | Z               | ARS7371      | DTS              | 09/06/2022 |
| Displacement Potentiometers      | Thoracic Rib  | Upper  | Y | G012            | FTSS         | 01/04/2023       |            |
|                                  |               | Middle | Y | G1163           | FTSS         | 01/04/2023       |            |
|                                  |               | Lower  | Y | G1158           | FTSS         | 01/04/2023       |            |
|                                  | Abdominal Rib | Upper  | Y | G1146           | FTSS         | 01/04/2023       |            |
|                                  |               | Lower  | Y | G1126           | FTSS         | 01/04/2023       |            |
| Lower Spine Accelerometers (T12) |               |        |   | X               | P79418       | Endevco          | 01/04/2023 |
|                                  |               |        |   | Y               | P79439       | Endevco          | 01/04/2023 |
|                                  |               |        |   | Z               | P79614       | Endevco          | 01/04/2023 |
| Acetabulum Load Cell             |               |        |   | Y               | ACG111       | FTSS             | 06/30/2022 |
| Iliac Wing Load Cell             |               |        |   | Y               | IWG226       | FTSS             | 06/30/2022 |
| Pelvis Plug (struck side)        |               |        |   |                 | 15368        | SACO             | 07/20/2021 |
| Pelvis Plug (non-struck side)    |               |        |   |                 | 14834        | SACO             | 01/28/2021 |

**Table 2 – Vehicle Instrumentation**

|                           |   | Serial Number | Manufacturer | Calibration Date |
|---------------------------|---|---------------|--------------|------------------|
| Vehicle Center of Gravity | X | A390927       | MSI          | 12/22/2022       |
| Vehicle Center of Gravity | Y | T29906        | Endevco      | 12/21/2022       |
| Vehicle Center of Gravity | Z | A390913       | MSI          | 12/22/2022       |
| Left Floor Sill           | Y | T32179        | Endevco      | 01/04/2023       |
| A-Pillar Sill             | Y | A391141       | MSI          | 01/04/2023       |
| A-Pillar Low              | Y | T32339        | Endevco      | 11/01/2022       |
| A-Pillar Mid              | Y | T24818        | Endevco      | 01/04/2023       |
| B-Pillar Sill             | Y | P33124        | Endevco      | 02/24/2023       |
| B-Pillar Low              | Y | A356245       | MSI          | 11/23/2022       |
| B-Pillar Mid              | Y | A394374       | MSI          | 11/15/2022       |
| Driver Seat               | Y | T29897        | Endevco      | 02/22/2023       |
| Engine Top                | X | T32316        | Endevco      | 11/01/2022       |
| Engine Top                | Y | T32324        | Endevco      | 11/01/2022       |
| Firewall                  | Y | T30607        | Endevco      | 02/24/2023       |
| Right Roof                | Y | T29904        | Endevco      | 02/24/2023       |
| Right Floor Sill          | Y | T30588        | Endevco      | 02/24/2023       |
| Rear Floorpan             | X | A390890       | MSI          | 09/27/2022       |
| Rear Floorpan             | Y | A391113       | MSI          | 09/27/2022       |

**Table 3 – Pole Instrumentation**

|             | Serial Number | Manufacturer | Calibration Date |
|-------------|---------------|--------------|------------------|
| Load Cell 1 | DG6277        | FTSS         | 07/30/2018       |
| Load Cell 2 | DG6278        | FTSS         | 07/30/2018       |
| Load Cell 3 | DG6279        | FTSS         | 07/30/2018       |
| Load Cell 4 | DG6280        | FTSS         | 07/30/2018       |
| Load Cell 5 | DG6281        | FTSS         | 07/30/2018       |
| Load Cell 6 | DG6283        | FTSS         | 07/30/2018       |
| Load Cell 7 | DG6284        | FTSS         | 07/30/2018       |
| Load Cell 8 | DG6582        | FTSS         | 07/30/2018       |