**REPORT NUMBER: SideNCAPMDB-MGA-21-040**

# NEW CAR ASSESSMENT PROGRAM (NCAP)
# Moving Deformable Barrier Side Impact Test

**TOYOTA MOTOR CORPORATION**
**2021 Toyota Prius Hybrid LE 5-Door Hatchback**
**NHTSA No.: O20215113**

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

**Test Date: April 29, 2021**

**Final Report Date: August 24, 2021**

**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**
**Room W43-410**
**Washington, DC 20590**

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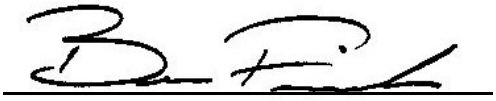
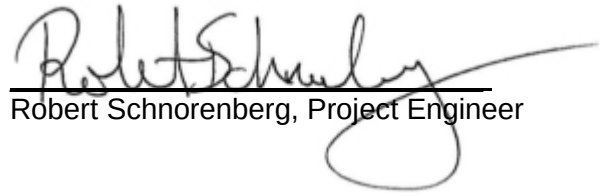
Prepared by: 
Ben Fischer, Program Manager

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: August 24, 2021

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

_____
COR, New Car Assessment Program
NHTSA, Office of Crashworthiness Standards

Date: _____

## TECHNICAL REPORT DOCUMENTATION PAGE

| | | |
|---|---|---|
| **1. Report No.**<br>SideNCAPMDB-MGA-21-040 | **2. Government Accession No.** | **3. Recipient's Catalog No.** |
| **4. Title and Subtitle**<br>Final Report of New Car Assessment Program Side Impact MDB Testing and FMVSS No. 305 Indicant Testing of 2021 Toyota Prius Hybrid LE 5-Door Hatchback, NHTSA No.: O20215113 | | **5. Report Date**<br>August 24, 2021<br>**6. Performing Organization Code**<br>MGA |
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| ***9. Performing Organization Name and Address***<br>MGA Research Corporation<br>5000 Warren Road<br>Burlington, WI 53105 | | **10. Work Unit No.**<br>**11. Contract or Grant No.**<br>DTNH22-14-D-00353 |
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| ***15. Supplementary Notes*** | | |

***16. Abstract***

A 55/28 km/h 90° Moving Deformable Barrier NCAP Side Impact Test was conducted on the subject 2021 Toyota Prius Hybrid LE 5-Door Hatchback in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP MDB Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at the MGA Research Corporation facility in Burlington, Wisconsin on April 29, 2021.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.60 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 22.1°C. The target vehicle post-test maximum crush was 163 mm at level 2. The test vehicle's performance was as follows:

| Measurement Description | Units | Driver ATD (ES-2re) | |
|---|---|---|---|
| | | Threshold | Result |
| Head Injury Criteria ($HIC_{36}$) | | 1000 | 168 |
| Maximum Thorax Rib Deflection | mm | 44 | 20 |
| Total Abdominal Force | N | 2500 | 595 |
| Pubic Symphysis Force | N | 6000 | 1658 |
| Resultant Lower Spine Acceleration | g | 82* | 25 |

| Measurement Description | Units | Passenger ATD (SID-IIs) | |
|---|---|---|---|
| | | Threshold | Result |
| Head Injury Criteria ($HIC_{36}$) | | 1000 | 249 |
| Resultant Lower Spine Acceleration | g | 82 | 45 |
| Total Pelvic Force (sum of acetabular and iliac forces) | N | 5525 | 2059 |
| Maximum Thoracic Rib Deflection | mm | 38* | 26 |
| Maximum Abdomen Rib Deflection | mm | 45* | 17 |

*Proposed IARV

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.

| | |
|---|---|
| ***17. Key Words***<br>New Car Assessment Program (NCAP)<br>Side Impact<br>MDB<br>ES-2re<br>SID-IIs | ***18. Distribution Statement***<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 |

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| Unclassified | Unclassified | 256 | |

## TABLE OF CONTENTS

## SECTION 1
## PURPOSE AND SUMMARY OF TEST

### PURPOSE

This moving deformable barrier side impact test is part of the MY 2021 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2021 Toyota Prius Hybrid LE 5-Door Hatchback. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated March 2020.

### SUMMARY

A 2021 Toyota Prius Hybrid LE 5-Door Hatchback was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.60 km/h. The target vehicle was stationary and was positioned at an angle of 63° to the line of forward motion. The side impact test was conducted by MGA Research Corporation in Burlington, Wisconsin on April 29, 2021. Pre-test and post-test photographs of the test vehicle, the MDB, and the dummies (ES-2re and SID-IIs) are included in this report.

Dummies were placed in the driver and left rear designated seating positions according to instructions specified in the OCWS NCAP Side Laboratory Test Procedure dated March 2020. The side impact event was documented by eleven (11) cameras. Camera locations are included in this report.

The dummies were instrumented in the following manner:

DRIVER ATD (ES-2re)
Primary and Redundant Head CG Triaxial Accelerometers
Chest Upper Rib, Middle Rib, and Lower Rib Y-Axis Displacement Potentiometers
Abdomen Forward, Middle, and Rear Y-Axis Load Cells
Lower Spine (T12) Triaxial Accelerometers
Pubic Symphysis Y-Axis Load Cell

PASSENGER ATD (SID-IIs)
Primary and Redundant Head CG Triaxial Accelerometers
Head Triaxial Angular Rate Sensors
Chest Upper Rib, Middle Rib, and Lower Rib Y-Axis Displacement Potentiometers
Abdomen Upper Rib and Lower Rib Y-Axis Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Acetabulum and Iliac Wing Y-Axis Load Cells

Appendix B contains the 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.

Dummy Injury readings were recorded as follows:

**DUMMY INJURY VALUES**

| Measurement Description | Units | Driver ATD (ES-2re) | |
|---|---|---|---|
| | | Threshold | Result |
| Head Injury Criteria ($HIC_{36}$) | | 1000 | 168 |
| Maximum Thorax Rib Deflection | mm | 44 | 20 |
| Total Abdominal Force | N | 2500 | 595 |
| Pubic Symphysis Force | N | 6000 | 1658 |
| Resultant Lower Spine Acceleration | g | 82* | 25 |

| Measurement Description | Units | Passenger ATD (SID-IIs) | |
|---|---|---|---|
| | | Threshold | Result |
| Head Injury Criteria ($HIC_{36}$) | | 1000 | 249 |
| Resultant Lower Spine Acceleration | g | 82 | 45 |
| Total Pelvic Force (sum of acetabular and iliac forces) | N | 5525 | 2059 |
| Maximum Thoracic Rib Deflection | mm | 38* | 26 |
| Maximum Abdomen Rib Deflection | mm | 45* | 17 |

*Proposed IARV

Supplemental restraint information is given below:

| Restraint Type | Left Front (Driver) Occupant Location 1 | | Left Rear (Passenger) 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 | Yes | Yes |
| 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

**GENERAL COMMENTS**

Left Lower A-Post Y recorded no valid data after 15 ms.
Left Front Sill Y recorded questionable data.

Low-level cyclical noise observed throughout many of the data channels.

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

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**TEST VEHICLE INFORMATION AND OPTIONS**

| | | | |
|---|---|---|---|
| NHTSA No. | O20215113 | Traction Control System (TCS) | Yes |
| Model Year | 2021 | Auto-Leveling System | No |
| Make | Toyota | Automatic Door Locks (ADL) | Yes |
| Model | Prius Hybrid LE | Power Window Auto-Reverse | Yes |
| Body Style | 5-Door Hatchback | Other Optional Feature | No |
| VIN | JTDKAMFUXM3131318 | Driver Front Airbag | Yes |
| Body Color | Supersonic Red | Driver Curtain Airbag | Yes |
| Odometer Reading (km/mi) | 270 km / 168 mi | Driver Head/Torso Airbag | No |
| Engine Displacement (L) | 1.8 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 | CVT | 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 | Yes |
| Sunroof/T-Top | No | 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 | No | 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 | TOYOTA MOTOR CORPORATION |
| Date of Manufacture | 08/20 |
| Vehicle Type | Passenger Car |

| | |
|---|---|
| GVWR (kg) | 1789 |
| GAWR Front (kg) | 1021 |
| GAWR Rear (kg) | 975 |

**VEHICLE SEATING AND WEIGHT CAPACITY DATA**

| Measured Parameter | Front | Rear | Third | Total | |
|---|---|---|---|---|---|
| Designated Seating Capacity (DSC) | 2 | 3 | | 5 | |
| Capacity Weight (VCW) (kg) | | | | 375 | (A) |
| DSC x 68.04 kg | | | | 340 | (B) |
| Rated Cargo and Luggage Weight (RCLW) (kg) | | | | 27 | (A-B) |

* Rated Cargo and Luggage Weight (RCLW) reduced by 8 kg to account for Load Carrying Capacity Reduction Label.

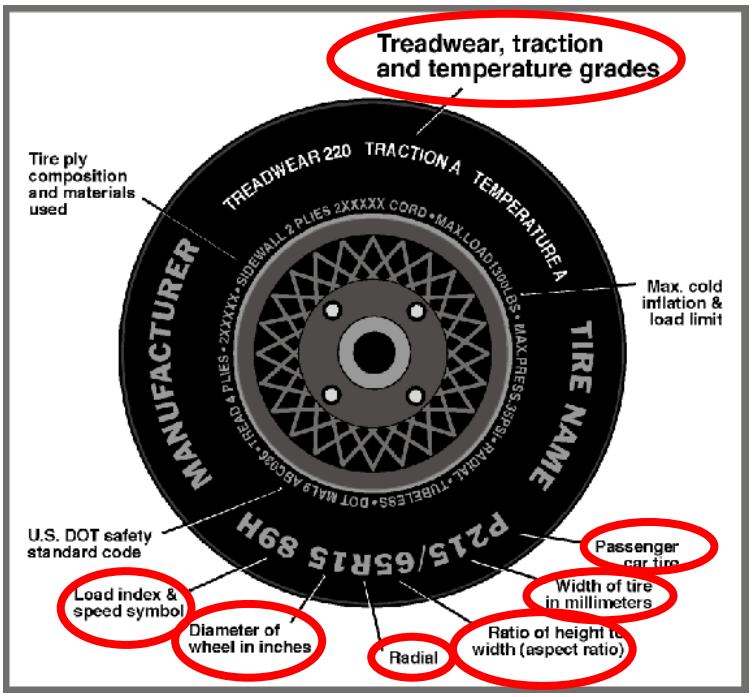
**VEHICLE SEAT TYPE**

| Seating Location | Type of Seat Pan | | | | Type of Seat Back | | |
|---|---|---|---|---|---|---|---|
| | Bucket | Bench | Split Bench | Contoured | Fixed | Adjustable w/ Lever | Adjustable 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: 2021 Toyota Prius Hybrid LE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test
NHTSA No.: O20215113
Test Date: 4/29/2021

**VEHICLE TIRE INFORMATION**




| Measured Parameter | Front | Rear |
|---|---|---|
| Max. Tire Pressure (kPa) | 300 | 300 |
| Cold Pressure (kPa) | 250 | 240 |
| Recommended Tire Size | 195/65R15 | 195/65R15 |
| Tire Size on Vehicle | 195/65R15 | 195/65R15 |
| Tire Manufacturer | Toyo | Toyo |
| Tire Model | Nano Energy A41 | Nano Energy A41 |
| Treadwear | 300 | 300 |
| Traction | B | B |
| Temperature Grade | B | B |
| Tire Plies Sidewall | 1 Polyester | 1 Polyester |
| Tire Plies Body | 2 Steel, 1 Polyester, 1 Nylon | 2 Steel, 1 Polyester, 1 Nylon |
| Load Index/Speed Symbol | 91S | 91S |
| Tire Material | Rubber | Rubber |
| DOT Safety Code Left | N39N 6H3 2820 | N39N 6H3 2720 |
| DOT Safety Code Right | N39N 6H3 2820 | N39N 6H3 2820 |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**TEST VEHICLE TIRE PRESSURES**

| | Units | LF | RF | LR | RR |
|---|---|---|---|---|---|
| As Delivered | kPa | 270 | 265 | 265 | 265 |
| Tire Placard | kPa | 250 | 250 | 240 | 240 |
| Owner's Manual | kPa | 250 | 250 | 240 | 240 |
| As Tested | kPa | 250 | 250 | 240 | 240 |

**MDB TIRE SPECIFICATIONS**

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

**TEST VEHICLE AXLE WEIGHTS**

| | Units | As Delivered (UVW) | | | As Tested (ATW) | | | Fully Loaded | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Front | Rear | Total | Front | Rear | Total | Front | Rear | Total |
| Left | kg | 441.0 | 275.0 | | 485.0 | 332.0 | | 479.5 | 342.5 | |
| Right | kg | 401.0 | 282.0 | | 415.5 | 315.0 | | 406.0 | 327.0 | |
| Ratio | % | 60.2% | 39.8% | | 58.2% | 41.8% | | 56.9% | 43.1% | |
| Totals | kg | 842.0 | 557.0 | 1399.0 | 900.5 | 647.0 | 1547.5 | 885.5 | 669.5 | 1555.0 |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter | Units | Value | |
|---|---|---|---|
| Total Delivered Weight (UVW) | kg | 1399.0 | (A) |
| Sum of Actual Weight of 2 P572 ATDs Used | kg | 129 | (B) |
| Rated Cargo/Luggage Weight (RCLW) | kg | 27 | (C) |
| Calculated Test Vehicle Target Weight (TVTW) | kg | 1555.0 | (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 | Fully Loaded | As Tested | Meets Requirement* |
|---|---|---|---|---|
| Left Front | mm | 656 | 663 | Yes |
| Right Front | mm | 676 | 669 | Yes |
| Right Rear | mm | 663 | 673 | Yes |
| Left Rear | mm | 652 | 649 | Yes |
| Vehicle CG (Aft of Front Axle) | mm | 1161 | 1127 | |
| Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline) | mm | 44 | 43 | |

* ND=Nose Down (-), NU=Nose Up (+) ** LD=Left Down (-), LU=Left Up (+)
*** The "As Tested" vehicle attitude measurements must be equal to or within ± 10 mm of the "Fully Loaded" vehicle attitude measurements at each wheel well.

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

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

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

| Component Description | Units | Weight |
|---|---|---|
| Weight of Ballast Added | kg | |
| Components Removed: LR taillight, rear bumper, rear fascia | kg | 16 |

**TEST SURFACE MARKINGS**

| | Units | Distance from 63° Impact Angle Line |
|---|---|---|
| Fore 25 mm Target | mm | 882 |
| Aft 25 mm Target | mm | 870 |
| Pre-Impact Angle Line | mm | 100 |

| Parallel Track Target | Units | X Location | Y Location |
|---|---|---|---|
| A | mm | 0 | 0 |
| B | mm | | |
| C | mm | | |
| D | mm | | |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**SEAT POSITIONING**

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

**SCRL ANGLE RANGE**

| Seat | SCRL (°) | | |
|---|---|---|---|
| | Max | Min | Mid |
| Driver Seat | 19.0 | 13.9 | 16.5 |
| Front Passenger Seat | Fixed | Fixed | Fixed |
| Front Center Seat | | | |
| Struck Side Rear Seat | Fixed | Fixed | Fixed |
| Non-Struck Side Rear Seat | Fixed | Fixed | Fixed |
| Rear Center Seat | Fixed | Fixed | Fixed |

**SEAT HEIGHT AND ANGLE**

| Seat | As-Tested SCRL Angle (Mid) (°) | As-Tested SCRP Height (mm) | SCRP Height Position | SCRP Height (mm) | | |
|---|---|---|---|---|---|---|
| | | | | Rear-Most | Mid | Forward-Most |
| Driver Seat | 16.5 | Fixed | Max | Fixed | Fixed | Fixed |
| | | | Mid | Fixed | Fixed | Fixed |
| | | | Min | Fixed | Fixed | Fixed |
| Front Passenger Seat | Fixed | 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**

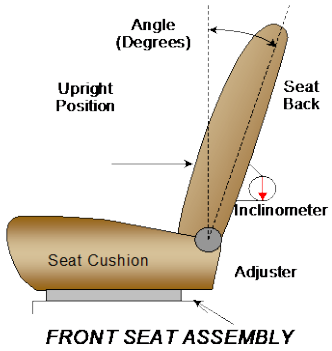
Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**SEAT FORE/AFT POSITIONS**

| Seat | Total Fore/Aft Travel | | Test Position from Forward-Most Position | |
|---|---|---|---|---|
| | mm | Detents (1st as 1) | mm | Detent (1st as 0) |
| Driver Seat | 260 | 27 | 130 | 13 |
| Front Passenger Seat | 260 | 27 | 130 | 13 |
| 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 to the manufacturer's designated design angle. 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 seat back is positioned such that the dummy's head is level. The rear center and non-struck side rear outboard seat backs are positioned in a similar manner as the struck-side rear seat back.




| Seat | Total Seat Back Angle Range | | Test Position from Vertical | |
|---|---|---|---|---|
| | Degrees | Detents (1st as 1) | Degrees | Detent (1st as 0) |
| Driver Seat | 63.5 | 33 | 3.1 | 5 |
| Front Passenger Seat | 64.1 | 33 | 2.8 | 5 |
| Front Center Seat | | | | |
| Struck Side Rear Seat | Fixed | | -6.8 | |
| Non-Struck Side Rear Seat | Fixed | | -6.8 | |
| Rear Center Seat | Fixed | | -6.8 | |

Seat back angles measured on outboard headrest post.

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

### 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 | 4 | 0 (Uppermost as 0) |
| Rear Seat | Fixed | |

### HEAD RESTRAINT ADJUSTMENT

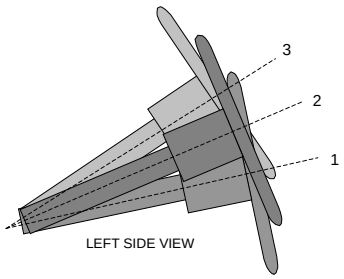
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

| | Total # of Positions | Placed in Position # |
|---|---|---|
| Driver Seat | 3 | 2 (Lowest as 0) / Fixed Fore-Aft |
| Rear Seat | Fixed | |

### STEERING COLUMN ADJUSTMENT

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

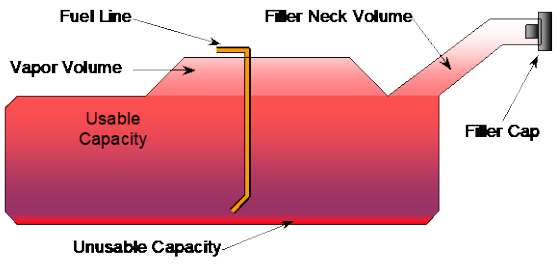
| | Wheel Angle (°) | Fore/Aft Position (mm) |
|---|---|---|
| Lowermost, Position 1 | 70.4 | |
| Geometric Center, Position 2 | 68.5 | |
| Uppermost, Position 3 | 66.5 | |
| Telescoping Steering Wheel Travel | | 38 |
| Test Position | 68.5 | 19 |



*STEERING COLUMN ASSEMBLY*

### FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The fuel pump is activated when the ignition is turned on. The filler neck is located on the driver's side.



*VEHICLE FUEL TANK ASSEMBLY*

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

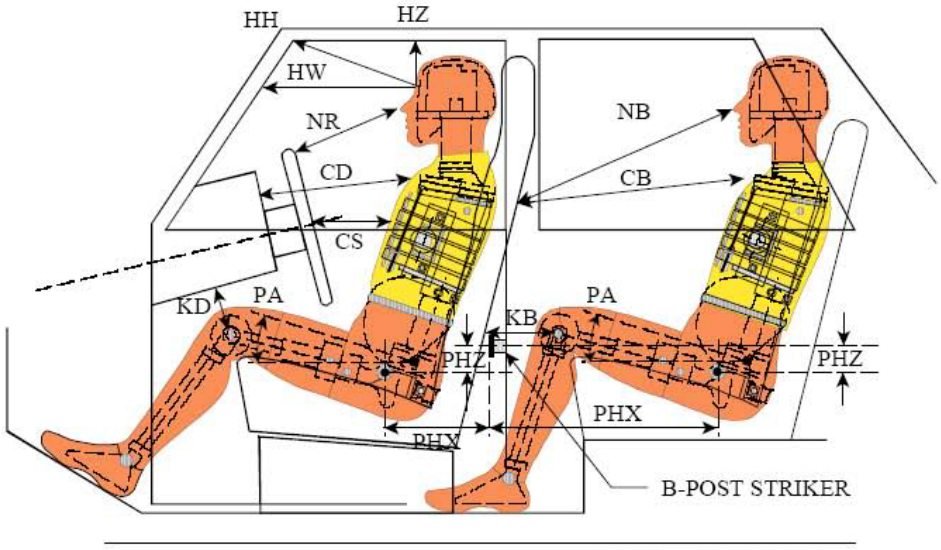
**FUEL TANK CAPACITY DATA**

| | **Liters** |
|---|---|
| Usable Capacity of Standard Tank (see S1 - Vehicle Setup Information) | 43.0 |
| Usable Capacity of Optional Tank (see S1 - Vehicle Setup Information) | |
| Usable Capacity of Standard Tank as Specified in Owner's Manual | 43.0 |
| Usable Capacity of Optional Tank as Specified in Owner's Manual | |
| 93% of Usable Capacity | 40.0 |
| Actual Amount of Solvent Used | 40.0 |
| 1/3 of Usable Capacity | 14.3 |

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

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021



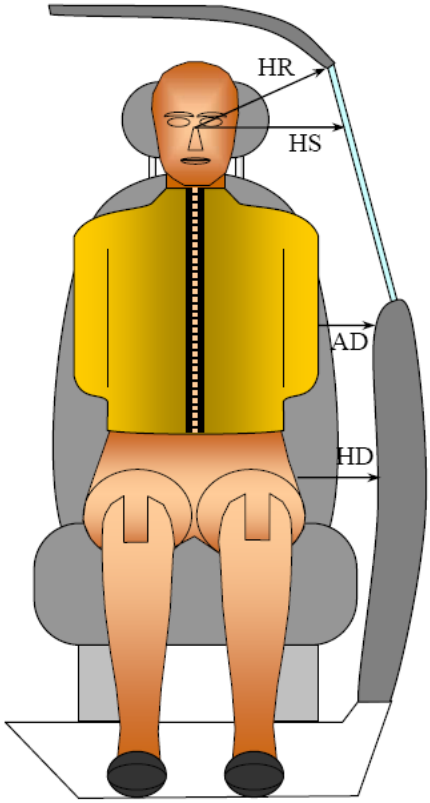

NOTE: 2-DOOR VEHICLE SHOWN. REAR DUMMY PHX & PHZ MEASUREMENTS FOR A 4-DOOR VEHICLE WOULD USE THE C-POST STRIKER AS A REFERENCE POINT

**LEFT SIDE VIEW**

| Driver Code | Pass. Code | Measurement Description | Driver | | Passenger | |
|---|---|---|---|---|---|---|
| | | | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| HH | | Head to Header | 422 | 11.7 | | |
| HW | | Head to Windshield | 658 | 0 | | |
| HZ | HZ | Head to Roof Liner | 172 | 90 | 239 | 90 |
| NR | NB | Nose to Rim/Seat Back | 411 | 22.7 | 598 | 15.1 |
| CD | CB | Chest to Dashboard/Seat Back | 558 | 8.7 | 569 | 12.5 |
| CS | | Chest to Steering Wheel | 343 | 9.2 | | |
| KDL | KBL | Left Knee to Dash/Seat Back | 154 | 33.7 | 285 | 20.0 |
| KDR | KBR | Right Knee to Dash/Seat Back | 155 | 43.2 | 280 | 20.0 |
| PAX | PAX | Pelvic Tilt Angle X | | 17.0 | | 25.9 |
| PAY | PAY | Pelvic Tilt Angle Y | | -1.1 | | -1.6 |
| PHX | PHX | Hip Point to Striker (X-Axis) | 198 | | 298 | |
| PHZ | PHZ | Hip Point to Striker (Z-Axis) | 210 | | 332 | |

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

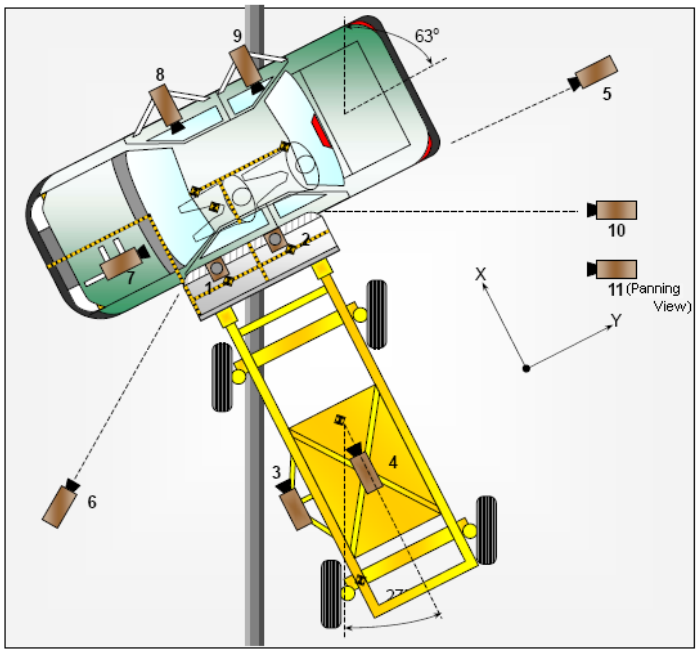
Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test
NHTSA No.: O20215113
Test Date: 4/29/2021




| Code | Measurement Description | Driver | Passenger |
|---|---|---|---|
| | | Length (mm) | |
| HR | Head to Side Header | 206 | 241 |
| HS | Head to Side Window | 357 | 368 |
| AD | Arm to Door | 112 | 163 |
| HD | Hip Point to Door | 151 | 167 |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021




**CAMERA LOCATIONS AND DATA**

| No. | Camera View | Coordinates* (mm) | | | Lens (mm) | Frame Rate (fps) |
|---|---|---|---|---|---|---|
| | | X | Y | Z | | |
| 1 | Overhead Overall | 600 | 500 | -4995 | 8.5 | 1000 |
| 2 | Overhead Close-Up | 0 | 0 | -4895 | 20 | 1000 |
| 3 | Left Impact Point (MDB) | | | | 50 | 1000 |
| 4 | Side Overall (MDB) | | | | 16 | 1000 |
| 5 | Rear | -35 | 7080 | -1540 | 24 | 1000 |
| 6 | Left Front | -1500 | -5175 | -1535 | 24 | 1000 |
| 7 | Driver Front (OB) | | | | 16 | 1000 |
| 8 | Driver Side (OB) | | | | 8 | 1000 |
| 9 | Passenger Side (OB) | | | | 8 | 1000 |
| 10 | Real Time Left Rear | | | | | 30 |
| 11 | Real Time Inrun | | | | | 30 |

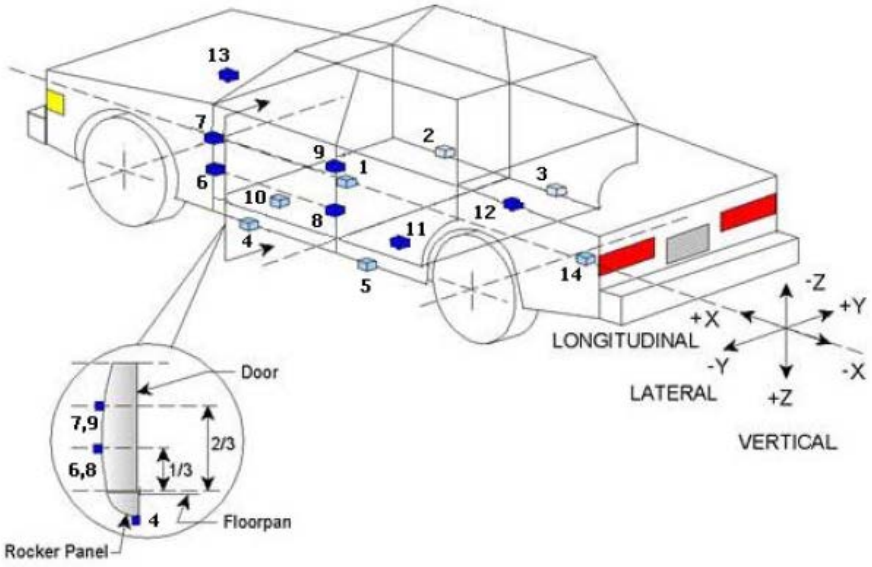
Reference: Impact Point projected to Ground; +X = To Front of MDB, + Y = To Right of MDB, +Z = Down
*All measurements accurate to ±6 mm

**INSTRUMENTATION**

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

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021



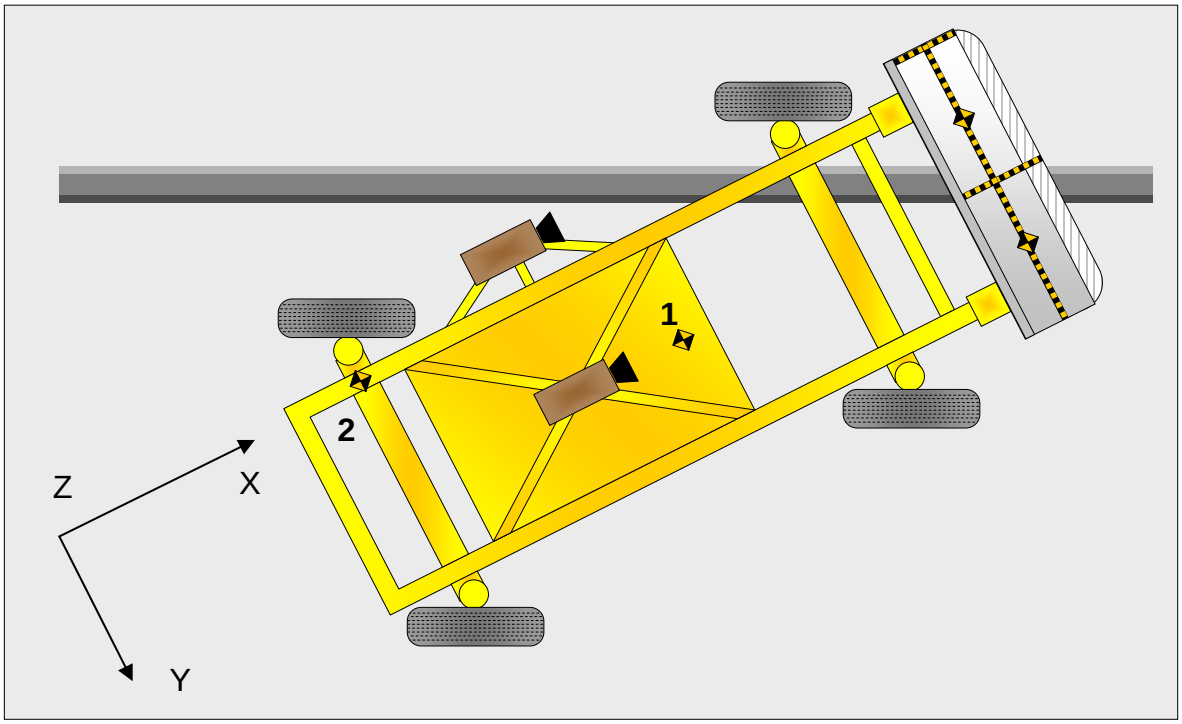

**TEST VEHICLE ACCELEROMETER LOCATIONS**

| No. | ID | Coordinates (mm) | | |
|---|---|---|---|---|
| | | X | Y | Z |
| 1 | Vehicle CG | 2341 | 167 | -220 |
| 2 | Right Sill at Front Seat | 2124 | 711 | -190 |
| 3 | Right Sill at Rear Seat | 1259 | 711 | -210 |
| 4 | Left Sill at Front Door | 2493 | -711 | -180 |
| 5 | Left Sill at Rear Door | 1438 | -711 | -200 |
| 6 | Left Lower A-Post | 3001 | -812 | -546 |
| 7 | Left Middle A-Post | 3009 | -808 | -794 |
| 8 | Left Lower B-Post | 1923 | -685 | -511 |
| 9 | Left Middle B-Post | 1882 | -693 | -763 |
| 10 | Front Seat Track | 2122 | -389 | -240 |
| 11 | Rear Seat Structure | 1694 | -386 | -246 |
| 12 | Rt. Rear Occ. Compartment | 1709 | 354 | -221 |
| 13 | Engine Block | 3731 | -20 | -796 |
| 14 | Rear Above Axle | 852 | 0 | -520 |

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

**DATA SHEET NO. 7**
**MDB ACCELEROMETER LOCATIONS**

| | | | |
|---|---|---|---|
| Test Vehicle: | 2021 Toyota Prius Hybrid LE 5-Door Hatchback | NHTSA No.: | O20215113 |
| Test Program: | NCAP Side MDB Impact Test | Test Date: | 4/29/2021 |




**MDB ACCELEROMETER LOCATIONS**

| No. | Accelerometer Location | Coordinates (mm) | | |
|---|---|---|---|---|
| | | X | Y | Z |
| 1 | MDB CG | -1105 | 0 | -330 |
| 2 | MDB Rear | -2580 | -650 | -625 |

Reference: X – MDB Face (+ forward)
Y – MDB Centerline (+ to right)
Z – Ground Plane (+ down)

| | | |
|---|---|---|
| Width between left and right MDB contact switches | mm | 1397 |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**TEST DUMMY INFORMATION AND CONTACT POINTS**

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

**POST-TEST DOOR PERFORMANCE**

| Description | Struck Side | | Non-Struck Side | | Rear Hatch |
|---|---|---|---|---|---|
| | Front | Rear | Front | Rear | |
| Remained Closed and Operational | No | No | Yes | Yes | |
| Total Separation from Vehicle at Hinges or Latches | No | No | No | No | |
| Latch or Hinge Systems Pulled Out of Their Anchorages | No | No | No | No | |
| Disengaged from Latched Position | No | No | No | No | |
| Latch Separated from Striker | No | No | No | No | |
| Jammed Shut | Yes | Yes | 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 | None |
| Windshield Damage | None |
| Side Window Damage | LF, LR window broken |
| Other Notable Effects | None |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

| Restraint Type | Struck Side Driver | | Struck Side Left Rear Passenger | |
|---|---|---|---|---|
| | 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 | Yes | Yes |
| Side Airbag (Other) | | | | |
| Seat Belt Pretensioner | Yes | Yes | No | |
| Seat Belt Load Limiter | Yes | | No | |
| Other: | No | | No | |

**IMPACT POINT LOCATION DATA**

| Measured Parameter | Units | Tolerance | Value |
|---|---|---|---|
| Vehicle Wheelbase | mm | | 2696 |
| Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point) | mm | | 408 |
| Actual Impact Point (Aft of Front Axle) | mm | | 403 |
| Horizontal Offset (+forward / -rearward) | mm | +/- 50 of intended impact point | 5 |
| Vertical Offset (+down / -up) | mm | +/- 20 of intended impact point | 4 |

**DATA SHEET NO. 9**
**MDB SUMMARY OF RESULTS**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test
NHTSA No.: O20215113
Test Date: 4/29/2021

**MDB SPECIFICATIONS**

| Measurement Description | Length (mm) |
|---|---|
| Overall Width of Framework Carriage | 1250 |
| Overall Length Including Honeycomb Face | 4119 |
| Wheelbase of Framework Carriage | 2591 |
| CG Location aft of Front Axle | 1127 |

**MDB WEIGHTS**

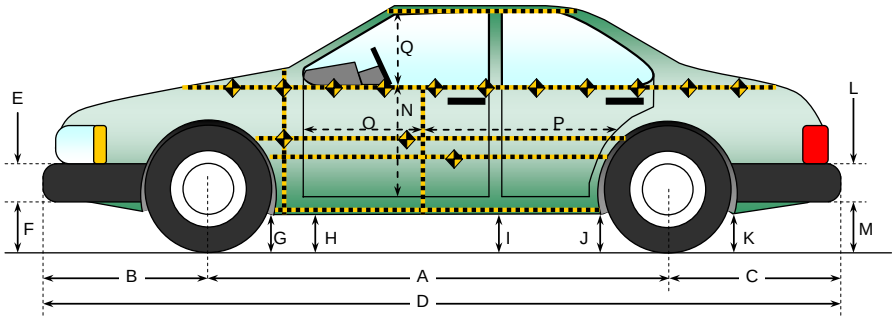
| | Units | Front Axle | Rear Axle | Total |
|---|---|---|---|---|
| Left | kg | 368.2 | 320.6 | |
| Right | kg | 400.7 | 271.4 | |
| Ratio | % | 56.5 | 43.5 | |
| Totals | kg | 768.9 | 592.0 | 1360.9 |

**SPEED AND ANGLE AT IMPACT DATA**

| Measured Parameter | Units | Requirement | Value |
|---|---|---|---|
| Trap No. 1 Velocity (Primary) | km/h | 61.1 to 62.7 | 61.60 |
| Trap No. 2 Velocity (Redundant) | km/h | 61.1 to 62.7 | 61.73 |
| MDB CL to Target Vehicle CL | degrees | 88.5 to 91.5 | 90.8 |
| MDB Forward Line of Motion to Target Vehicle CL | degrees | 62.5 to 63.5 | 63.2 |
| MDB Crabbed Angle to MDB Forward Line of Motion | degrees | 26 to 28 | 26.6 |

**DATA SHEET NO. 10**
**TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback
Test Program: NCAP Side MDB Impact Test
NHTSA No.: O20215113
Test Date: 4/29/2021




All measurements in (mm) with tolerance of ± 3 mm

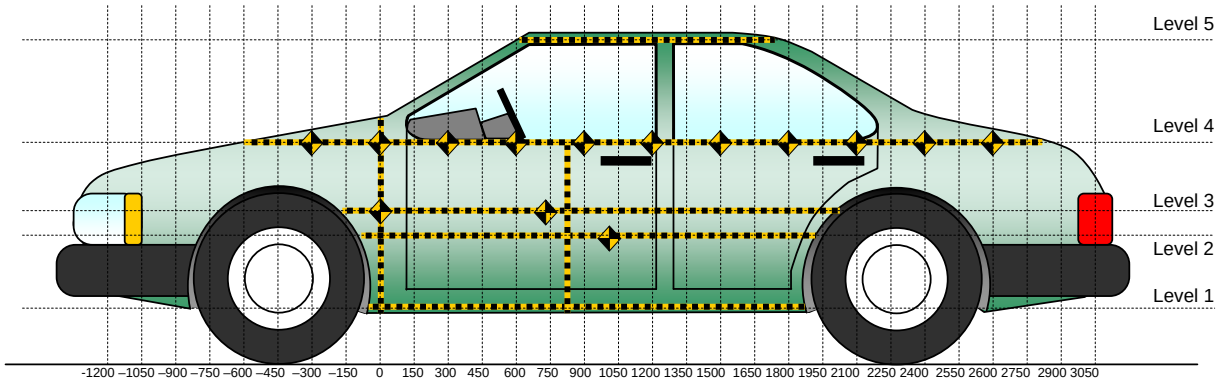
**LEFT SIDE VIEW**

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

| Code | Measurement Description | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|
| A | Wheelbase | 2696 | 2695 | 1 |
| B | Front Axle to FSOV | 949 | 970 | -21 |
| C | Rear Axle to RSOV | 842 | 823 | 19 |
| D | Total Length at Centerline | 4487 | 4488 | -1 |
| E | Front Bumper Thickness | 118 | 118 | 0 |
| F | Front Bumper Bottom to Ground | 188 | 189 | -1 |
| G | Sill Height at Front Wheel Well | 152 | 155 | -3 |
| H | Sill Height at Front Door Leading Edge | 150 | 154 | -4 |
| I | Sill Height at B Pillar | 156 | 158 | -2 |
| J1 | Sill Height at Rear Wheel Well | 163 | 167 | -4 |
| J2 | Pinch Weld Height at Rear Wheel Well | 160 | 162 | -2 |
| K | Sill Height Aft of Rear Wheel Well | 212 | 225 | -13 |
| L | Rear Bumper Thickness | N/A | N/A | N/A |
| M | Rear Bumper Bottom to Ground | 409 | 419 | -10 |
| N | Sill Height to Window Bottom Sill | 712 | 630 | 82 |
| O | Front Door Leading Edge to Impact CL | 763 | 751 | 12 |
| P | Rear Door Trailing Edge to Impact CL | 1141 | 1129 | 12 |
| Q | Front Window Opening | 486 | 511 | -25 |
| R | Right Side Length | 3794 | 3796 | -2 |
| S | Left Side Length | 3794 | 3795 | -1 |
| T | Vehicle Width at B Post | 1778 | 1762 | 16 |
| U | Front Wheel Track Width | 1534 | | |
| V | Rear Wheel Track Width | 1534 | | |

**DATA SHEET NO. 11**
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021




All Measurements Shown in mm

**LEFT SIDE VIEW**

**MAXIMUM EXTERIOR CRUSH MEAUREMENTS**

| Level | Measurement Description | Height Above Ground | Maximum Exterior Static Crush | Distance from Impact |
|---|---|---|---|---|
| 1 | Sill Top | 262 | 42 | 300 |
| 2 | Occupant H-Point | 501 | 163 | 750 |
| 3 | Mid Door | 571 | 153 | 600 |
| 4 | Window Sill | 836 | 151 | 1500 |
| 5 | Window Top | 1400 | 16 | 1650 |

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

## DATA SHEET NO. 11 (CONTINUED)
## TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS

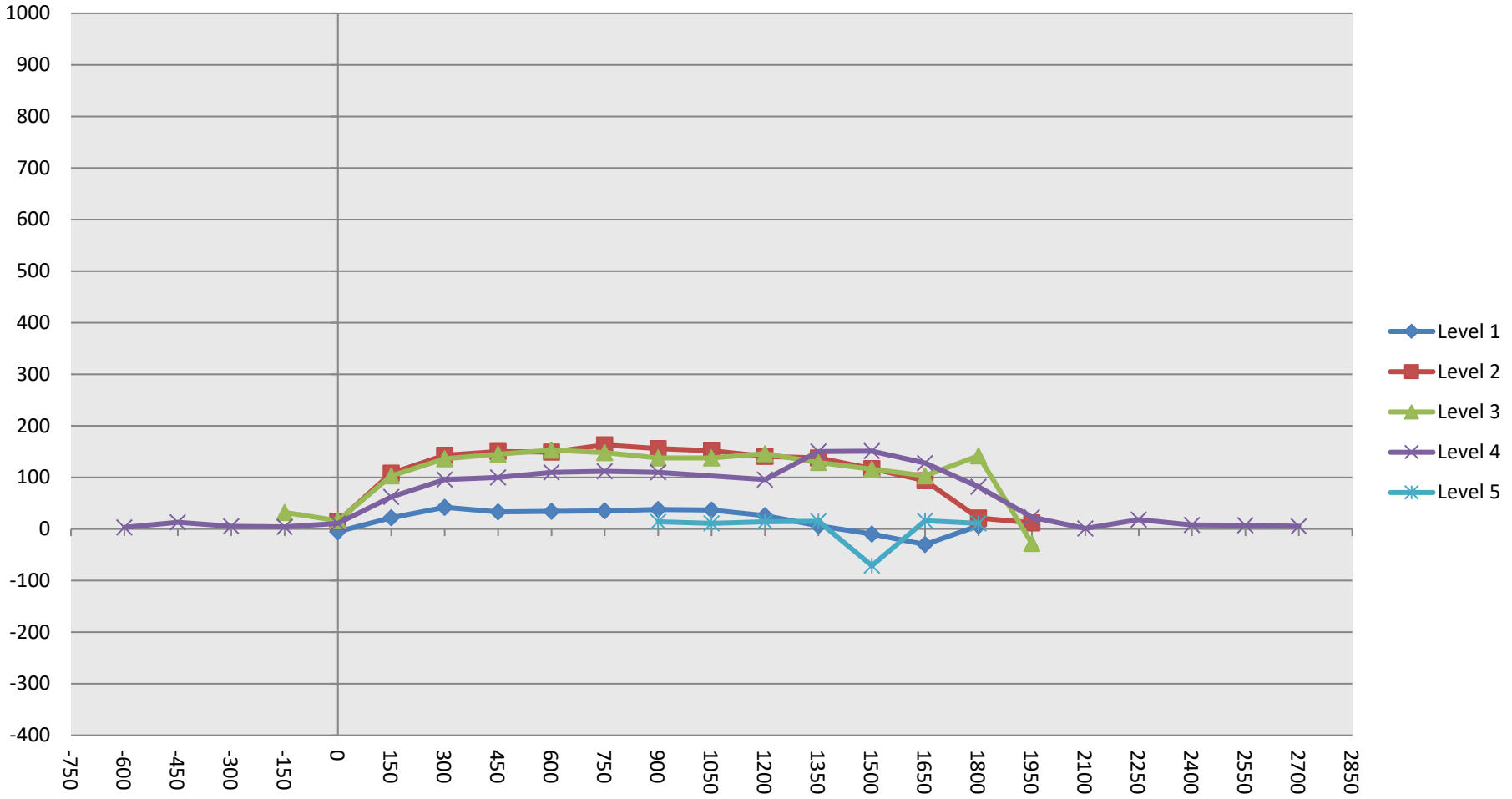
Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

| | Pre-Test | | | | | Post-Test | | | | | Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| -2100 | | | | | | | | | | | | | | | |
| -1950 | | | | | | | | | | | | | | | |
| -1800 | | | | | | | | | | | | | | | |
| -1650 | | | | | | | | | | | | | | | |
| -1500 | | | | | | | | | | | | | | | |
| -1350 | | | | | | | | | | | | | | | |
| -1200 | | | | | | | | | | | | | | | |
| -1050 | | | | | | | | | | | | | | | |
| -900 | | | | | | | | | | | | | | | |
| -750 | | | | | | | | | | | | | | | |
| -600 | | | | 353 | | | | | 356 | | | | | 3 | |
| -450 | | | | 322 | | | | | 335 | | | | | 13 | |
| -300 | | | | 297 | | | | | 302 | | | | | 5 | |
| -150 | | | 221 | 280 | | | | 253 | 284 | | | | 32 | 4 | |
| 0 | 240 | 221 | 220 | 273 | | 235 | 236 | 236 | 284 | | -5 | 15 | 16 | 11 | |
| 150 | 244 | 223 | 221 | 267 | | 266 | 331 | 324 | 329 | | 22 | 108 | 103 | 62 | |
| 300 | 248 | 225 | 221 | 260 | | 290 | 368 | 357 | 356 | | 42 | 143 | 136 | 96 | |
| 450 | 252 | 226 | 222 | 254 | | 285 | 376 | 367 | 354 | | 33 | 150 | 145 | 100 | |
| 600 | 254 | 227 | 223 | 248 | | 288 | 376 | 376 | 358 | | 34 | 149 | 153 | 110 | |
| 750 | 255 | 229 | 224 | 244 | | 290 | 392 | 372 | 356 | | 35 | 163 | 148 | 112 | |
| 900 | 256 | 231 | 226 | 240 | 501 | 294 | 387 | 364 | 350 | 515 | 38 | 156 | 138 | 110 | 14 |
| 1050 | 256 | 232 | 226 | | 495 | 293 | 384 | 364 | | 506 | 37 | 152 | 138 | | 11 |
| 1200 | 255 | 234 | 229 | 238 | 493 | 281 | 375 | 375 | 334 | 507 | 26 | 141 | 146 | 96 | 14 |
| 1350 | 245 | 236 | 231 | 236 | 494 | 251 | 374 | 360 | 386 | 509 | 6 | 138 | 129 | 150 | 15 |
| 1500 | 239 | 237 | 233 | 236 | 583 | 229 | 354 | 349 | 387 | 512 | -10 | 117 | 116 | 151 | -71 |
| 1650 | 239 | 235 | 231 | 236 | 525 | 209 | 329 | 334 | 364 | 541 | -30 | 94 | 103 | 128 | 16 |
| 1800 | 233 | 228 | 227 | 238 | 561 | 239 | 249 | 369 | 320 | 572 | 6 | 21 | 142 | 82 | 11 |
| 1950 | | 221 | 220 | 240 | | | 233 | 192 | 263 | | | 12 | -28 | 23 | |
| 2100 | | | | 245 | | | | | 246 | | | | | 1 | |
| 2250 | | | | 249 | | | | | 267 | | | | | 18 | |
| 2400 | | | | 258 | | | | | 266 | | | | | 8 | |
| 2550 | | | | 270 | | | | | 277 | | | | | 7 | |
| 2700 | | | | 284 | | | | | 289 | | | | | 5 | |
| 2850 | | | | | | | | | | | | | | | |
| 3000 | | | | | | | | | | | | | | | |
| 3150 | | | | | | | | | | | | | | | |
| 3300 | | | | | | | | | | | | | | | |
| 3450 | | | | | | | | | | | | | | | |
| 3600 | | | | | | | | | | | | | | | |
| 3750 | | | | | | | | | | | | | | | |
| 3900 | | | | | | | | | | | | | | | |

NOTE: 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.

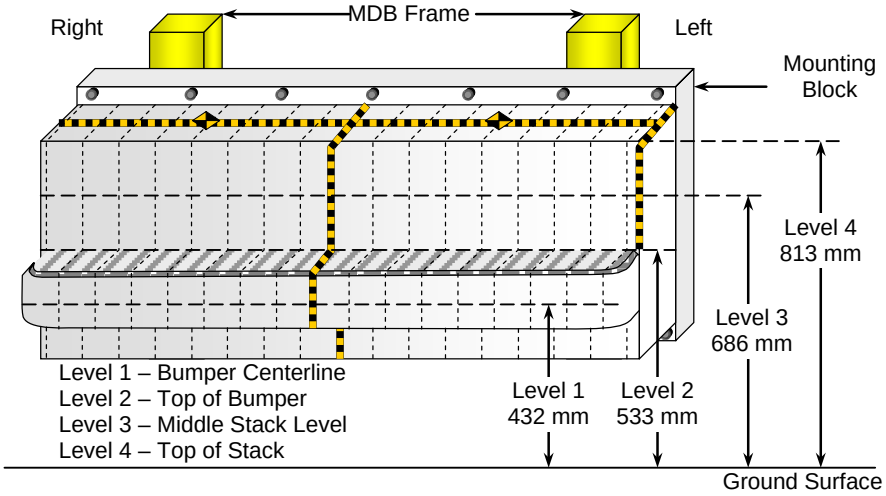
**DATA SHEET NO. 11 (CONTINUED)**
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021



**DATA SHEET NO. 12**
**MDB EXTERIOR STATIC CRUSH MEASUREMENTS**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021




**FRONT VIEW**

**MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE**

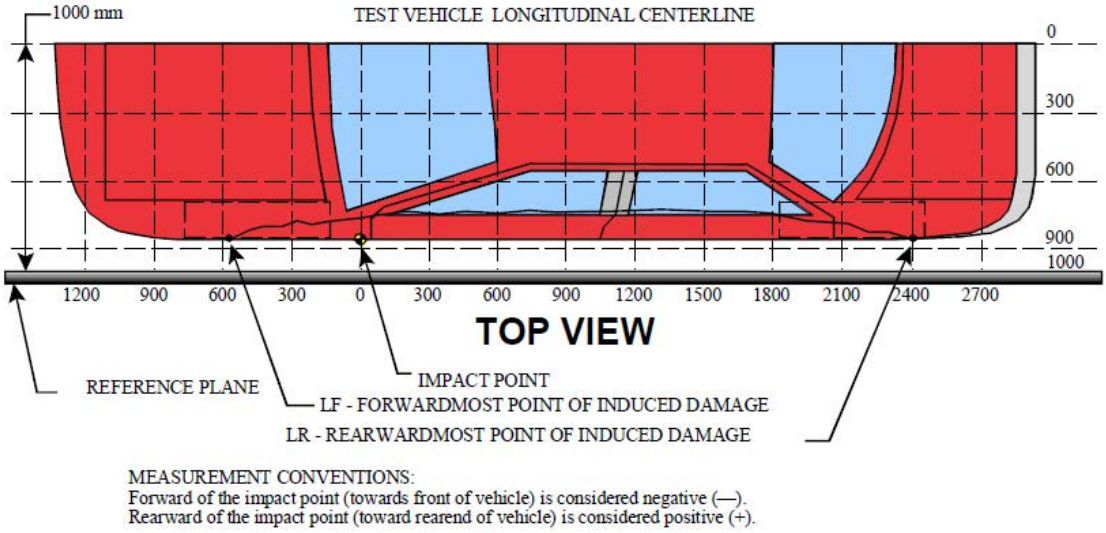
| Vertical Location | | | From Centerline | | Maximum Crush (mm) |
|---|---|---|---|---|---|
| Row | Description | Height (mm) | Distance (mm) | Direction | |
| A | Center of Bumper | 432 | 800 | Left | 244 |
| B | Top of Bumper | 533 | 800 | Left | 185 |
| C | Mid-Level | 686 | 800 | Left | 167 |
| D | Top of Stack | 813 | 800 | Left | 135 |

**DEFORMABLE BARRIER STATIC CRUSH**

| Stack Level | Distance Right of Center (mm) | | | | | | | | $C_L$ | Distance Left of Center (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 800 | 700 | 600 | 500 | 400 | 300 | 200 | 100 | 0 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 |
| 4 | 85 | 57 | 51 | 58 | 77 | 126 | 125 | 115 | 95 | 95 | 75 | 65 | 75 | 85 | 90 | 106 | 135 |
| 3 | 101 | 69 | 55 | 48 | 51 | 70 | 90 | 66 | 48 | 45 | 35 | 30 | 35 | 49 | 58 | 90 | 167 |
| 2 | 115 | 113 | 113 | 115 | 110 | 100 | 101 | 95 | 99 | 101 | 106 | 106 | 108 | 106 | 115 | 128 | 185 |
| 1 | 184 | 177 | 172 | 172 | 178 | 178 | 180 | 180 | 178 | 177 | 176 | 177 | 178 | 182 | 192 | 227 | 244 |

**DATA SHEET NO. 13**
**VEHICLE AND MDB DAMAGE PROFILE DISTANCES**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021




MEASUREMENT CONVENTIONS:
Forward of the impact point (towards front of vehicle) is considered negative (—).
Rearward of the impact point (toward rearend of vehicle) is considered positive (+).

**VEHICLE DAMAGE PROFILE DISTANCES**

| DPD | Distance from Impact Point (mm) | Level | Post-Test (mm) | Pre-Test (mm) | Max. Static Crush (mm) |
|---|---|---|---|---|---|
| 1 | 1975 | 3 | 185 | 229 | -44 |
| 2 | 1595 | 3 | 346 | 232 | 114 |
| 3 | 1215 | 3 | 374 | 229 | 145 |
| 4 | 835 | 3 | 368 | 225 | 143 |
| 5 | 455 | 3 | 367 | 222 | 145 |
| 6 | 75 | 3 | 306 | 221 | 85 |

**MDB DAMAGE PROFILE DISTANCES**

| DPD | Distance from Impact Point (mm) | Level | Post-Test (mm) | Pre-Test (mm) | Max. Static Crush (mm) |
|---|---|---|---|---|---|
| 1 | 800 mm right of center | 1 | 660 | 476 | 184 |
| 2 | 480 mm right of center | 1 | 643 | 463 | 180 |
| 3 | 160 mm right of center | 1 | 639 | 463 | 176 |
| 4 | 160 mm left of center | 1 | 629 | 463 | 166 |
| 5 | 480 mm left of center | 1 | 662 | 463 | 199 |
| 6 | 800 mm left of center | 1 | 720 | 476 | 244 |

**DATA SHEET NO. 14**
**FMVSS NO. 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback
NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test
Test Date: 4/29/2021

Test Time: 11:38 am
Temperature: 22.1°C

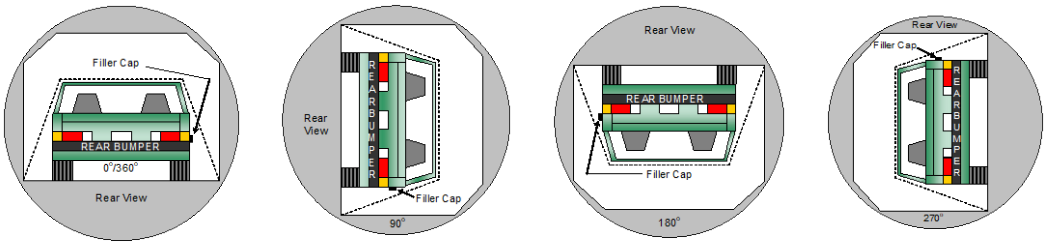
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.

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**




0°/360° 90° 180° 270°

**ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase | Rotation Time | Hold Time | Total Time |
|---|---|---|---|
| 0° to 90° | 112 | 300 | 412 |
| 90° to 180° | 110 | 300 | 410 |
| 180° to 270° | 108 | 300 | 408 |
| 270° to 360° | 111 | 300 | 411 |

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

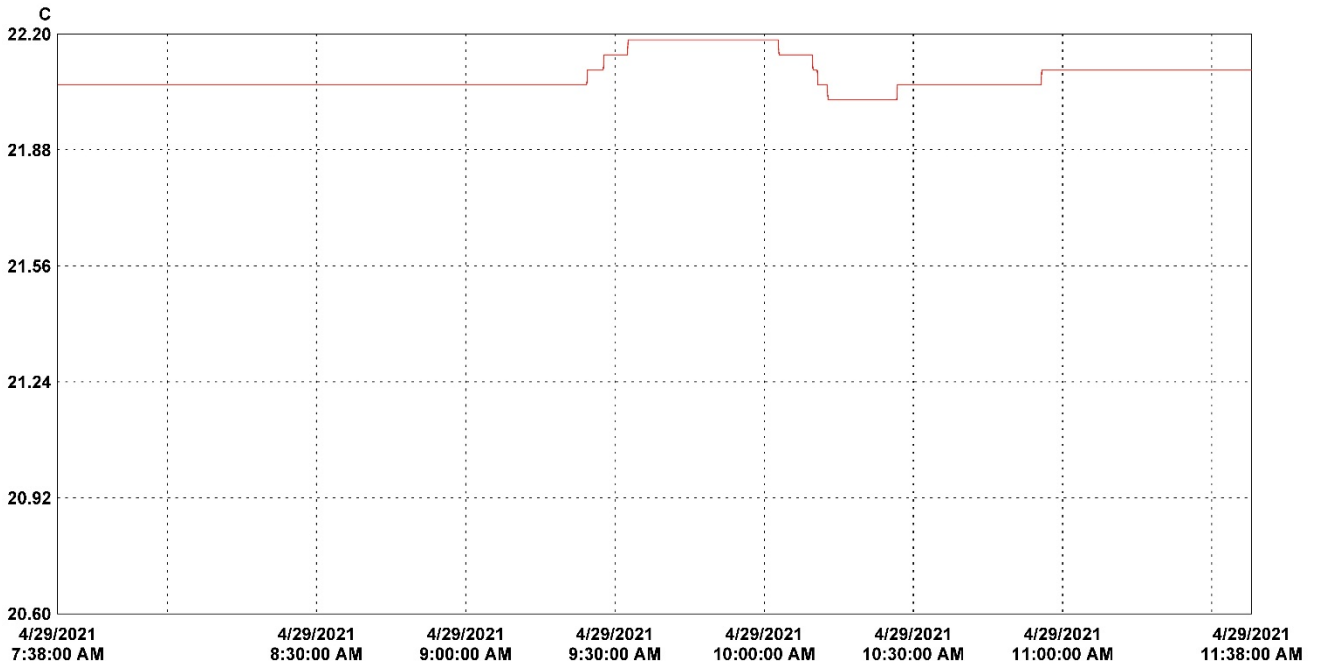
| Test Phase | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|---|---|---|---|---|
| 0° to 90° | 0.0 | 0.0 | 0.0 | |
| 90° to 180° | 0.0 | 0.0 | 0.0 | |
| 180° to 270° | 0.0 | 0.0 | 0.0 | |
| 270° to 360° | 0.0 | 0.0 | 0.0 | |

**ROLLOVER SOLVENT SPILLAGE LOCATION TABLE**

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

**DATA SHEET NO. 15**
**DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021




| LN | Serial # | Description | CH | Value | Maximum | Average | Minimum | Units | CH description | Logger file |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14182020 | VSC_North_Hall | 1 | | 22.18 | 22.09 | 22.02 | C | Temperature | 14182020_VSC_North_Hall.spl |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**ELECTRIC VEHICLE PROPULSION SYSTEM**

| | Units | Observations and Conclusions |
|---|---|---|
| Type of Electric Vehicle | | Gas-Electric Hybrid |
| Propulsion Battery Type | | Li-ion |
| Nominal Voltage | V | 207.2 |
| Physical Location of Automatic Propulsion Battery Disconnect | | Physically contained within the hybrid battery system |
| Auxiliary Battery Type | | Lead-acid Battery |

**PROPULSION BATTERY SYSTEM DATA**

| | Units | | Observations and Conclusions |
|---|---|---|---|
| Electrolyte Fluid Type | | | Flammable Liquid Electolyte |
| Electrolyte Fluid Specific Gravity | g/L | | 1.3 |
| Electrolyte Fluid Kinematic Viscosity | cSt | | 4.0 |
| Electrolyte Fluid Color | | | Clear |
| 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 2nd row seat cushion. |

**PROPULSION BATTERY STATE OF CHARGE**

| | |
|---|---|
| *For all battery types:* | |
| Voltage range corresponding to **useable energy** 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 | |
| *For batteries that are rechargeable ONLY by an energy source on the vehicle:* | |
| Voltage range corresponding to **useable energy** of the battery: | |
| Minimum State of Charge | N/A |
| Maximum State of Charge | N/A |
| Test Voltage – Maximum practicable State of Charge within Normal Operating Range | 207.8 V |

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

| | | | |
|---|---|---|---|
| Test Vehicle: | 2021 Toyota Prius Hybrid LE 5-Door Hatchback | NHTSA No.: | O20215113 |
| Test Program: | NCAP Side MDB Impact Test | Test Date: | 4/29/2021 |

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

| | |
|---|---|
| Details of Vehicle Chassis Ground Point(s) & Location(s) | Vehicle body shell at cargo area floor |

**PROPULSION BATTERY SYSTEM**

| | |
|---|---|
| Details of Electric Energy Storage/Conversion 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: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**VOLTMETER INFORMATION**

| | Units | Observations and Conclusions |
|---|---|---|
| Make | | Fluke |
| Model | | 177 |
| Serial Number | | 51490264 |
| Internal Impedance Value | MΩ | > 10 MΩ < 100 pF |
| Resolution | V | 0.001 |
| Last Calibration Date | | 3/3/2021 |

**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 | 207.8 |

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

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

| | | |
|---|---|---|
| V1 | V | 101.8 |
| V2 | V | 101.9 |

**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 | 110,000 |

| | | |
|---|---|---|
| V1' Pre-Impact | V | 23.6 |
| V2' Pre-Impact | V | 16.8 |

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

| | | | |
|---|---|---|---|
| Test Vehicle: | 2021 Toyota Prius Hybrid LE 5-Door Hatchback | NHTSA No.: | O20215113 |
| Test Program: | NCAP Side MDB Impact Test | Test Date: | 4/29/2021 |

**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.

| | | |
|---|---|---|
| Ri1 = Ro (1 + V2/V1) [(V1-V1’)/V1’] | | |
| Ri1 Pre-Impact | Ω | 729,341 |
| Ri2 = Ro (1 + V1/V2) [(V2-V2’)/V2’] | | |
| Ri2 Pre-Impact | Ω | 1,113,858 |
| Ri = The lesser of Ri1 and Ri2 | | |
| Ri Pre-Impact | Ω | 729,341 |
| Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage | | |
| Ri / Vb Pre-Impact | Ω | 3,510 |

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

| | Yes | No (Fail) |
|---|---|---|
| Is the measured Electrical Isolation Value ≥ 500 Ω/V? | X | |
| Additional Comments | None | |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**VOLTMETER INFORMATION**

| | Units | Observations and Conclusions |
|---|---|---|
| Make | | Fluke |
| Model | | 177 |
| Serial Number | | 51490264 |
| Internal Impedance Value | MΩ | > 10 MΩ < 100 pF |
| Resolution | V | 0.001 |
| Last Calibration Date | | 3/3/2021 |

**ELECTRICAL ISOLATION MEASUREMENTS**

| | | |
|---|---|---|
| Vb Post-Impact | V | 0.3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| V1 Post-Impact | V | 2.6 | Impact Time | 1 | Minutes | 18 | Seconds |
| V2 Post-Impact | V | 2.3 | | 1 | Minutes | 21 | Seconds |
| V1' Post-Impact | V | 0.1 | | 1 | Minutes | 29 | Seconds |
| V2' Post-Impact | V | 0.1 | | 1 | Minutes | 25 | Seconds |

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

| | | | |
|---|---|---|---|
| Test Vehicle: | 2021 Toyota Prius Hybrid LE 5-Door Hatchback | NHTSA No.: | O20215113 |
| Test Program: | NCAP Side MDB Impact Test | Test Date: | 4/29/2021 |

**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.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1'] | | | | | | | |
| Ri1 Post-Impact | Ω | 5,182,692 | Impact Time | 1 | Minutes | 25 | Seconds |
| Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2'] | | | | | | | |
| Ri2 Post-Impact | Ω | 5,155,652 | Impact Time | 1 | Minutes | 29 | Seconds |
| Ri = The lesser of Ri1 and Ri2 | | | | | | | |
| Ri Post-Impact | Ω | 5,155,652 | Impact Time | 1 | Minutes | 29 | Seconds |
| Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage | | | | | | | |
| Ri / Vb Post-Impact | Ω | 17,185,507 | Impact Time | 1 | Minutes | 29 | Seconds |

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

| | Yes | No (Fail) |
|---|---|---|
| Is the measured Electrical Isolation Value ≥ 500 Ω/V? | X | |
| Additional Comments | None | |

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

| | | | |
|---|---|---|---|
| Test Vehicle: | 2021 Toyota Prius Hybrid LE 5-Door Hatchback | NHTSA No.: | O20215113 |
| Test Program: | NCAP Side MDB Impact Test | Test Date: | 4/29/2021 |

**PROPULSION BATTERY SYSTEM COMPONENTS**

| Describe any Propulsion Battery Module movement within the passenger compartment [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 [Supply photographs as appropriate]: |
|---|
| No Intrusion |

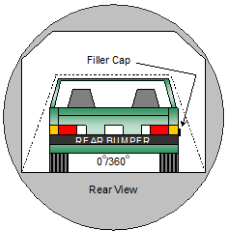
| | Yes (Fail) | No |
|---|---|---|
| Has an outside Propulsion Battery Component intruded into the passenger compartment? | | X |

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

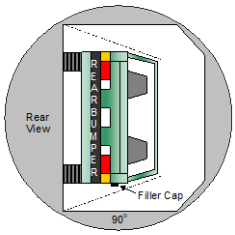
**DATA SHEET NO. 305-5**
**STATIC ROLLOVER TEST DATA**
**FOR INDICANT FMVSS NO. 305 TESTING**

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

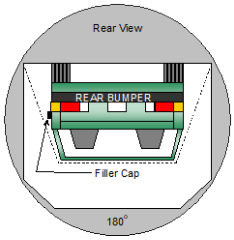
## PROPULSION BATTERY SYSTEM COMPONENTS



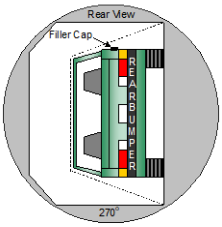
**0°/360°**



**90°**



**180°**



**270°**

## PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

| Test Phase | Rotation Time (spec. 1-3 min) | | | | FMVSS 301 Hold Time | | Total Time | | | | Next Whole Minute Interval | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0° - 90° | 1 | min | 52 | sec | 5 | min | 6 | min | 52 | sec | 7 | min |
| 90° - 180° | 1 | min | 50 | sec | 5 | min | 6 | min | 50 | 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 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: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**VOLTMETER INFORMATION**

| | Units | Observations and Conclusions |
|---|---|---|
| Make | | Fluke |
| Model | | 177 |
| Serial Number | | 51490264 |
| Internal Impedance Value | MΩ | > 10 MΩ < 100 pF |
| Resolution | V | 0.001 |
| Last Calibration Date | | 3/3/2021 |

**ELECTRICAL ISOLATION MEASUREMENTS**

| | | |
|---|---|---|
| Vb Post-Impact | V | 0.0 |

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 | | 39 | |
| | 0.0 | | 180° | 2 | | 32 | |
| | 0.0 | | 270° | 2 | | 9 | |
| | 0.0 | | 360° | 2 | | 16 | |
| V2 | 0.0 | V | 0° | | min | | sec |
| | 0.0 | | 90° | 2 | | 42 | |
| | 0.0 | | 180° | 2 | | 35 | |
| | 0.0 | | 270° | 2 | | 12 | |
| | 0.0 | | 360° | 2 | | 19 | |
| V1' | 0.0 | V | 0° | | min | | sec |
| | 0.0 | | 90° | 2 | | 49 | |
| | 0.0 | | 180° | 2 | | 43 | |
| | 0.0 | | 270° | 2 | | 20 | |
| | 0.0 | | 360° | 2 | | 28 | |
| V2' | 0.0 | V | 0° | | min | | sec |
| | 0.0 | | 90° | 2 | | 45 | |
| | 0.0 | | 180° | 2 | | 39 | |
| | 0.0 | | 270° | 2 | | 15 | |
| | 0.0 | | 360° | 2 | | 24 | |

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

Test Vehicle: 2021 Toyota Prius Hybrid LE 5-Door Hatchback NHTSA No.: O20215113
Test Program: NCAP Side MDB Impact Test Test Date: 4/29/2021

**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 | | 45 | |
| | Zero Volts | | 180° | 2 | | 39 | |
| | Zero Volts | | 270° | 2 | | 15 | |
| | Zero Volts | | 360° | 2 | | 24 | |
| Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2'] | | | | | | | |
| Ri2 | Zero Volts | Ω | 0° | | min | | sec |
| | Zero Volts | | 90° | 2 | | 49 | |
| | Zero Volts | | 180° | 2 | | 43 | |
| | Zero Volts | | 270° | 2 | | 20 | |
| | Zero Volts | | 360° | 2 | | 28 | |
| Ri = The lesser of Ri1 and Ri2 | | | | | | | |
| Ri | Zero Volts | Ω | 0° | | min | | sec |
| | Zero Volts | | 90° | 2 | | 49 | |
| | Zero Volts | | 180° | 2 | | 43 | |
| | Zero Volts | | 270° | 2 | | 20 | |
| | Zero Volts | | 360° | 2 | | 28 | |
| Ri / Vb = Electrical Isolation Value / Nominal Battery Voltage | | | | | | | |
| Ri / Vb | Zero Volts | Ω/V | 0° | | min | | sec |
| | Zero Volts | | 90° | 2 | | 49 | |
| | Zero Volts | | 180° | 2 | | 43 | |
| | Zero Volts | | 270° | 2 | | 20 | |
| | Zero Volts | | 360° | 2 | | 28 | |

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

| | Yes | No (Fail) |
|---|---|---|
| Is the measured Electrical Isolation Value ≥ 500 Ω/V? | X | |
| Additional Comments | None | |

# APPENDIX A
# PHOTOGRAPHS

## TABLE OF PHOTOGRAPHS

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 Three-Quarter Rear View of Test Vehicle

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

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

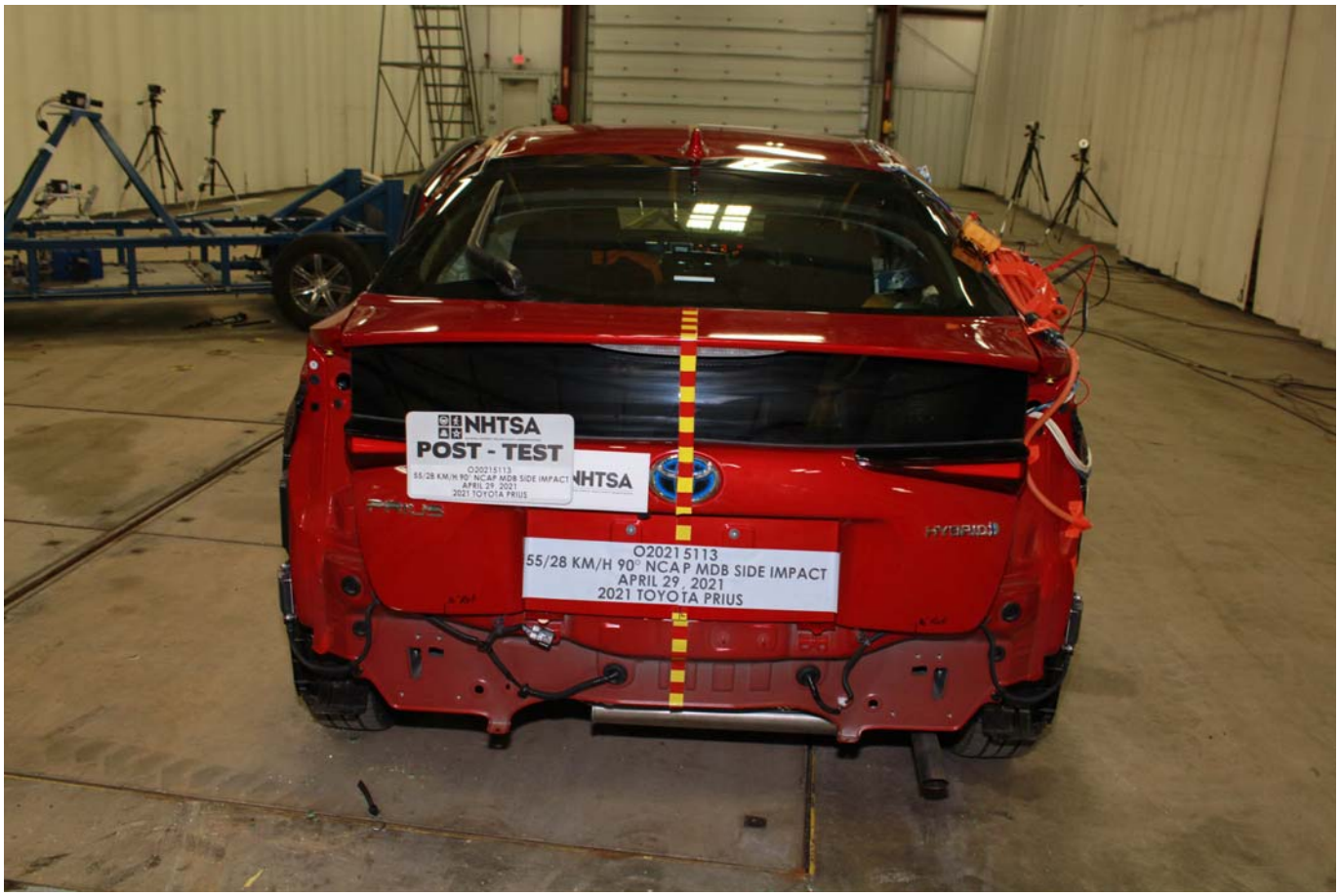


Photo No. 012 - Post-Test Rear View of Test Vehicle

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

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

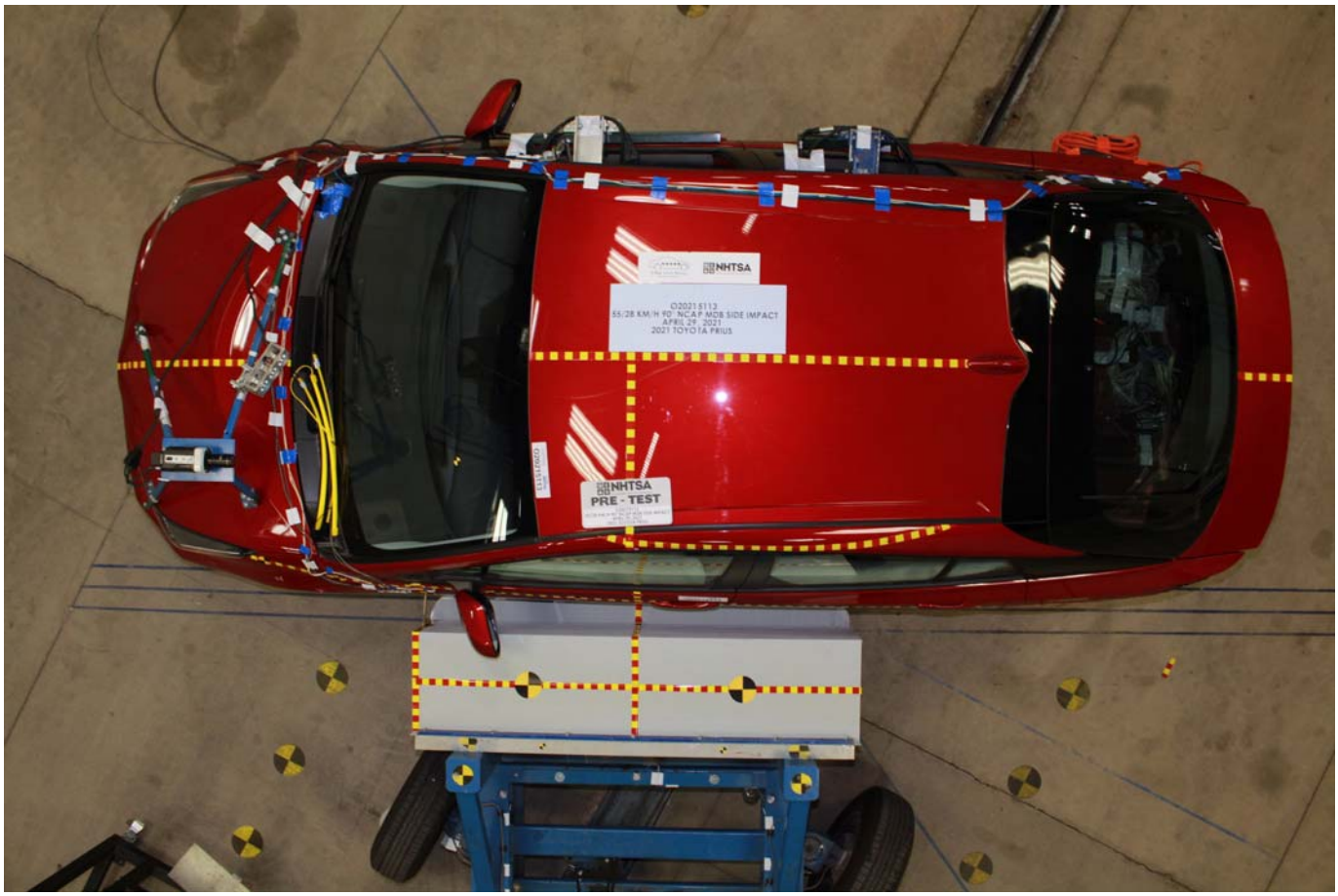


Photo No. 015 - Pre-Test Overhead View of Test Area

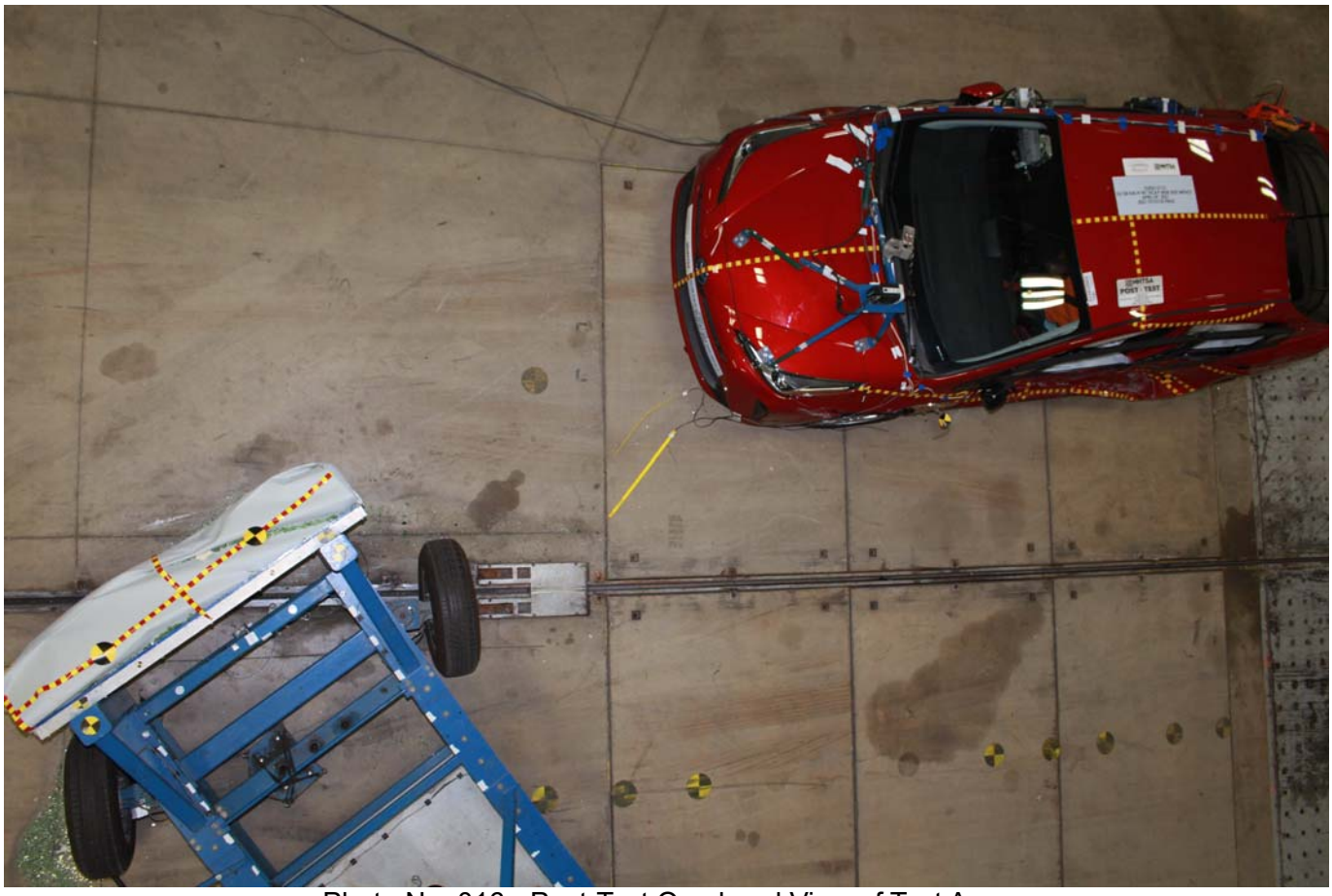


Photo No. 016 - Post-Test Overhead View of Test Area

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

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

Photo No. 021 - Pre-Test Left Front Door Latch Close-Up

Photo No. 022 - Post-Test Left Front Door Latch Close-Up

Photo No. 023 - Pre-Test Left Rear Door Latch Close-Up

Photo No. 024 - Post-Test Left Rear Door Latch Close-Up

Photo No. 025 - Pre-Test Front Close-Up View of Driver Dummy

Photo No. 026 - Post-Test Front Close-Up View of Driver Dummy

Photo No. 027 - Pre-Test Left Side View of Driver Dummy Showing Belt and Chalking

Photo No. 028 - Pre-Test Left Side View of Driver Dummy Shoulder and Door Top View

Photo No. 029 - Post-Test Left Side View of Driver Dummy Shoulder and Door Top View

Photo No. 030 - Pre-Test Frontal View of Driver Seat Back Prior to Dummy Positioning

Photo No. 031 - Pre-Test Frontal View of Driver Dummy Head and Shoulders in Relation to Head Restraint

Photo No. 032 - Pre-Test Frontal View of Driver Seat Pan Prior to Dummy Positioning

Photo No. 033 - Pre-Test Overhead View of Driver Dummy Thighs on Seat Pan

Photo No. 034 - Pre-Test Placement of Driver Dummy Feet

Photo No. 035 - Pre-Test View of Belt Anchorage for Driver Dummy

Photo No. 036 - Pre-Test Left Side View of Steering Wheel

Photo No. 037 - Pre-Test View of Disengaged Parking Brake

Photo No. 038 - Pre-Test View of Parking Brake

Photo No. 039 - Pre-Test Close-Up Left Side View of Driver Seat Track

Photo No. 040 - Pre-Test Close-Up Left Side View of Driver Seat Back

Photo No. 041 - Pre-Test Close-Up View of Driver Seat Back or Head Restraint

Photo No. 042 - Pre-Test Driver Dummy and Door Clearance View

Photo No. 043 - Post-Test Driver Dummy and Door Clearance View

Photo No. 044 - Pre-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

Photo No. 045 - Post-Test Right Side View of Driver Dummy and Front Seat of Occupant Compartment

Photo No. 046 - Pre-Test Driver Inner Door Panel View

Photo No. 047 - Post-Test Driver Inner Door Panel View

Photo No. 048 - Post-Test Driver Dummy Close-up Head Contact with Vehicle Interior View

Photo No. 049 - Post-Test Driver Dummy Close-up Head Contact with Side Airbag View

Photo No. 050 - Post-Test Driver Dummy Close-up Torso Contact with Vehicle Interior View

Photo No. 051 - Post-Test Driver Dummy Close-up Torso Contact with Side Airbag View

PHOTOGRAPH NOT APPLICABLE

Photo No. 052 - Post-Test Driver Dummy Close-up Pelvis Contact with Vehicle Interior View

Photo No. 053 - Post-Test Driver Dummy Close-up Pelvis Contact with Side Airbag View

Photo No. 054 - Post-Test Driver Dummy Close-up Knee Contact View

Photo No. 055 - Pre-Test Left Side View of Rear Passenger Dummy Showing Belt and Chalking

Photo No. 056 - Pre-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View

Photo No. 057 - Post-Test Left Side View of Rear Passenger Dummy Shoulder and Door Top View

Photo No. 058 - Pre-Test Frontal View of Rear Passenger Seat Back Prior to Dummy Positioning

Photo No. 059 - Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

Photo No. 060 - Pre-Test Overhead View of Rear Passenger Seat Pan Prior to Dummy Positioning

Photo No. 061 - Pre-Test Overhead View of Rear Passenger Dummy Thighs on Seat Pan

Photo No. 062 - Pre-Test View of Rear Passenger Dummy Neck Showing Position of Adjustable Neck Bracket

Photo No. 063 - Pre-Test View of Rear Passenger Dummy Head Showing Dummy Head is Level

Photo No. 064 - Pre-Test Placement of Rear Passenger Dummy Feet

Photo No. 065 - Pre-Test View of Belt Anchorage for Rear Passenger Dummy

Photo No. 066 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Track

Photo No. 067 - Pre-Test Close-Up Left Side View of Rear Passenger Seat Back

Photo No. 068 - Pre-Test Close-up View of Rear Passenger Seat Back or Head Restraint

Photo No. 069 - Pre-Test Rear Passenger Dummy and Door Clearance View

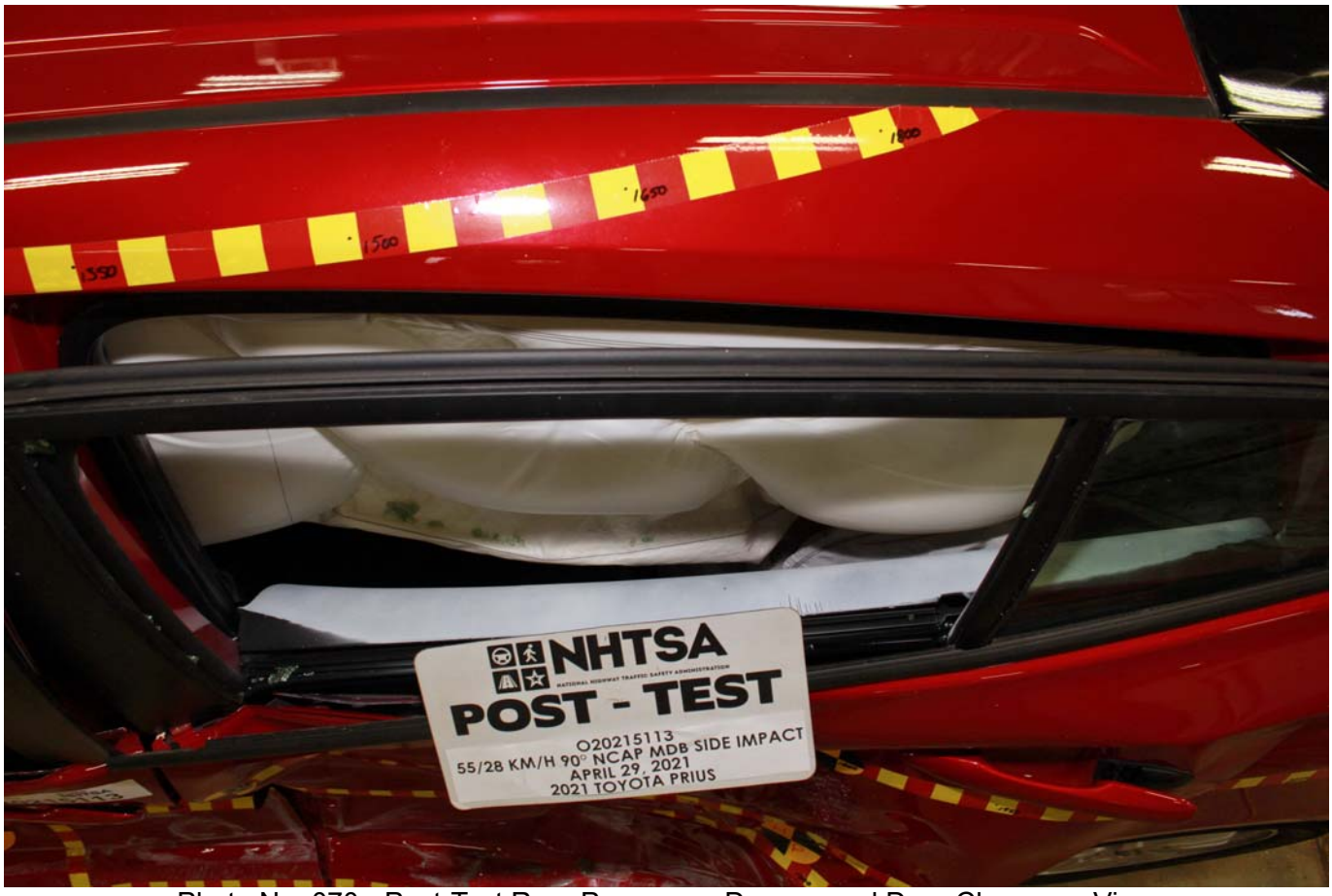


Photo No. 070 - Post-Test Rear Passenger Dummy and Door Clearance View

Photo No. 071 - Pre-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

Photo No. 072 - Post-Test Right Side View of Rear Passenger Dummy and Rear Seat Occupant Compartment

Photo No. 073 - Pre-Test Rear Passenger Inner Door Panel View

Photo No. 074 - Post-Test Rear Passenger Inner Door Panel View

Photo No. 075 - Post-Test Rear Passenger Dummy Close-up Head Contact with Vehicle Interior View

Photo No. 076 - Post-Test Rear Passenger Dummy Close-up Head Contact with Side Airbag View

Photo No. 077 - Post-Test Rear Passenger Dummy Close-up Torso Contact with Vehicle Interior View

Photo No. 078 - Post-Test Rear Passenger Dummy Close-up Torso Contact with Side Airbag View

PHOTOGRAPH NOT APPLICABLE

Photo No. 079 - Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Vehicle Interior View


Photo No. 080 - Post-Test Rear Passenger Dummy Close-up Pelvis Contact with Side Airbag View

Photo No. 081 - Post-Test Rear Passenger Dummy Close-up Knee Contact View

Photo No. 082 - Pre-Test View of Fuel Filler Cap or Fuel Filler Neck

Photo No. 083 - Post-Test View of Fuel Filler Cap or Fuel Filler Neck

Photo No. 084 - Pre-Test Front View of MDB Impactor Face

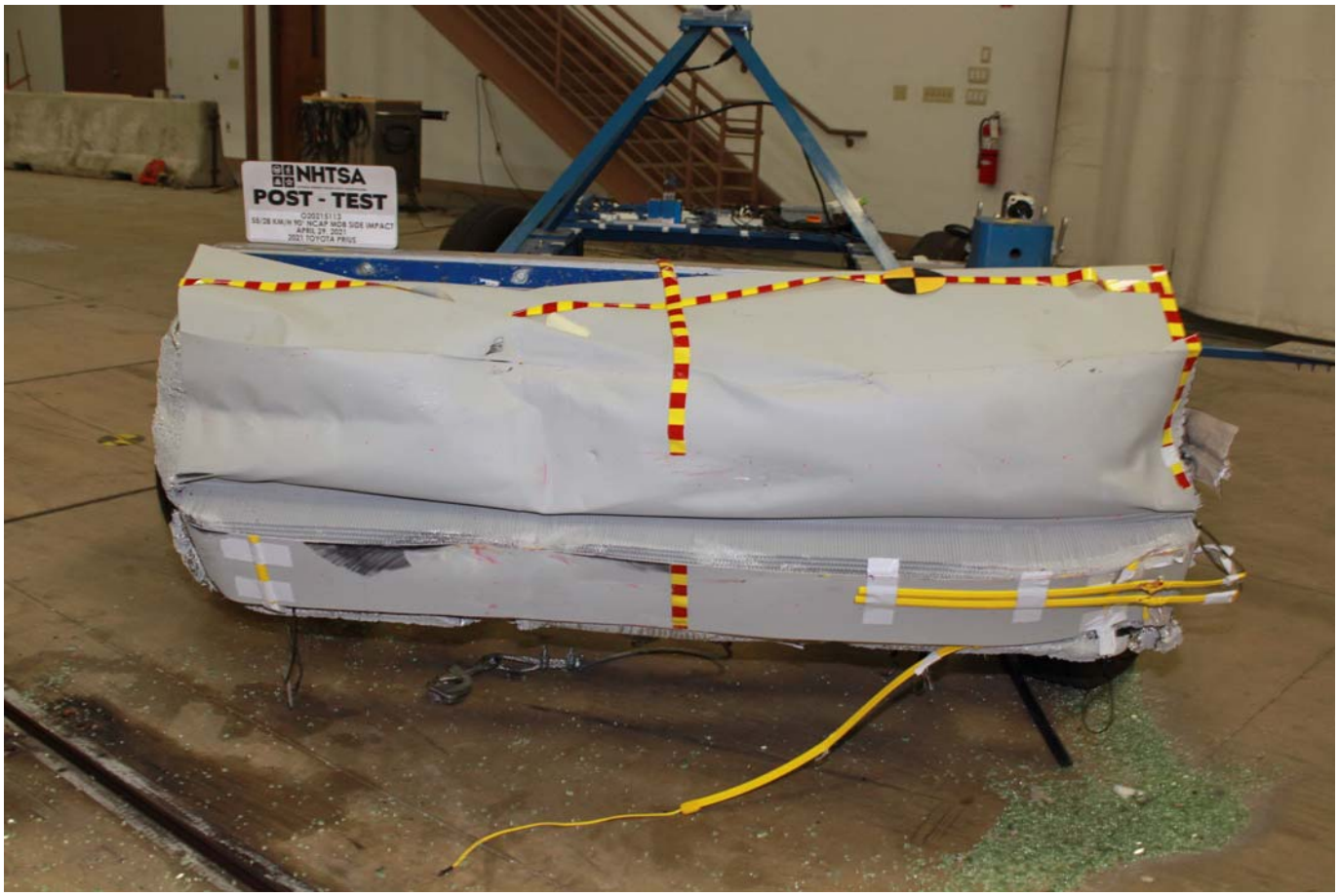


Photo No. 085 - Post-Test Front View of MDB Impactor Face

Photo No. 086 - Pre-Test Top View of MDB Impactor Face

Photo No. 087 - Post-Test Top View of MDB Impactor Face

Photo No. 088 - Pre-Test Left Side View of MDB Impactor Face

Photo No. 089 - Post-Test Left Side View of MDB Impactor Face

Photo No. 090 - Pre-Test Right Side View of MDB Impactor Face

Photo No. 091 - Post-Test Right Side View of MDB Impactor Face

Photo No. 092 - Close-Up View of Vehicle Certification Label

Photo No. 093 - Close-Up View of Vehicle Tire Information Placard or Label

Photo No. 093a - Close-Up View of Vehicle Load Carrying Capacity Reduction Label

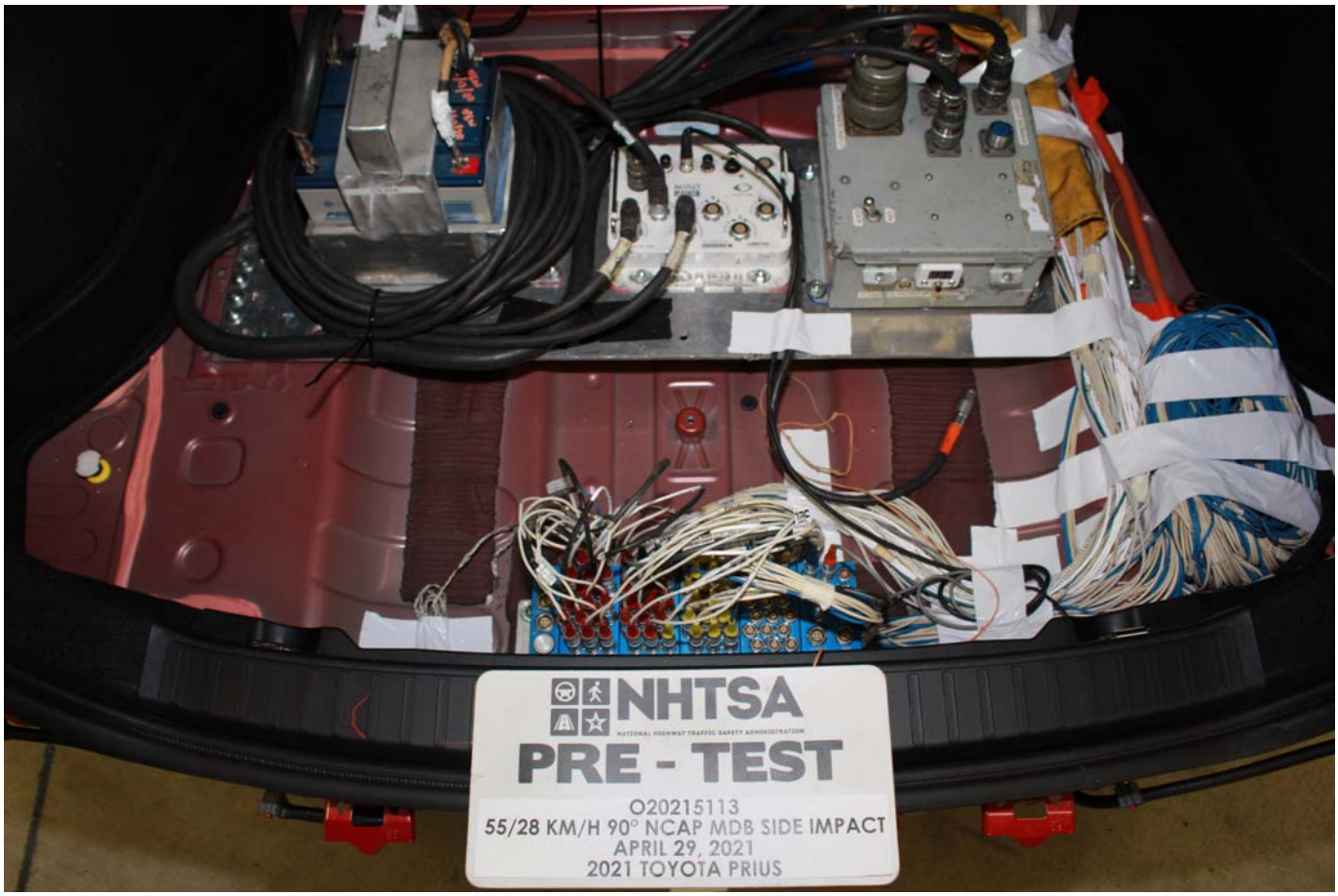


Photo No. 094 - Pre-Test Ballast View

Photo No. 095 - Post-Test Primary and Redundant Speed Trap Read-Out

Photo No. 096 - FMVSS Photo No. 301 Static Rollover 0 Degrees

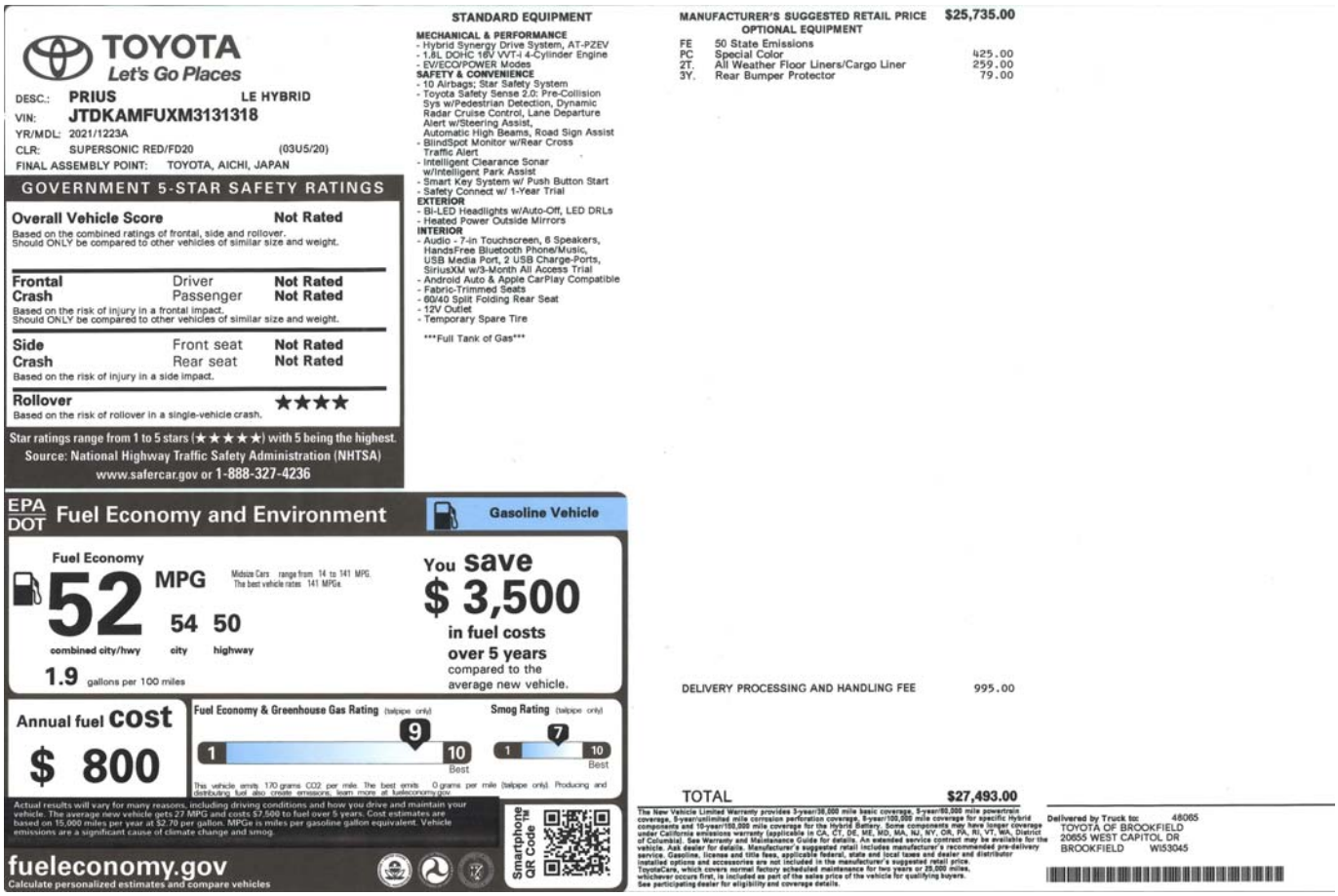
Photo No. 097 - FMVSS Photo No. 301 Static Rollover 90 Degrees


Photo No. 098 - FMVSS Photo No. 301 Static Rollover 180 Degrees


Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees


Photo No. 100 - FMVSS Photo No. 301 Static Rollover 360 Degrees


Photo No. 101 - Impact Event



TOYOTA
Let's Go Places

DESC.: PRIUS LE HYBRID
VIN: JTDKAMFUXM3131318
YR/MDL: 2021/1223A
CLR: SUPERSONIC RED/FD20 (03U5/20)
FINAL ASSEMBLY POINT: TOYOTA, AICHI, JAPAN

GOVERNMENT 5-STAR SAFETY RATINGS

Overall Vehicle Score: Not Rated
Based on the combined ratings of frontal, side and rollover. Should ONLY be compared to other vehicles of similar size and weight.

Frontal Crash: Driver Not Rated; 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 Crash: Front seat Not Rated; Rear seat Not Rated
Based on the risk of injury in a side impact.

Rollover: ★★★★
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

STANDARD EQUIPMENT

MECHANICAL & PERFORMANCE
- Hybrid Synergy Drive System, AT-PZEV
- 1.8L DOHC 16V VVT-i 4-Cylinder Engine
- EV/ECO/POWER Modes

SAFETY & CONVENIENCE
- 10 Airbags; Star Safety System
- Toyota Safety Sense 2.0: Pre-Collision Sys w/Pedestrian Detection, Dynamic Radar Cruise Control, Lane Departure Alert w/Steering Assist, Automatic High Beams, Road Sign Assist
- BlindSpot Monitor w/Rear Cross Traffic Alert
- Intelligent Clearance Sonar w/Intelligent Park Assist
- Smart Key System w/ Push Button Start
- Safety Connect w/ 1-Year Trial

EXTERIOR
- Bi-LED Headlights w/Auto-Off, LED DRLs
- Heated Power Outside Mirrors

INTERIOR
- Audio - 7-in Touchscreen, 6 Speakers, HandsFree Bluetooth Phone/Music, USB Media Port, 2 USB Charge-Ports, SiriusXM w/3-Month All Access Trial
- Android Auto & Apple CarPlay Compatible
- Fabric-Trimmed Seats
- 60/40 Split Folding Rear Seat
- 12V Outlet
- Temporary Spare Tire

***Full Tank of Gas***

MANUFACTURER'S SUGGESTED RETAIL PRICE $25,735.00

OPTIONAL EQUIPMENT

| | | |
|---|---|---|
| FE | 50 State Emissions | |
| PC | Special Color | 425.00 |
| ZT | All Weather Floor Liners/Cargo Liner | 259.00 |
| 3Y | Rear Bumper Protector | 79.00 |

DELIVERY PROCESSING AND HANDLING FEE 995.00

TOTAL $27,493.00

The New Vehicle Limited Warranty provides 3-year/36,000 mile basic coverage, 5-year/60,000 mile powertrain coverage, 5-year/unlimited mile corrosion perforation coverage, 5-year/100,000 mile coverage for specific Hybrid components and 10-year/150,000 mile coverage for the Hybrid Battery. Some components may have longer coverage under California emissions warranty (applicable in CA, CT, DE, ME, MD, MA, NJ, NY, OR, PA, RI, VT, WA, District of Columbia). See Warranty and Maintenance Guide for details. An extended service contract may be available for the vehicle. Ask dealer for details. Manufacturer's suggested retail includes manufacturer's recommended pre-delivery service. Gasoline, license and title fees, applicable federal, state and local taxes and dealer and distributor installed options and accessories are not included in the manufacturer's suggested retail price. ToyotaCare, which covers normal factory scheduled maintenance for two years or 25,000 miles, whichever occurs first, is included as part of the sales price of the vehicle for qualifying buyers. See participating dealer for eligibility and coverage details.

Delivered by Truck to: 48065
TOYOTA OF BROOKFIELD
20655 WEST CAPITOL DR
BROOKFIELD WI53045

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy
52 MPG combined city/hwy
54 city 50 highway
1.9 gallons per 100 miles
Midsize Cars range from 14 to 141 MPG. The best vehicle rates 141 MPGe.

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

Annual fuel cost $ 800

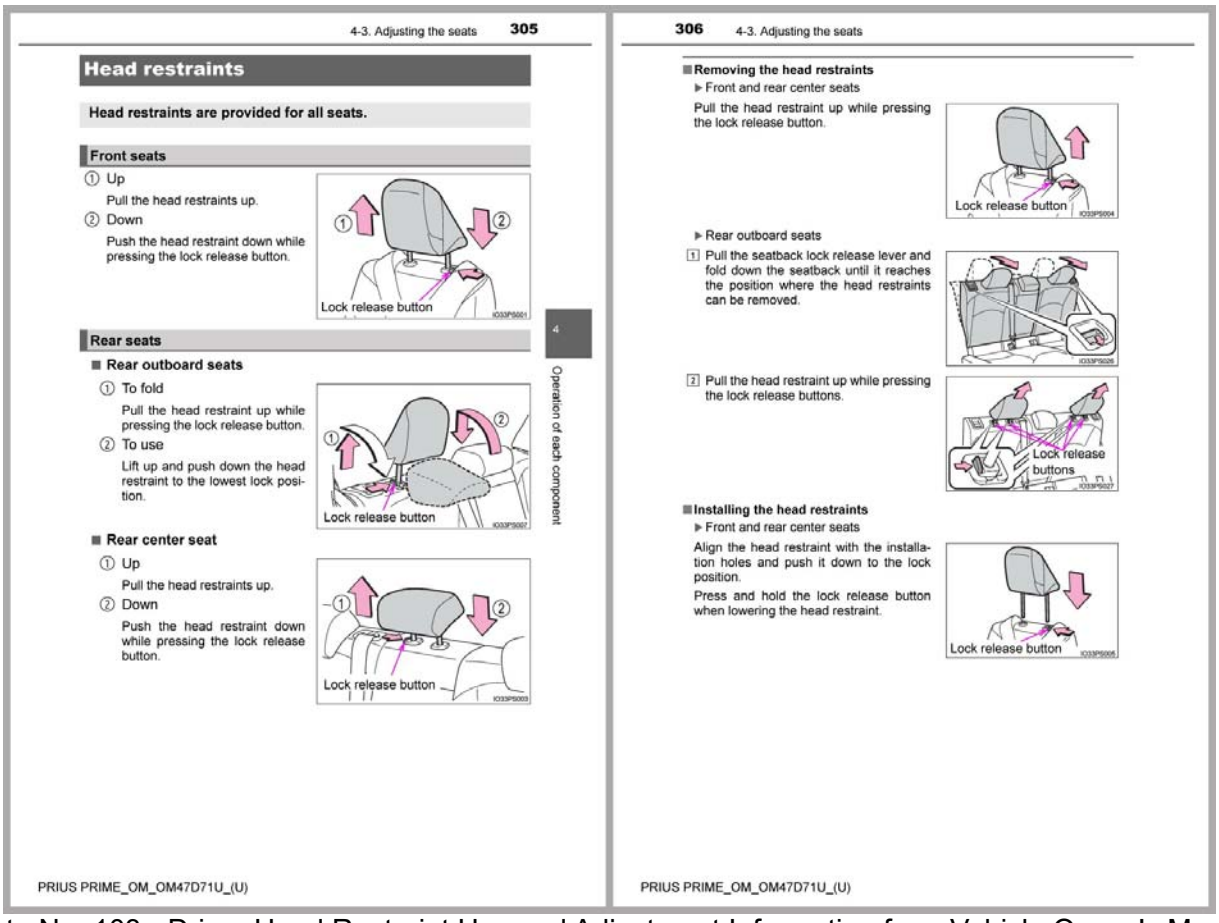
Fuel Economy & Greenhouse Gas Rating (tailpipe only): 9 (1 to 10, Best)
Smog Rating (tailpipe only): 7 (1 to 10, Best)
This vehicle emits 170 grams CO2 per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also creates emissions, learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions, and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.70 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

fueleconomy.gov
Calculate personalized estimates and compare vehicles

Smartphone QR Code

Photo No. 102 - Monroney Label



4-3. Adjusting the seats 305

## Head restraints

**Head restraints are provided for all seats.**

### Front seats

① Up
Pull the head restraints up.
② Down
Push the head restraint down while pressing the lock release button.




### Rear seats

■ Rear outboard seats

① To fold
Pull the head restraint up while pressing the lock release button.
② To use
Lift up and push down the head restraint to the lowest lock position.




■ Rear center seat

① Up
Pull the head restraints up.
② Down
Push the head restraint down while pressing the lock release button.




4 Operation of each component

PRIUS PRIME_OM_OM47D71U_(U)

306 4-3. Adjusting the seats

■ Removing the head restraints

▶ Front and rear center seats

Pull the head restraint up while pressing the lock release button.




▶ Rear outboard seats

1 Pull the seatback lock release lever and fold down the seatback until it reaches the position where the head restraints can be removed.



2 Pull the head restraint up while pressing the lock release buttons.




■ Installing the head restraints

▶ Front and rear center seats

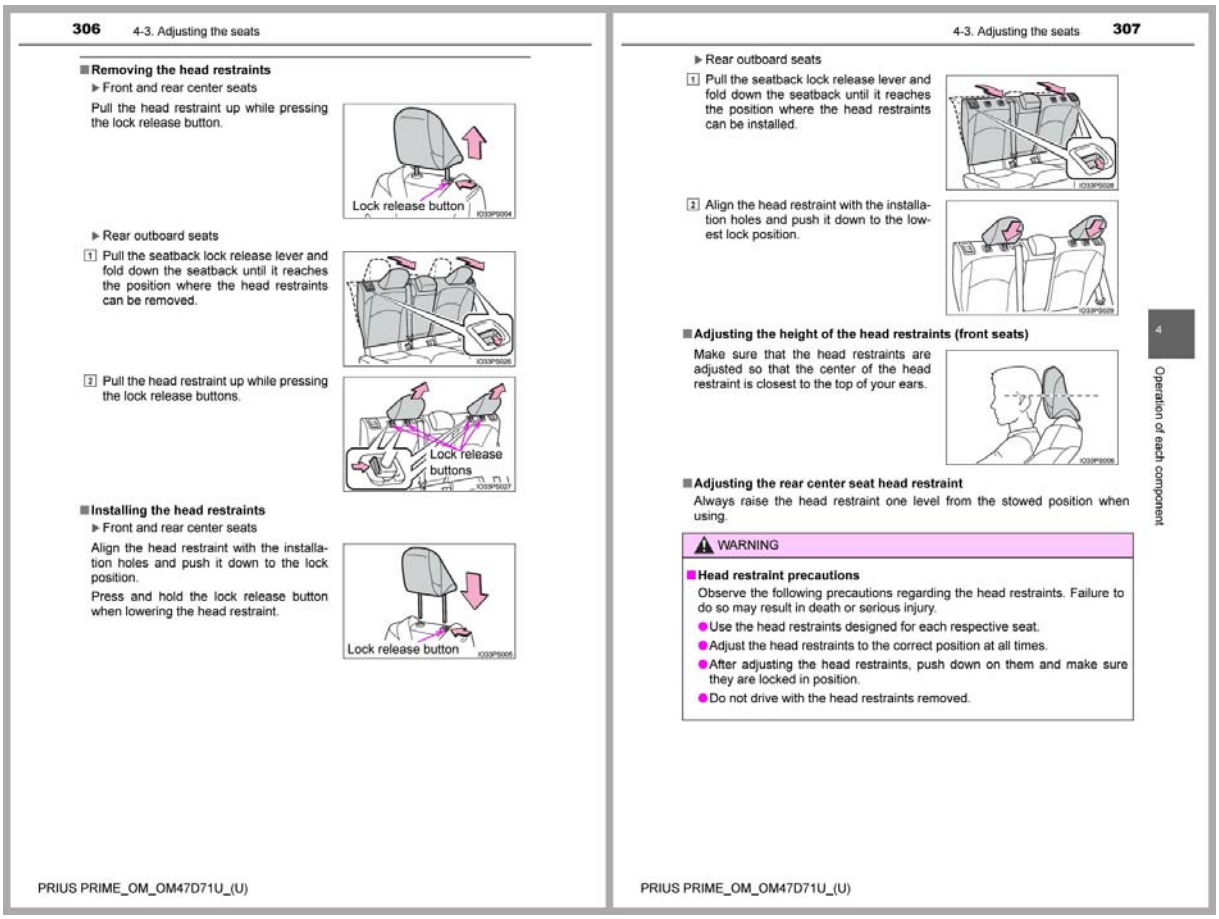
Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button when lowering the head restraint.




PRIUS PRIME_OM_OM47D71U_(U)

Photo No. 103 - Driver Head Restraint Use and Adjustment Information from Vehicle Owner's Manual



306 4-3. Adjusting the seats

**Removing the head restraints**

▶ Front and rear center seats

Pull the head restraint up while pressing the lock release button.



▶ Rear outboard seats

1 Pull the seatback lock release lever and fold down the seatback until it reaches the position where the head restraints can be removed.

2 Pull the head restraint up while pressing the lock release buttons.



**Installing the head restraints**

▶ Front and rear center seats

Align the head restraint with the installation holes and push it down to the lock position.

Press and hold the lock release button when lowering the head restraint.



PRIUS PRIME_OM_OM47D71U_(U)

4-3. Adjusting the seats 307

▶ Rear outboard seats

1 Pull the seatback lock release lever and fold down the seatback until it reaches the position where the head restraints can be installed.

2 Align the head restraint with the installation holes and push it down to the lowest lock position.

**Adjusting the height of the head restraints (front seats)**

Make sure that the head restraints are adjusted so that the center of the head restraint is closest to the top of your ears.

**Adjusting the rear center seat head restraint**

Always raise the head restraint one level from the stowed position when using.

WARNING

**Head restraint precautions**

Observe the following precautions regarding the head restraints. Failure to do so may result in death or serious injury.

- Use the head restraints designed for each respective seat.
- Adjust the head restraints to the correct position at all times.
- After adjusting the head restraints, push down on them and make sure they are locked in position.
- Do not drive with the head restraints removed.

4 Operation of each component

PRIUS PRIME_OM_OM47D71U_(U)

Photo No. 104 - Left Rear Passenger Head Restraint Use and Adjustment Information from Vehicle Owner's Manual


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

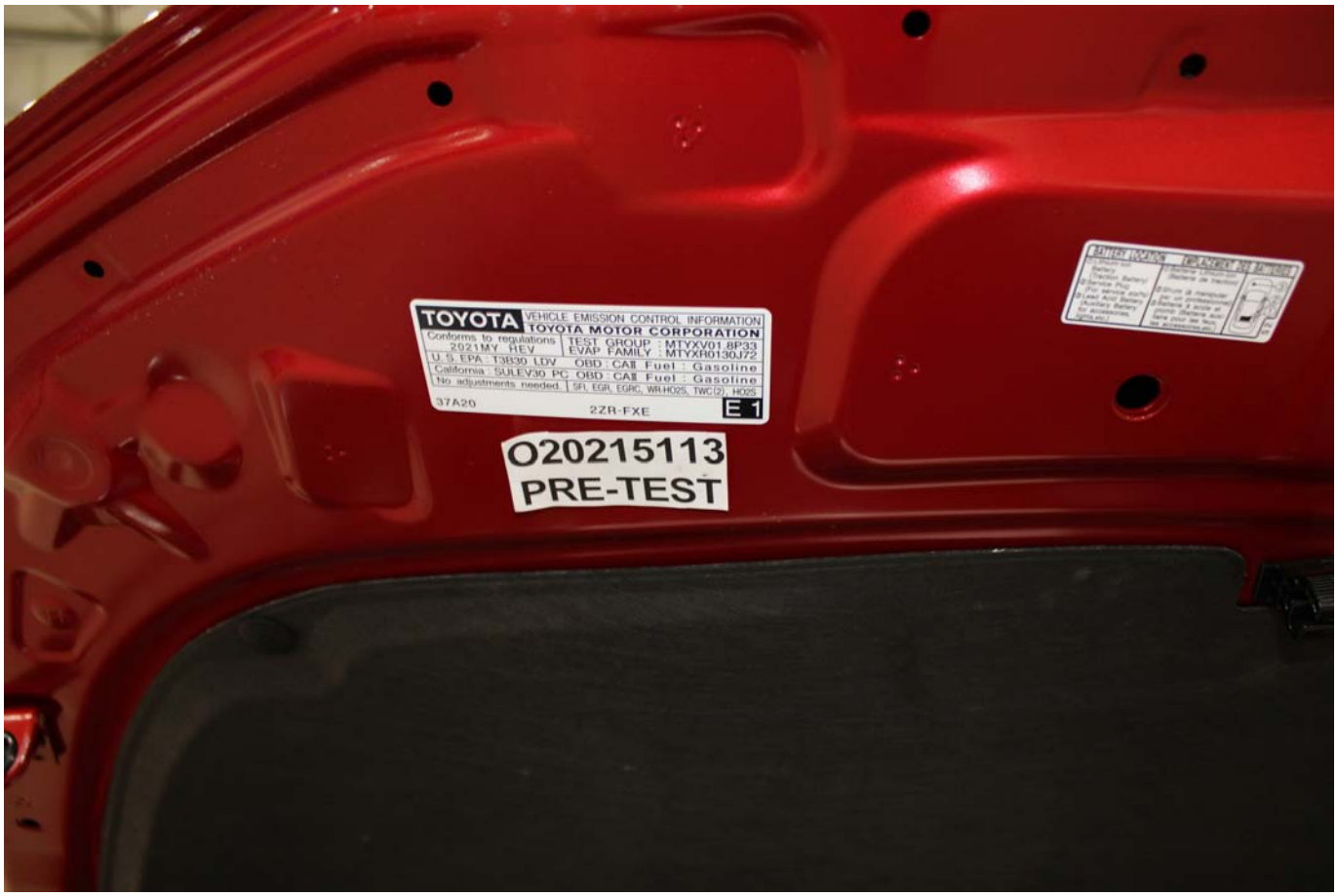



Photo No. 305-04 - First Responder Warning Location


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

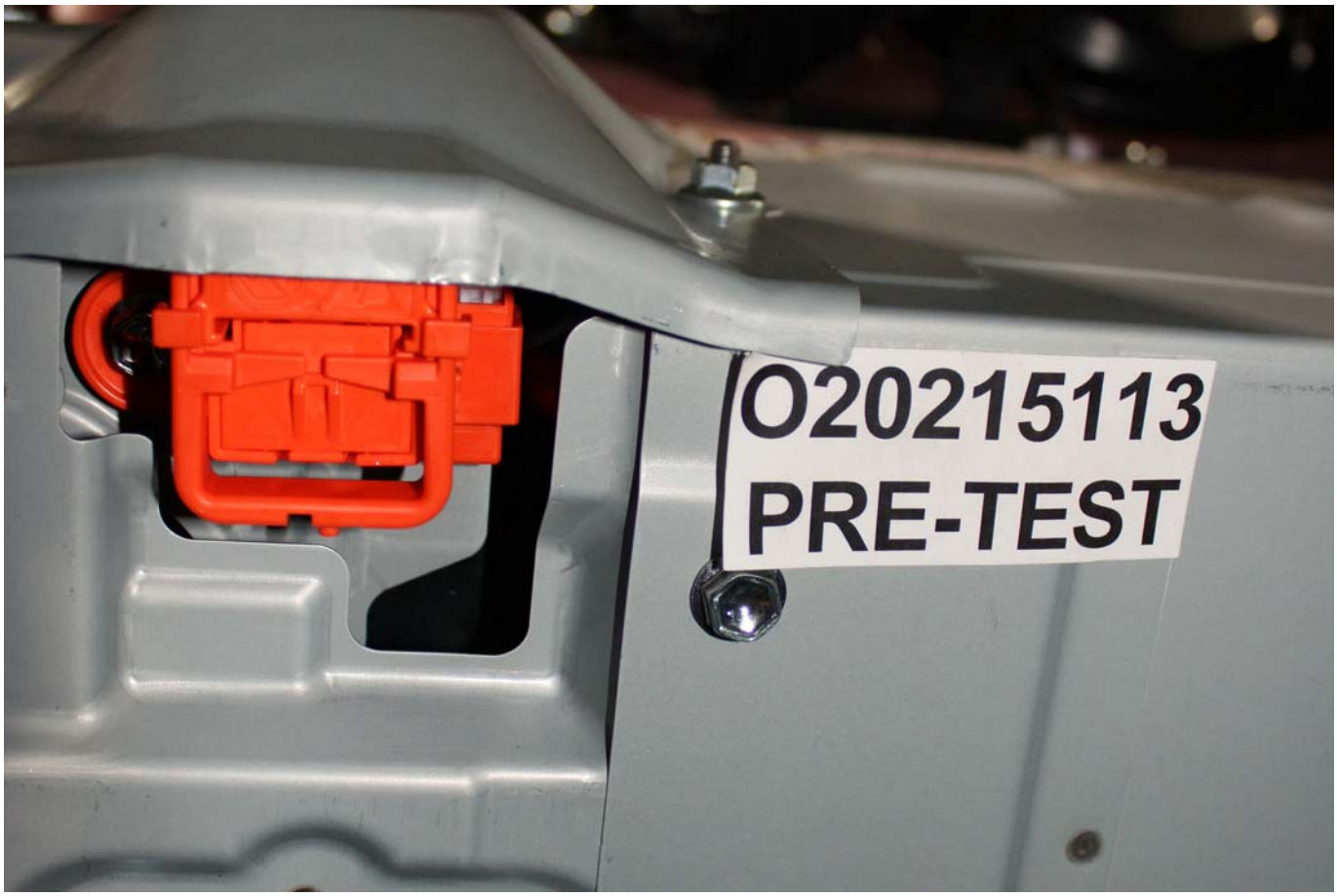


Photo No. 305-06 - Manual High Voltage Service Disconnect in Place

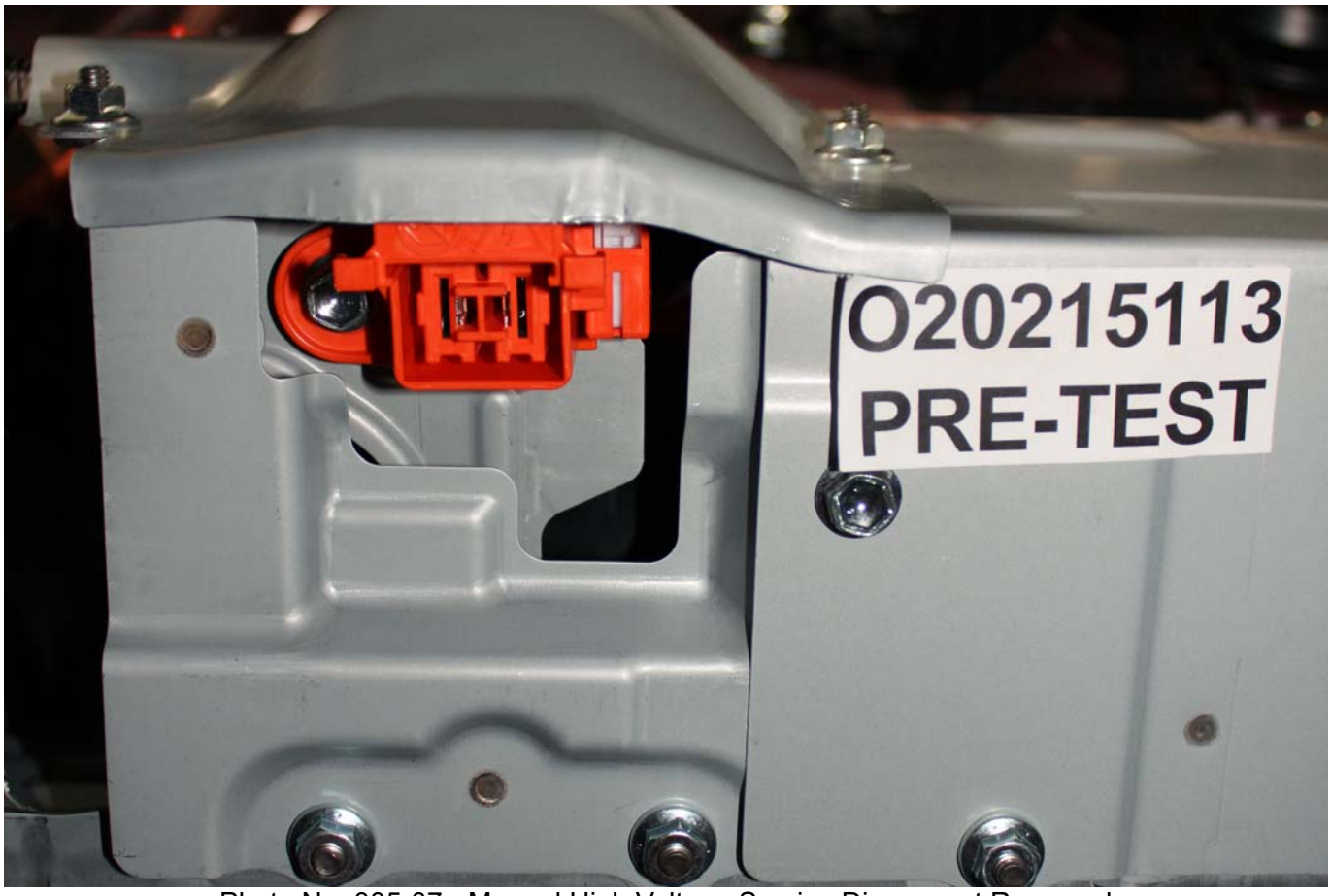


Photo No. 305-07 - Manual High Voltage Service Disconnect Removed

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

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

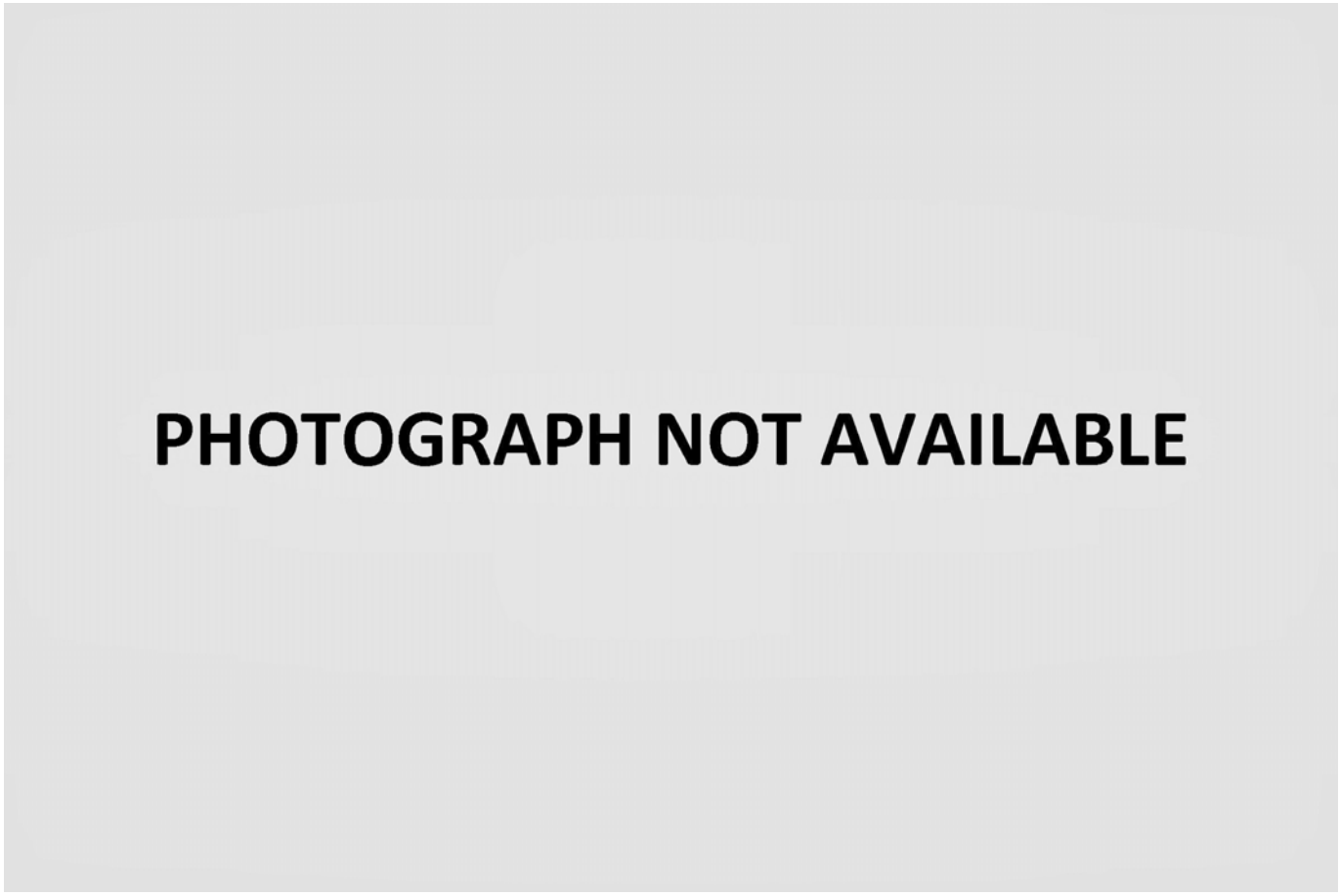



Photo No. 305-10 - Post-Impact Front View of Propulsion Battery

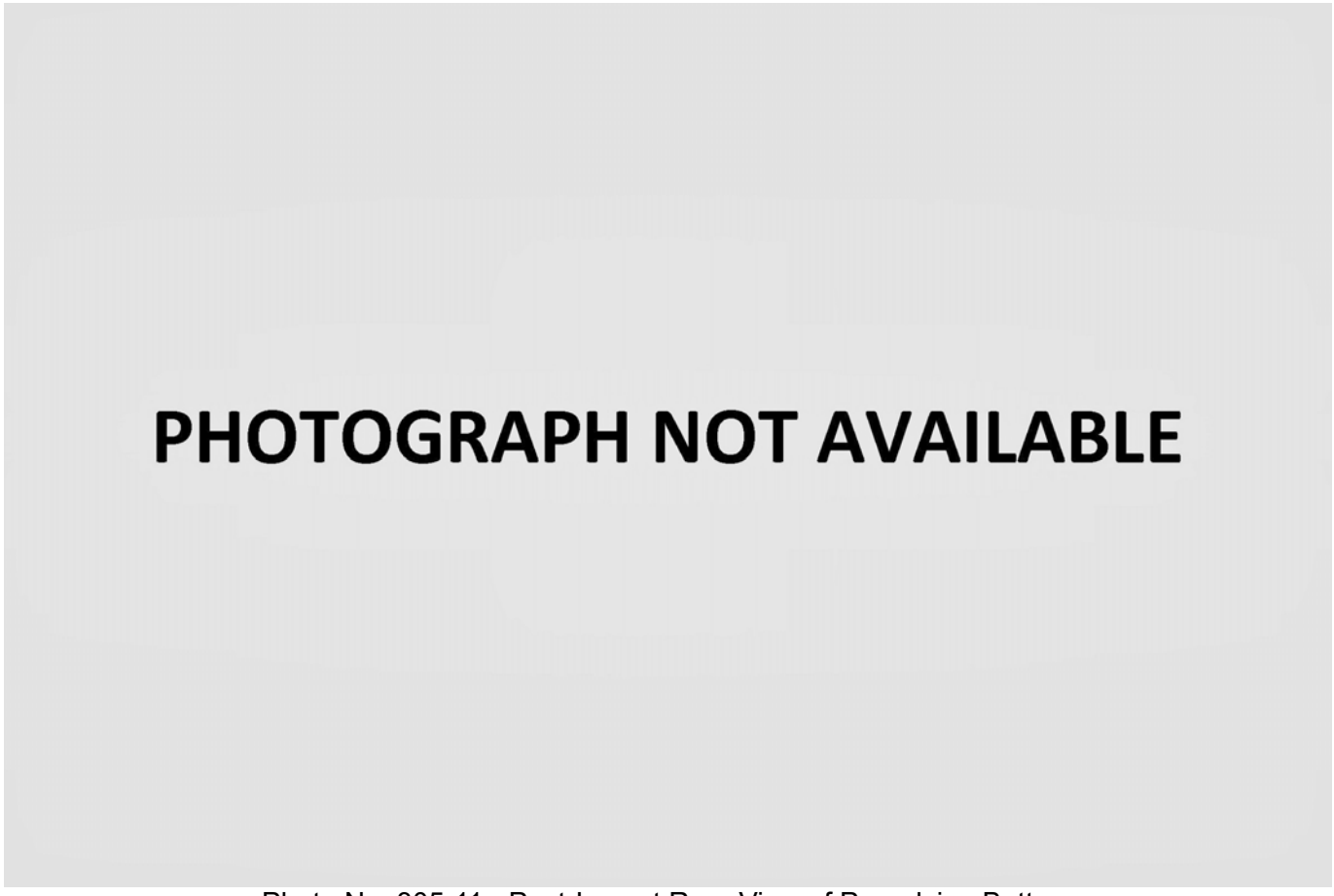



Photo No. 305-11 - Post-Impact Rear View of Propulsion Battery

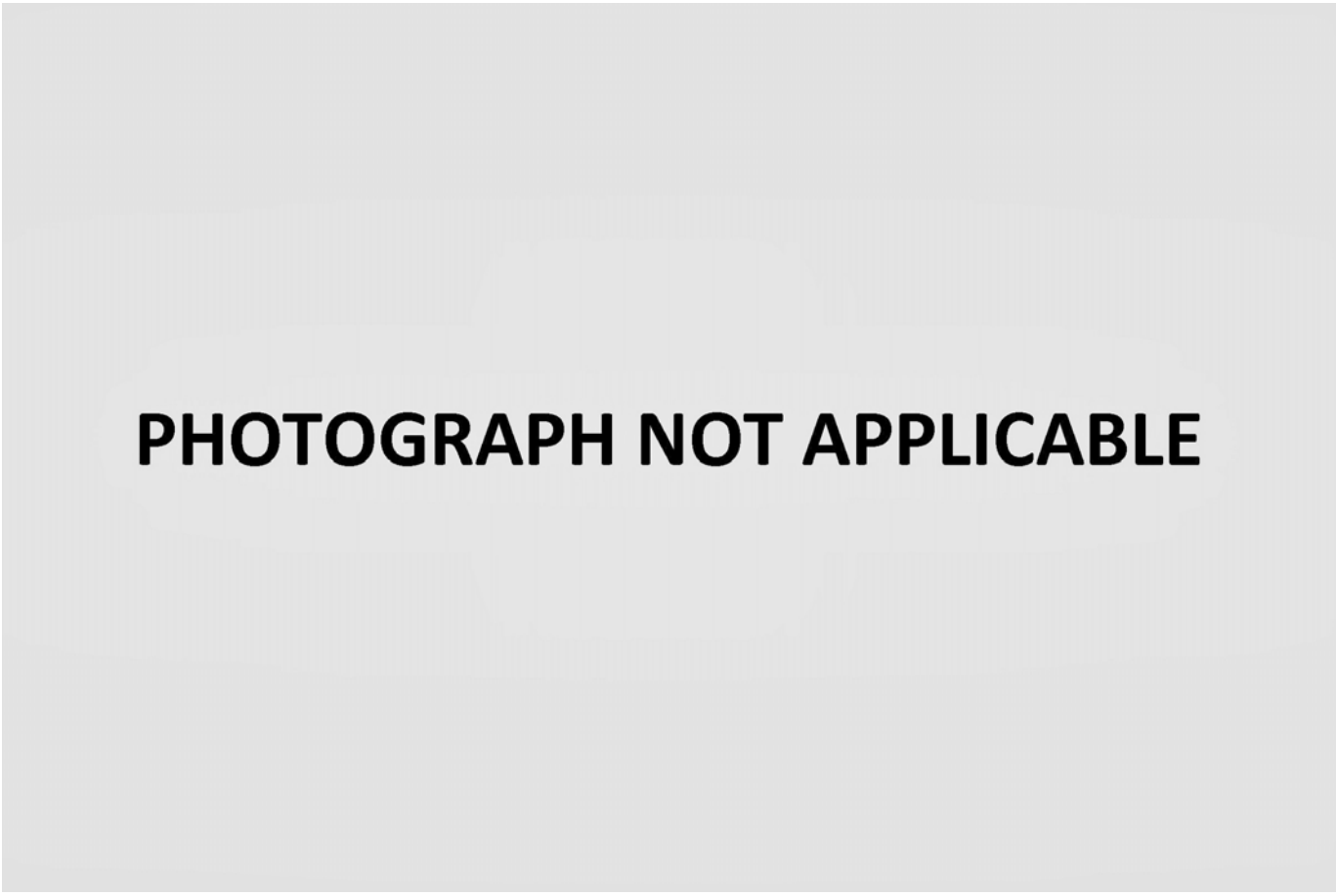



Photo No. 305-12 - Pre-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

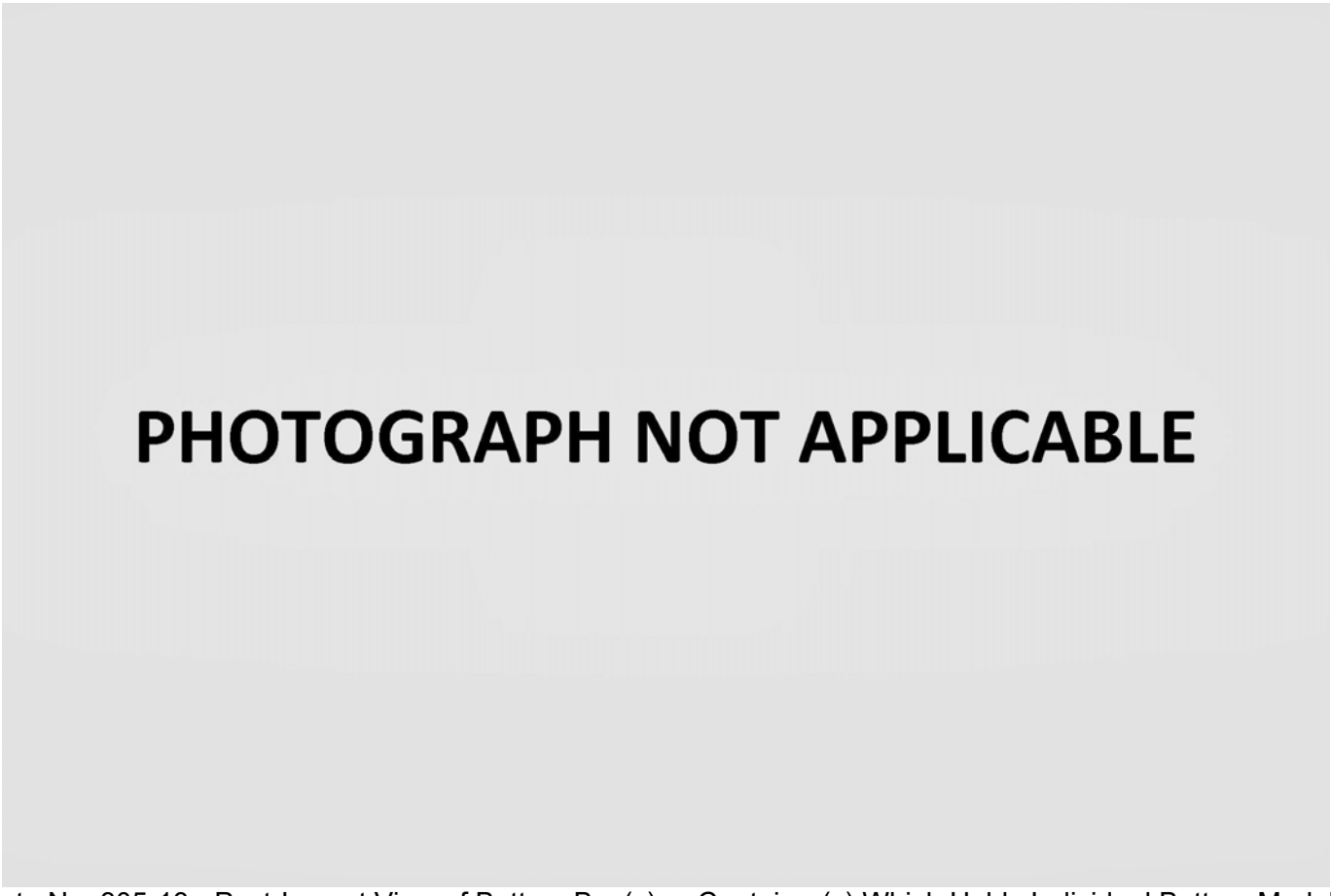



Photo No. 305-13 - Post-Impact View of Battery Box(s) or Container(s) Which Holds Individual Battery Modules

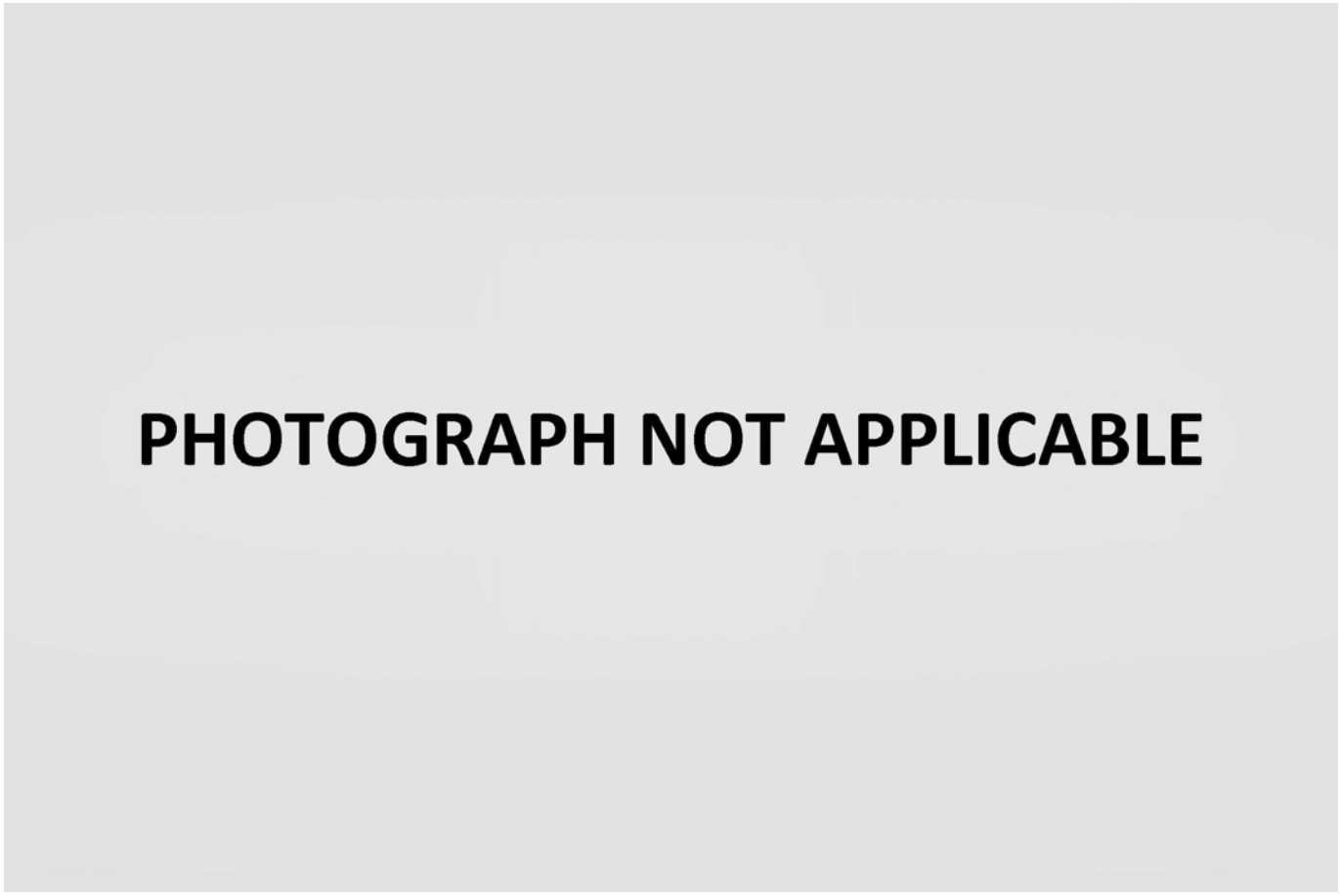



Photo No. 305-14 - Pre-Impact View of Propulsion Battery Module(s)

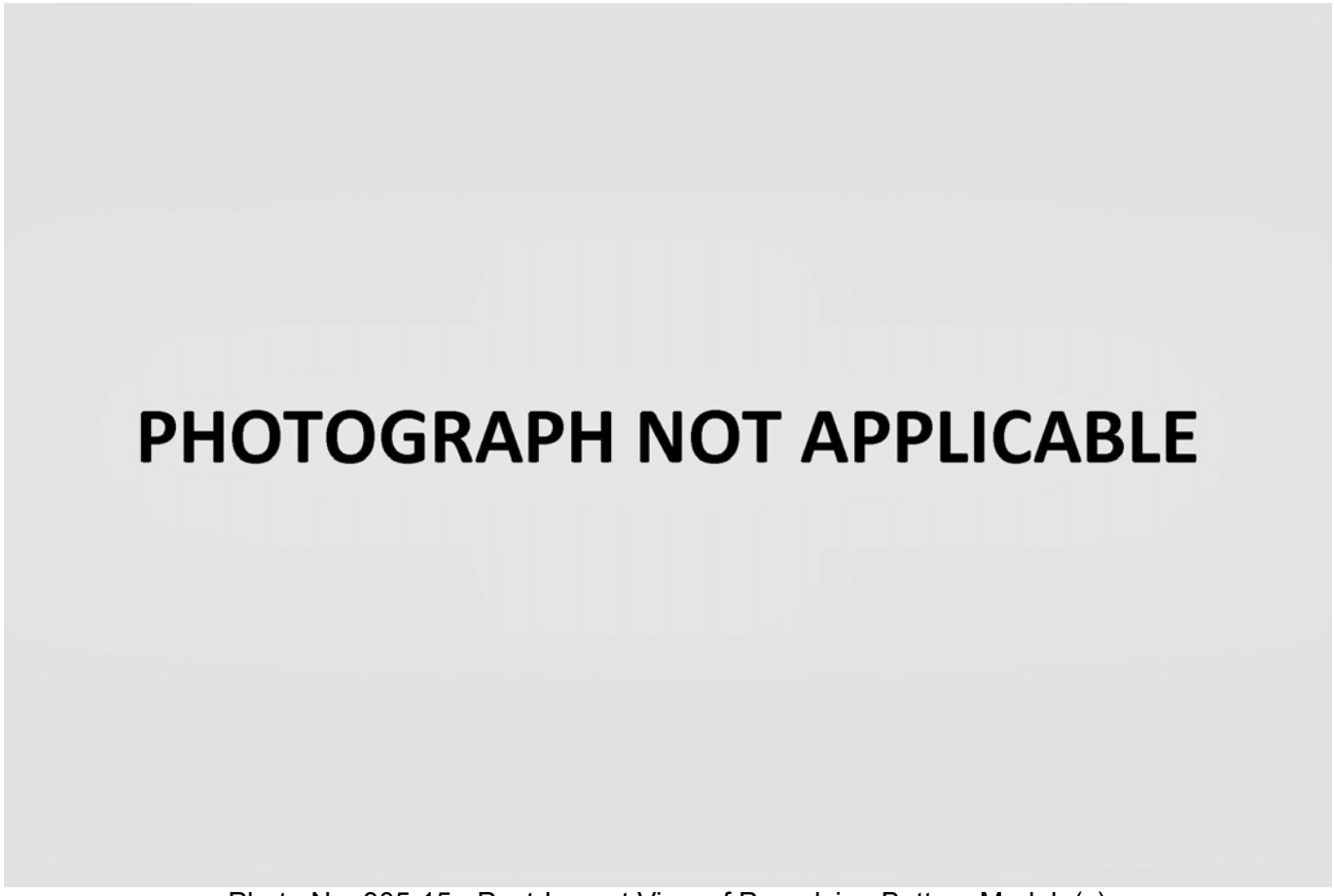



Photo No. 305-15 - Post-Impact View of Propulsion Battery Module(s)

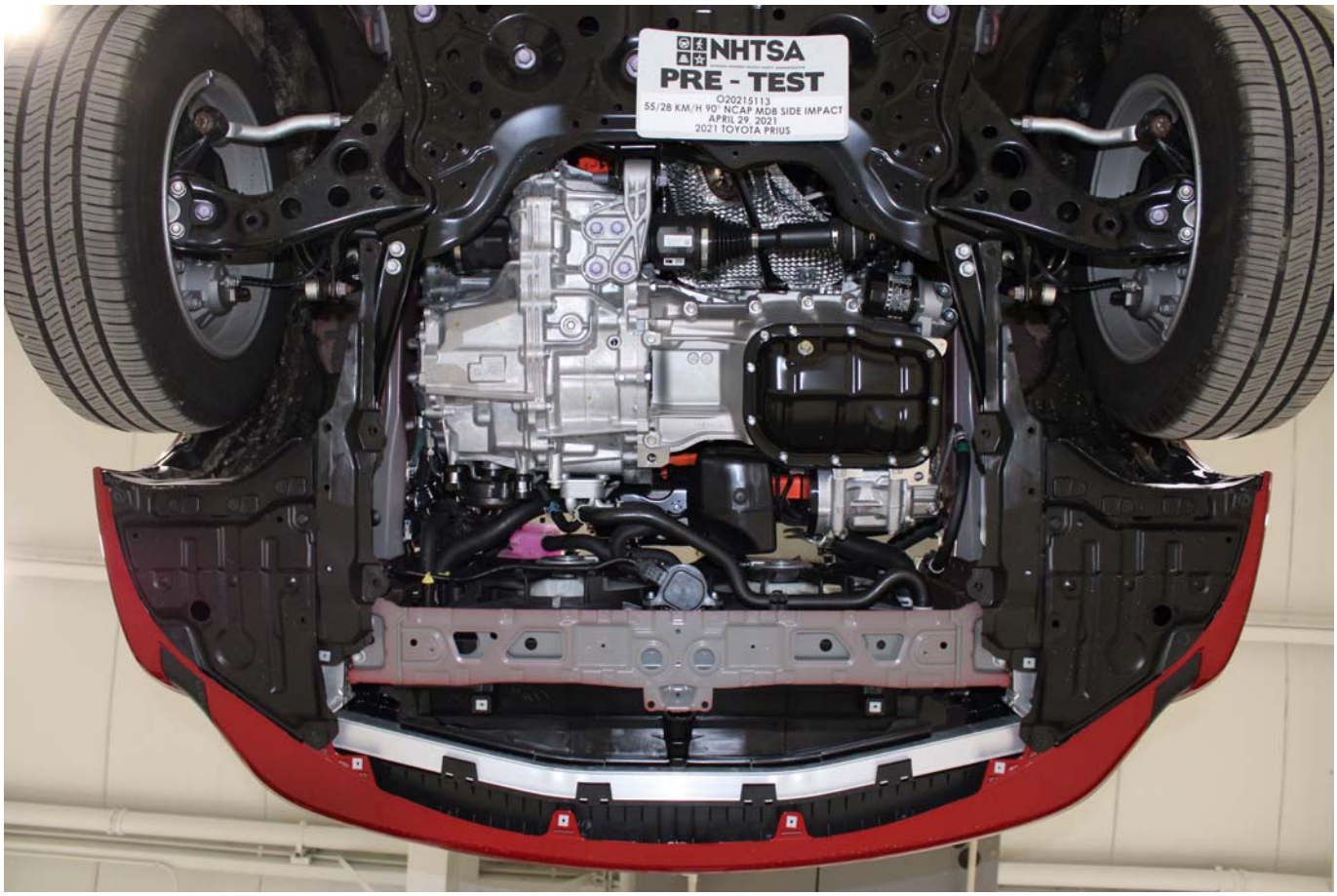


Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive

PHOTOGRAPH NOT AVAILABLE

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

PHOTOGRAPH NOT APPLICABLE

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


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

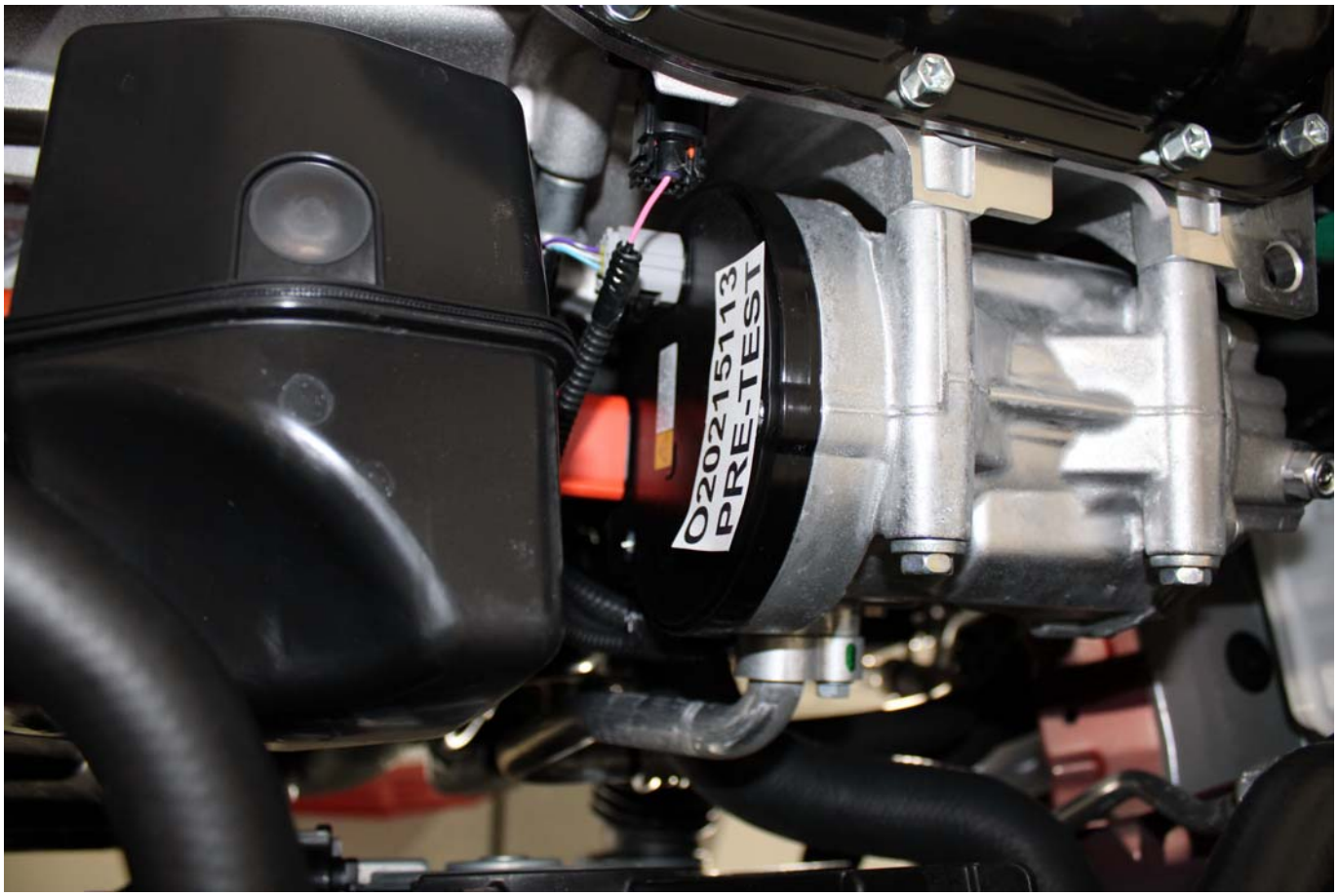


Photo No. 305-20 - Pre-Impact View of Other Visible Electric Propulsion Components

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

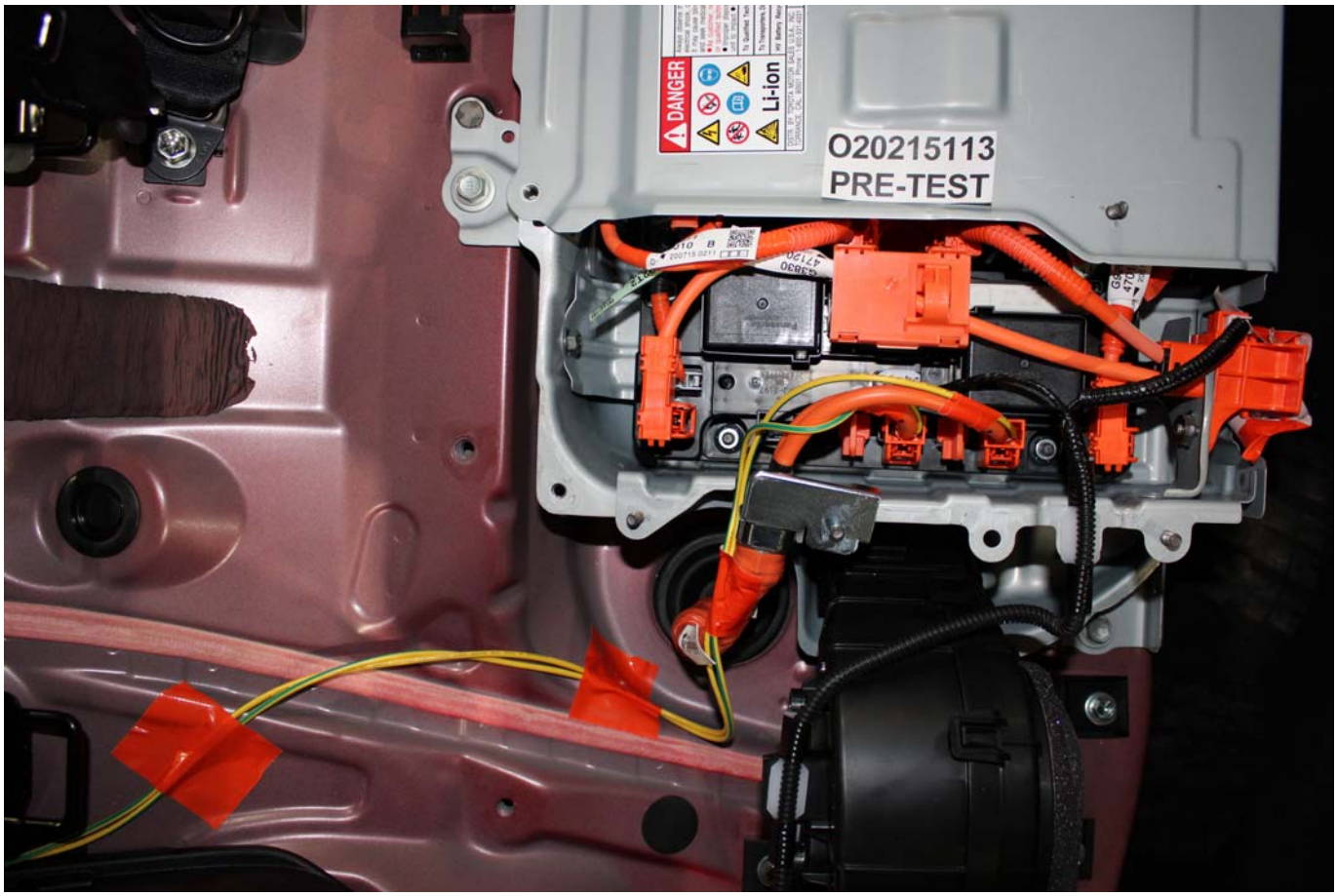


Photo No. 305-22 - Pre-Impact View of High Voltage Leads Attached

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

PHOTOGRAPH NOT AVAILABLE

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

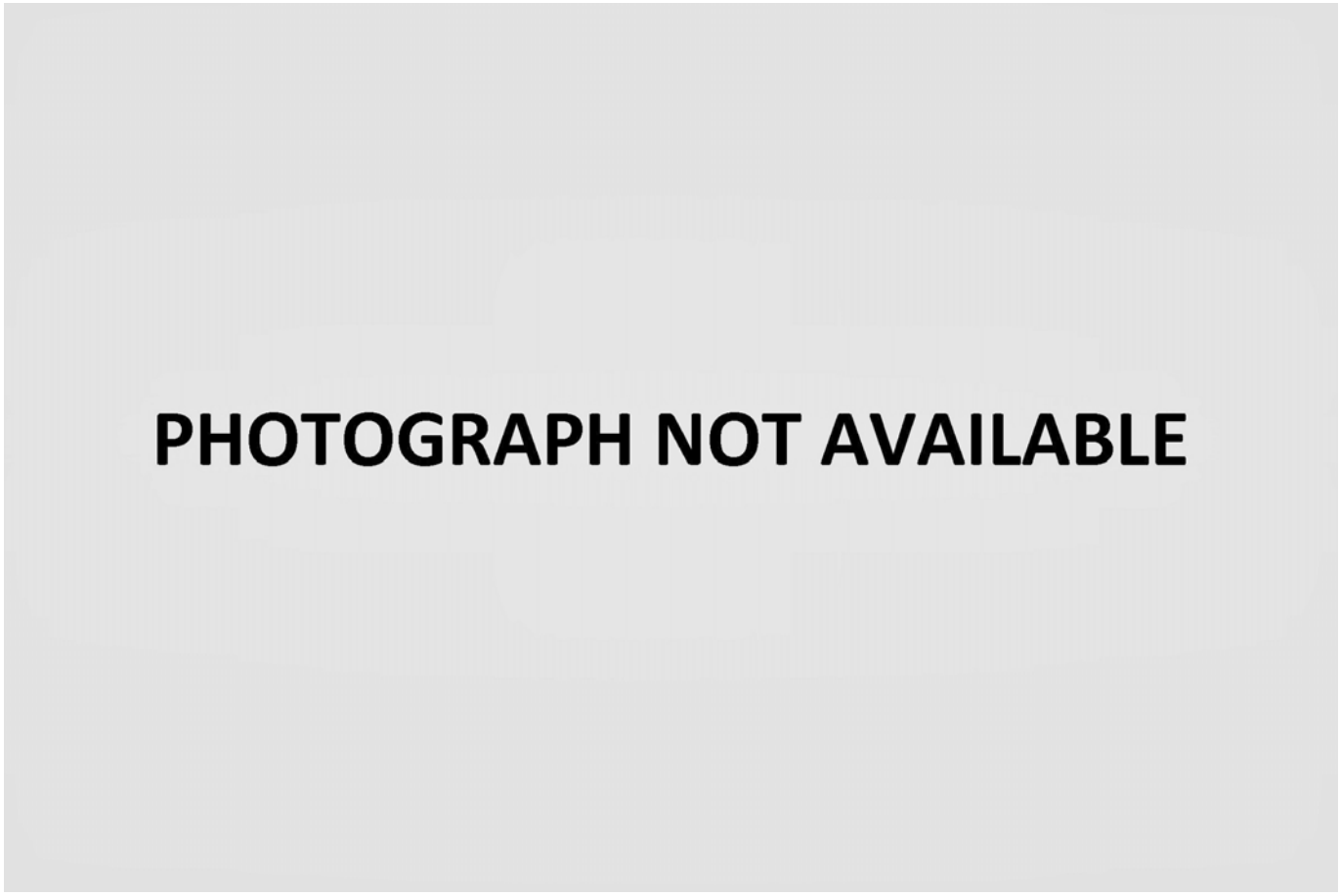



Photo No. 305-26 - Pre-Impact View of Other Test Devices

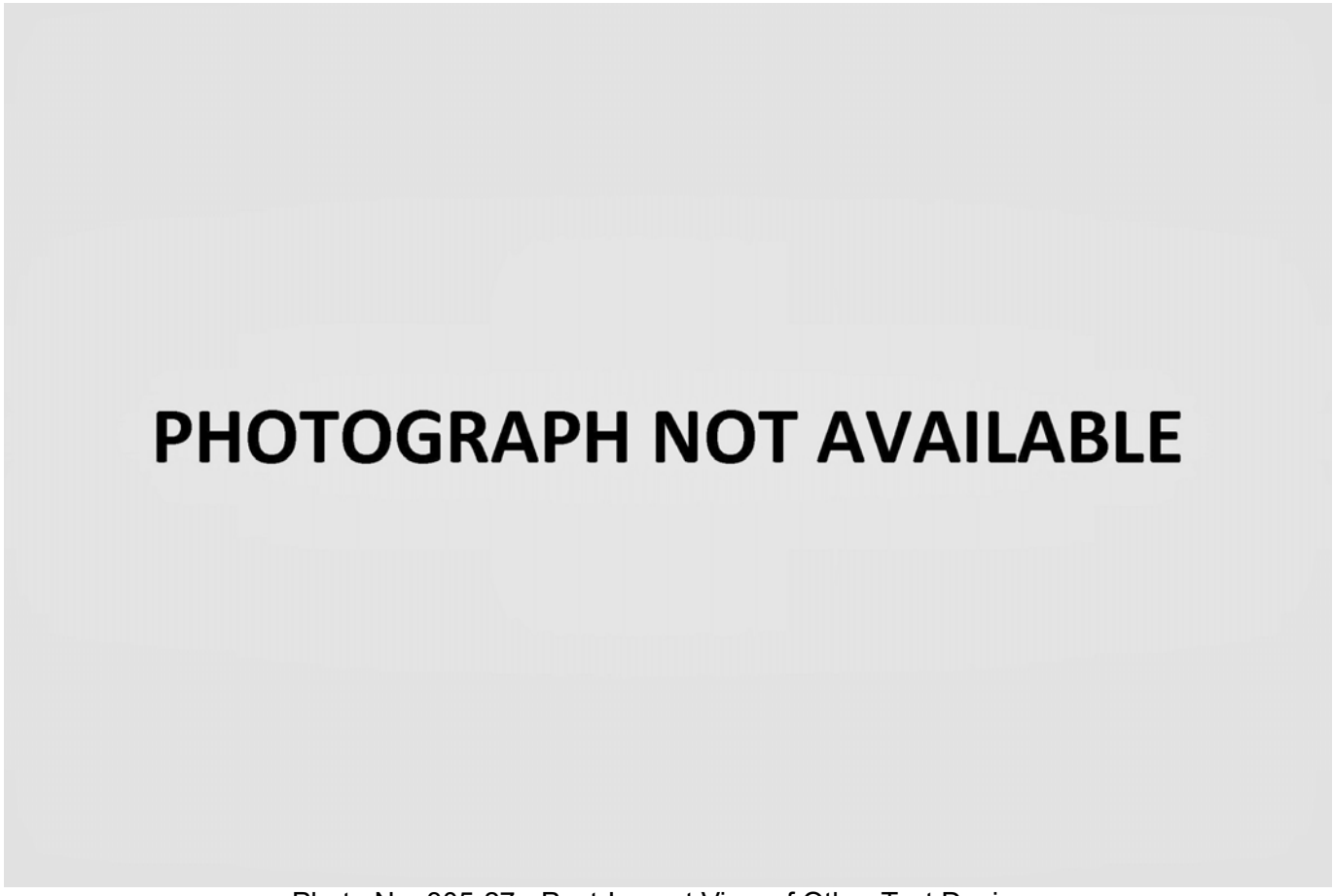



Photo No. 305-27 - Post-Impact View of Other Test Devices

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. 305-30 - FMVSS No. 305 Static Rollover at 270 Degrees

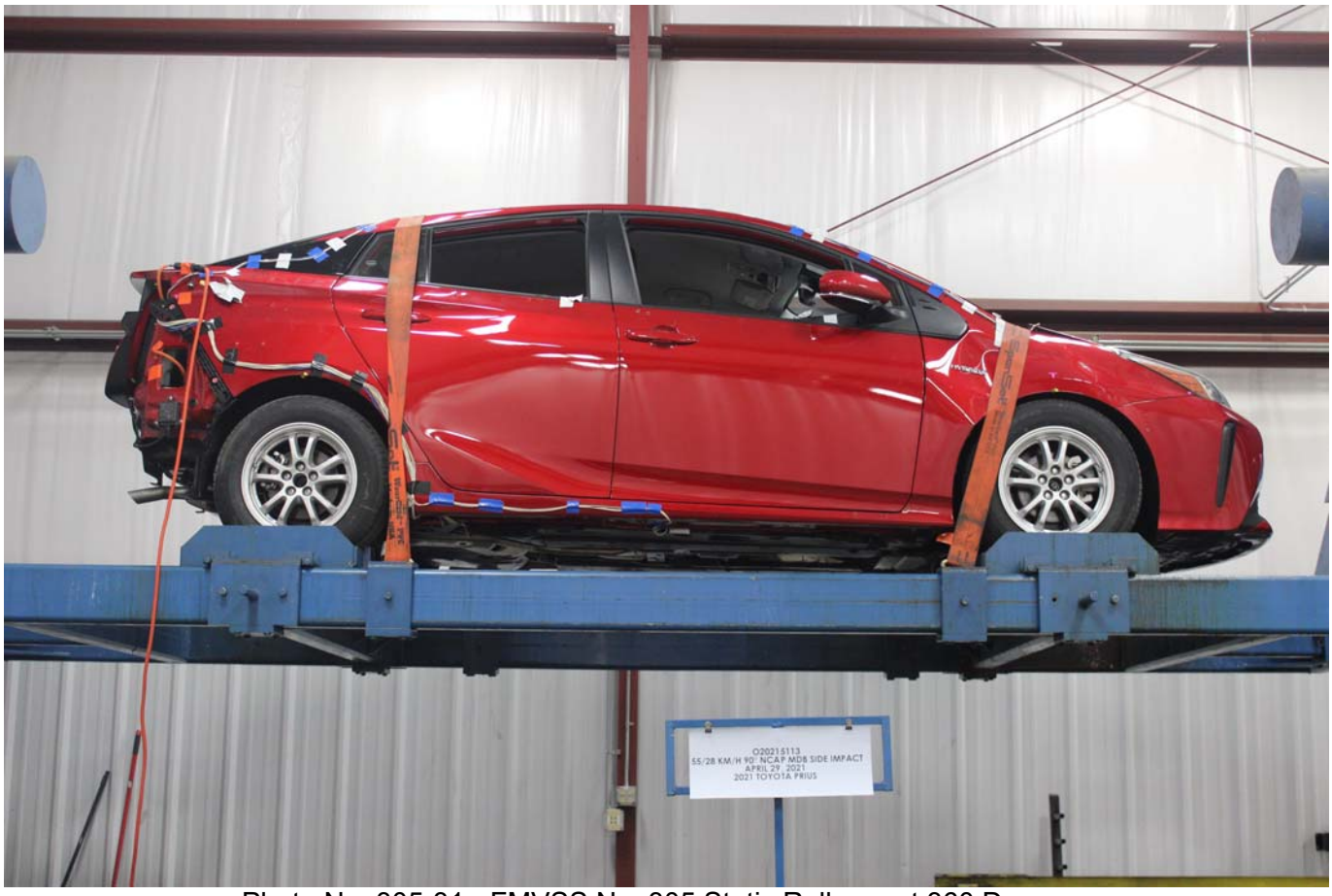



Photo No. 305-31 - FMVSS No. 305 Static Rollover at 360 Degrees

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

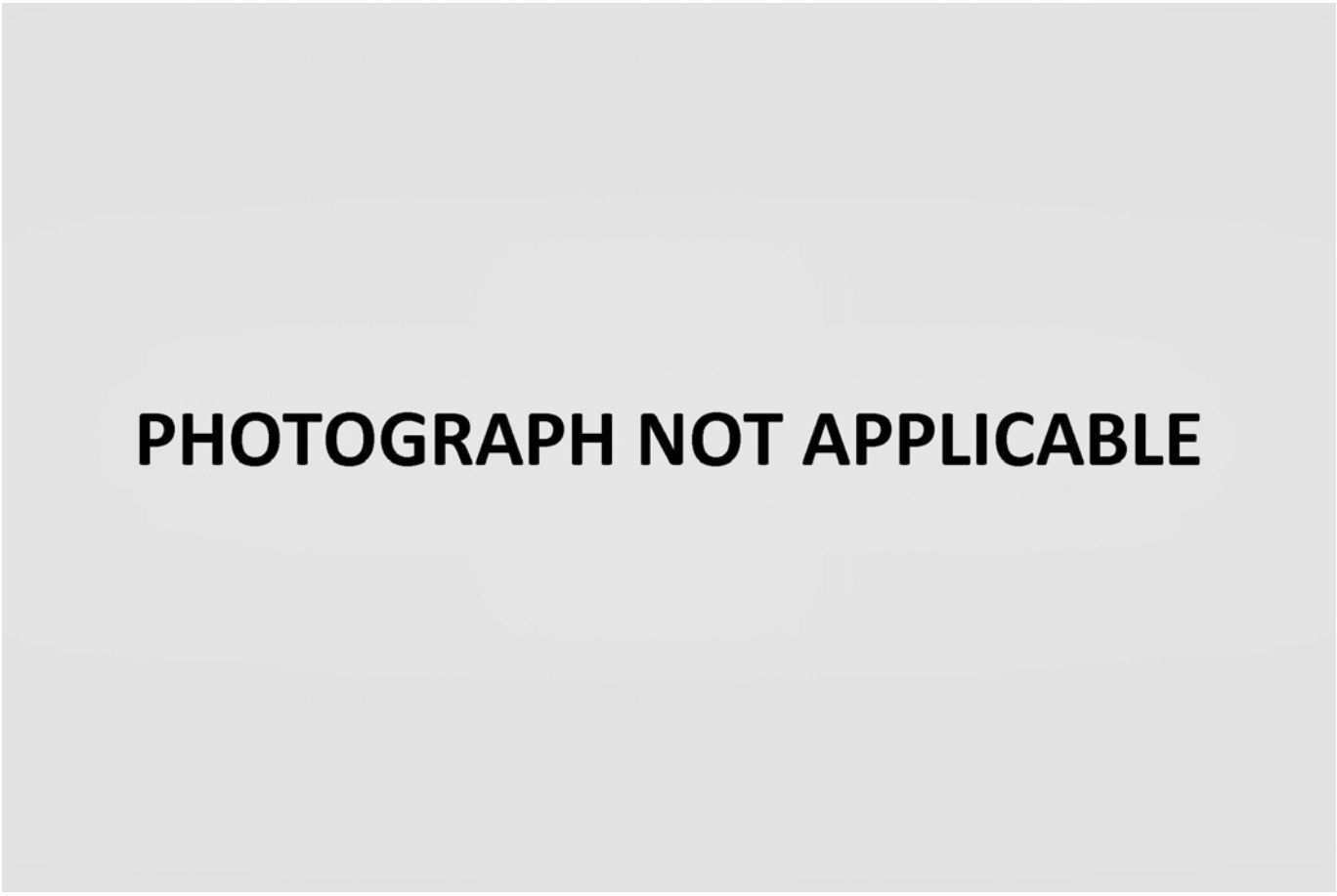



Photo No. 305-34 - Post-Impact Propulsion Battery System Mounting and-or Intrusion Failure(s)

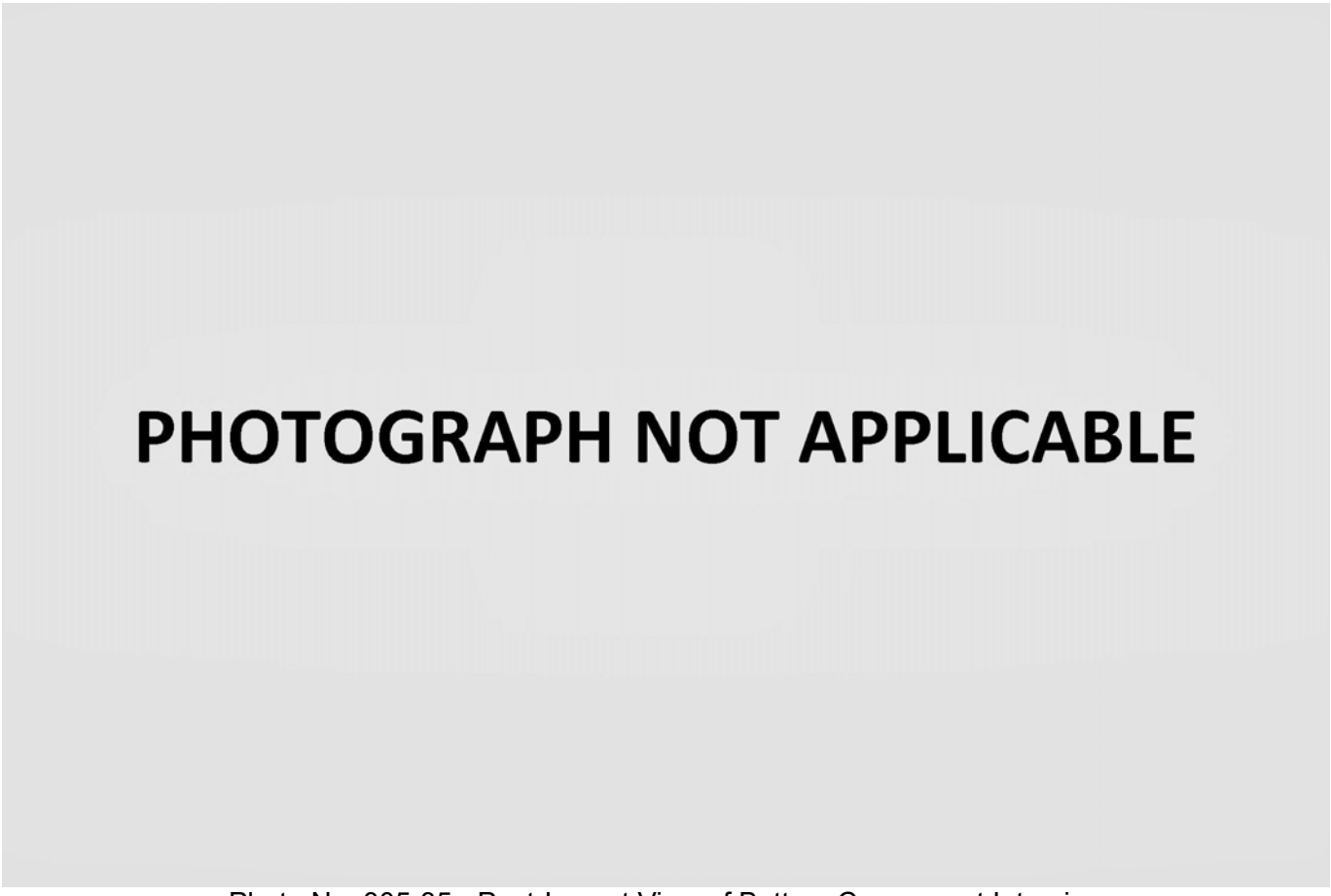



Photo No. 305-35 - Post-Impact View of Battery Component Intrusion

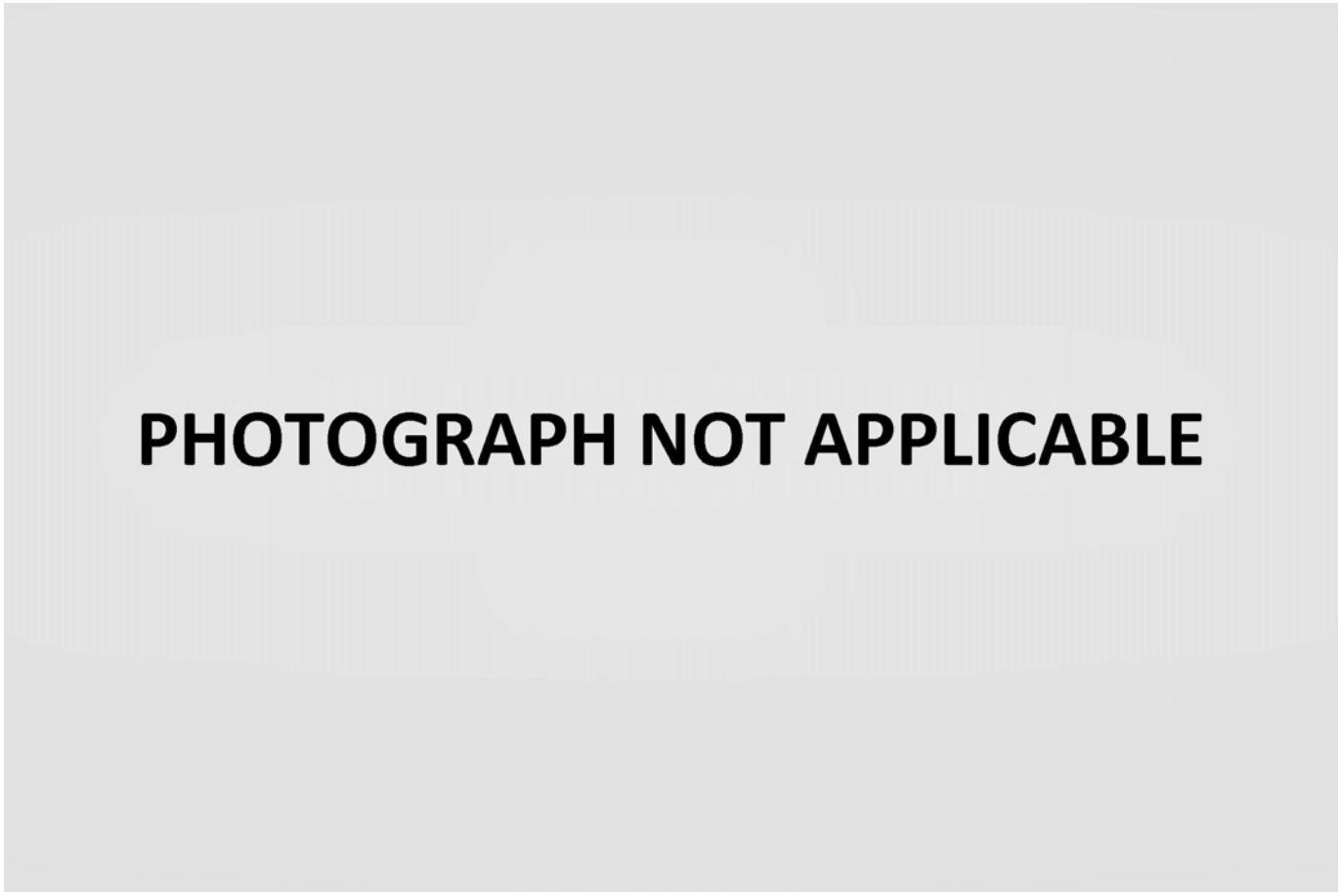



Photo No. 305-36 - Post-Impact View of Battery Module Movement or Retention Loss

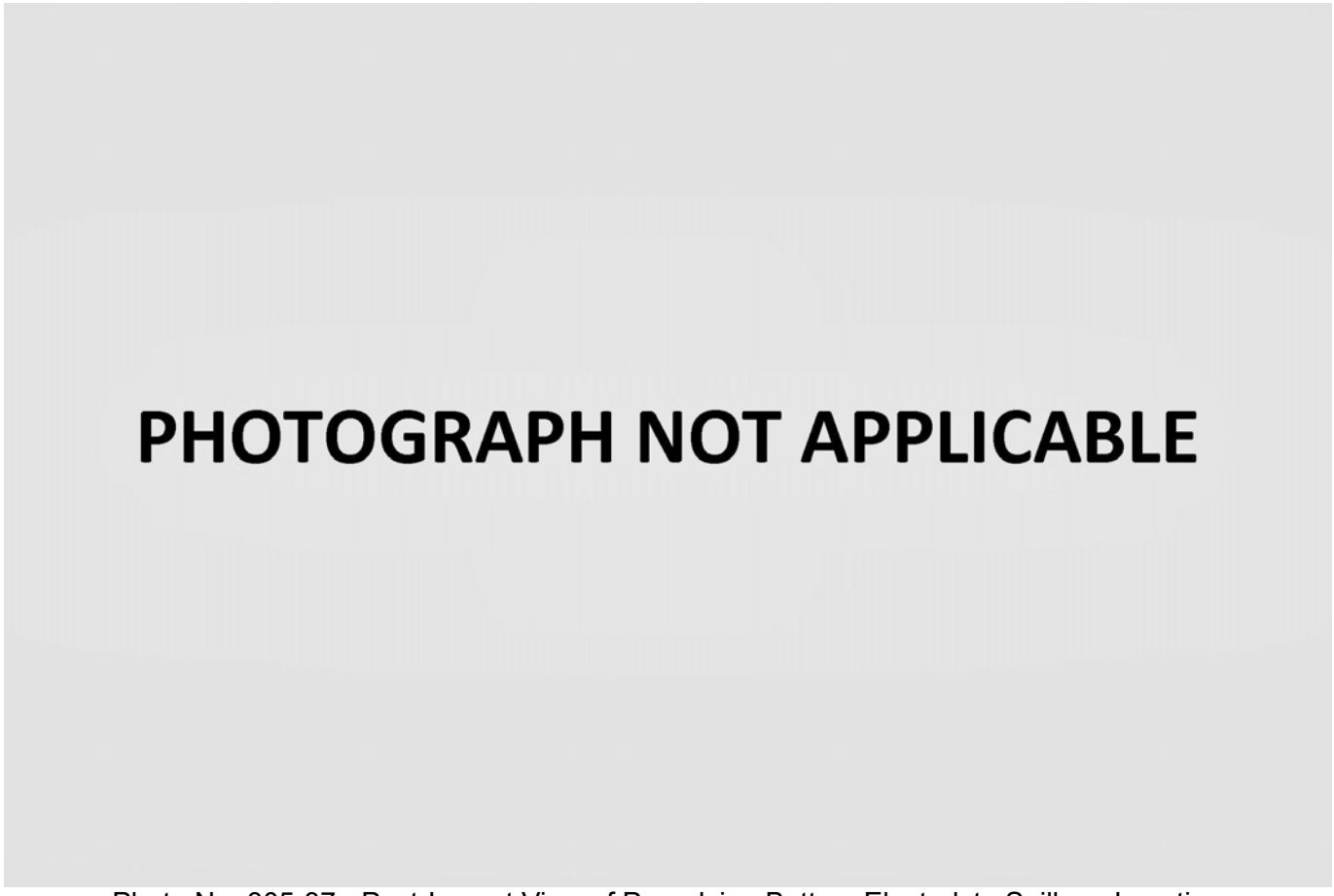



Photo No. 305-37 - Post-Impact View of Propulsion Battery Electrolyte Spillage Location

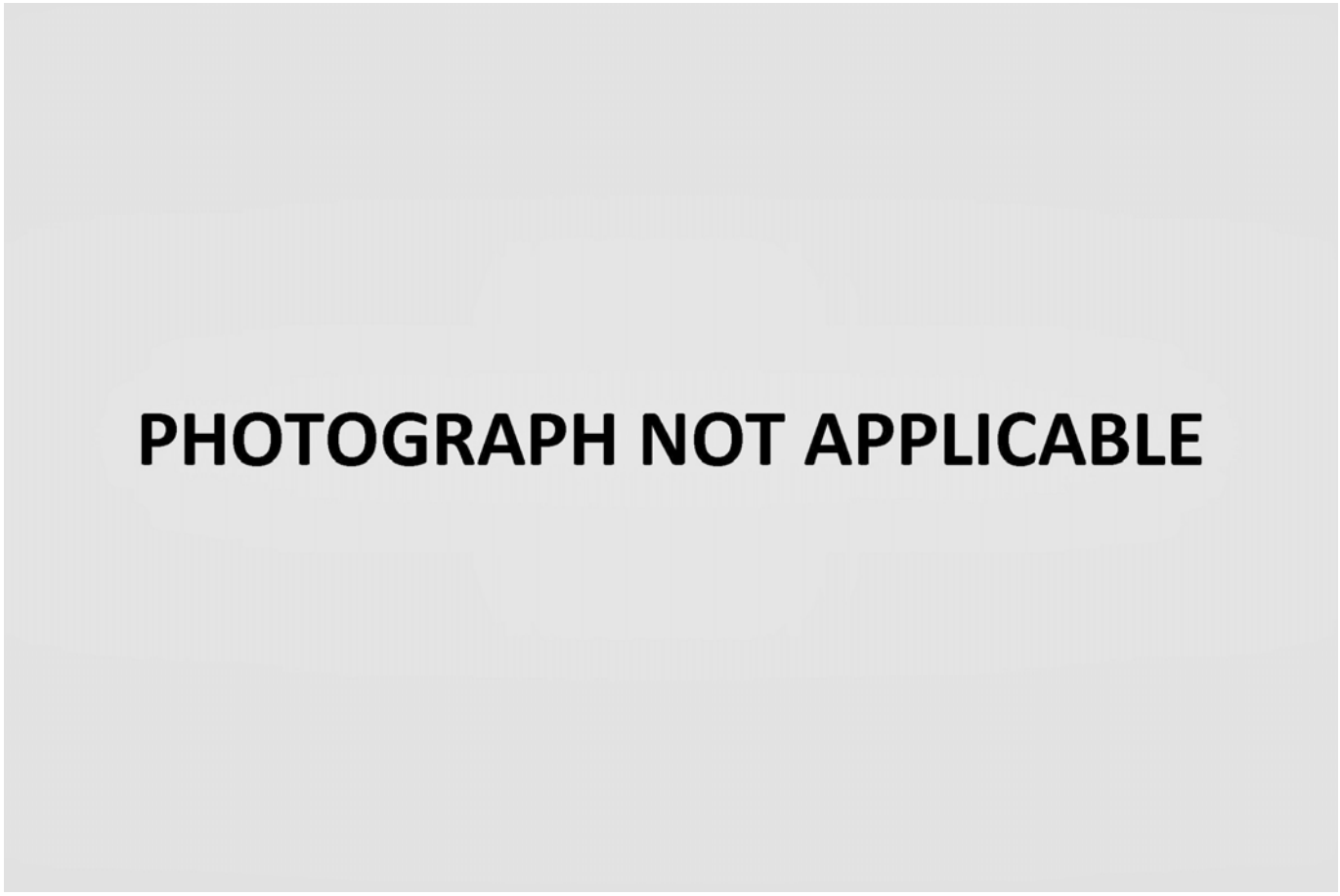



Photo No. 305-38 - Post-Test View of Propulsion Battery Electrolyte Spillage Location

# APPENDIX B
# DUMMY RESPONSE DATA PLOTS

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

**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**

## Additional Driver & Passenger Dummy Instrumentation Data

Passenger Head Angular Velocity (X)

Passenger Head Angular Velocity (Y)

Passenger Head Angular Velocity (Z)

Driver Lower Spine T12 Acceleration (X)

Driver Lower Spine T12 Acceleration (Y)

Driver Lower Spine T12 Acceleration (Z)

Passenger Upper Thorax Rib Deflection (Y)

Passenger Middle Thorax Rib Deflection (Y)

Passenger Lower Thorax Rib Deflection (Y)

Passenger Upper Abdomen Rib Deflection (Y)

Passenger Lower Abdomen Rib Deflection (Y)

Driver Head Acceleration Redundant (X)

Driver Head Acceleration Redundant (Y)

Driver Head Acceleration Redundant (Z)

Passenger Head Acceleration Redundant (X)

Passenger Head Acceleration Redundant (Y)

Passenger Head Acceleration Redundant (Z)

**Vehicle Instrumentation Data**

Vehicle Center of Gravity Acceleration (X)

Vehicle Center of Gravity Acceleration (Y)

Vehicle Center of Gravity Acceleration (Z)

Right Side Sill at Front Seat Acceleration (X)

Right Side Sill at Front Seat Acceleration (Y)

Right Side Sill at Front Seat Acceleration (Z)

Right Side Sill at Rear Seat Acceleration (X)

Right Side Sill at Rear Seat Acceleration (Y)

Right Side Sill at Rear Seat Acceleration (Z)

Left Side Sill at Front Seat Acceleration (Y)

Left Side Sill at Rear Seat Acceleration (Y)

Lower A-Post Acceleration (Y)

Middle A-Post Acceleration (Y)

Lower B-Post Acceleration (Y)

Middle B-Post Acceleration (Y)

Front Seat Track Acceleration (Y)

Rear Seat Track Acceleration (Y)

Right Rear Occupant Compartment Acceleration (Y)

Engine Block (X)

Engine Block (Y)

Rear Floorpan Above Axle Acceleration (X)

Rear Floorpan Above Axle Acceleration (Y)

Rear Floorpan Above Axle Acceleration (Z)

**MDB Instrumentation Data**

MDB Center of Gravity Acceleration (X)

MDB Center of Gravity Acceleration (Y)

MDB Center of Gravity Acceleration (Z)

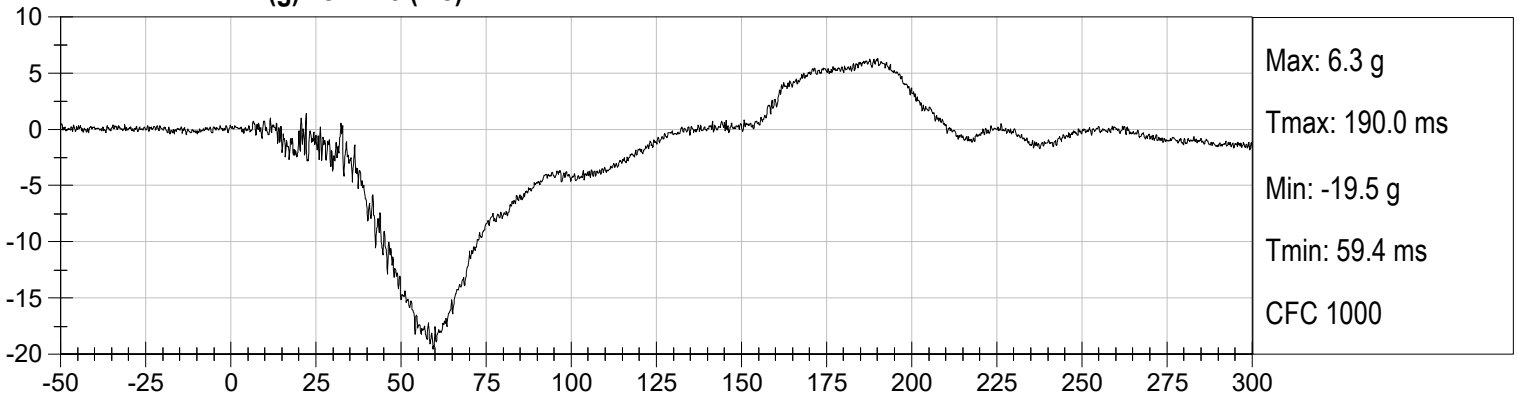
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

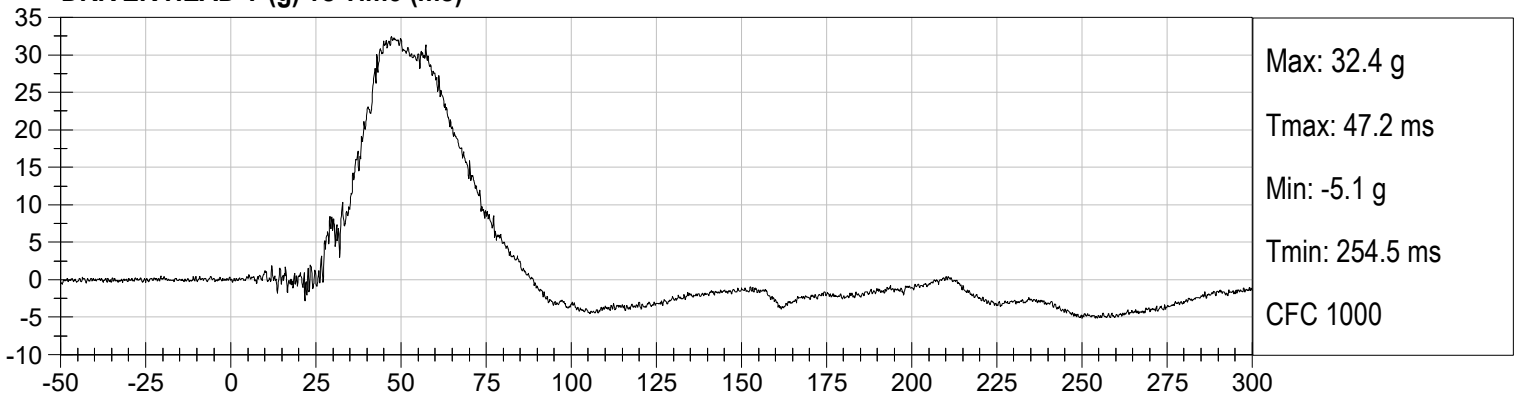
Left MDB Contact Switch

Right MDB Contact Switch

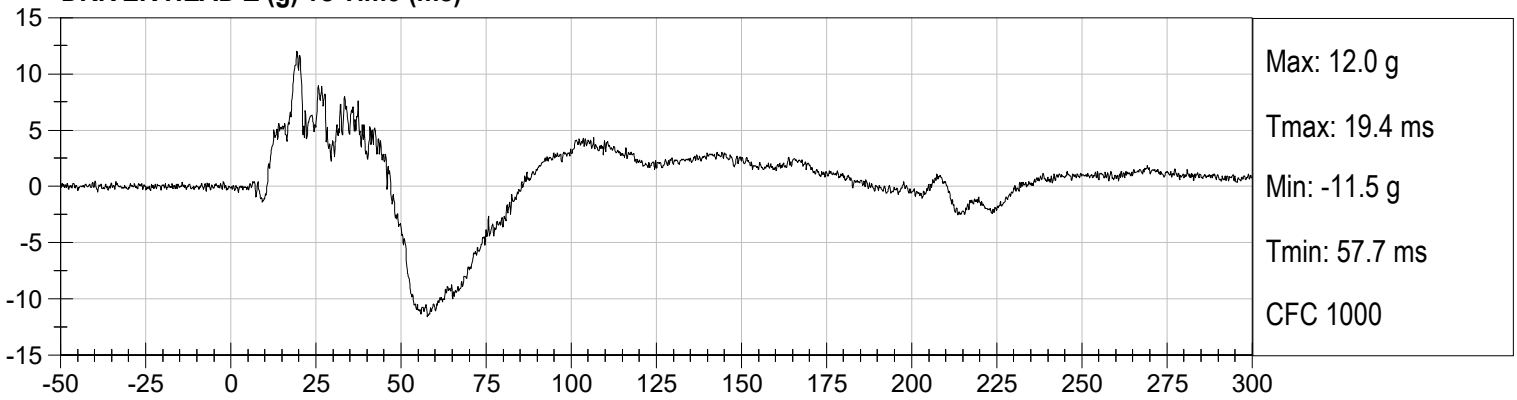
## DRIVER HEAD X (g) vs Time (ms)



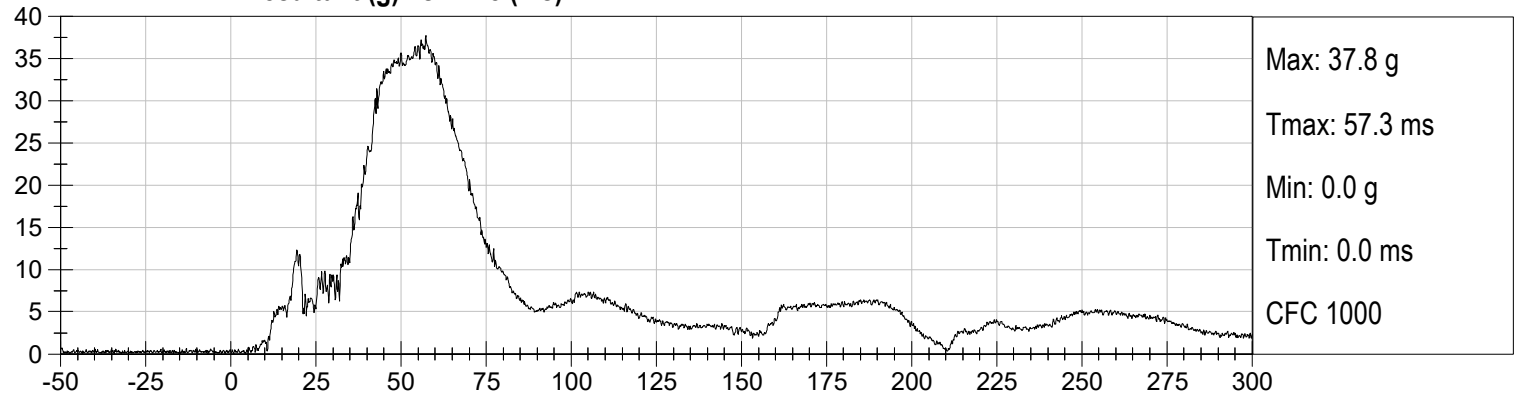

## DRIVER HEAD Y (g) vs Time (ms)



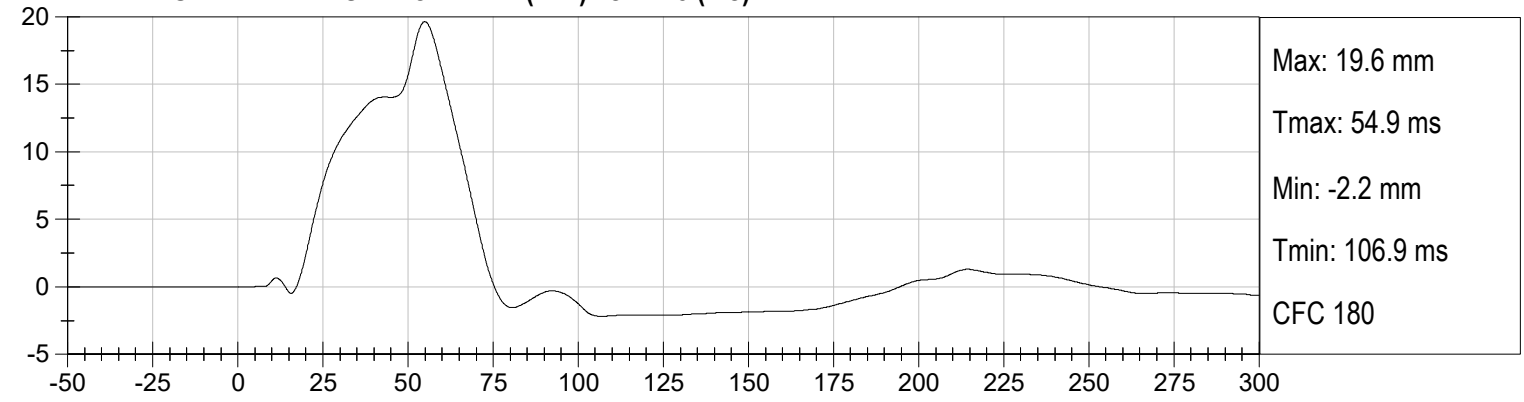

## DRIVER HEAD Z (g) vs Time (ms)



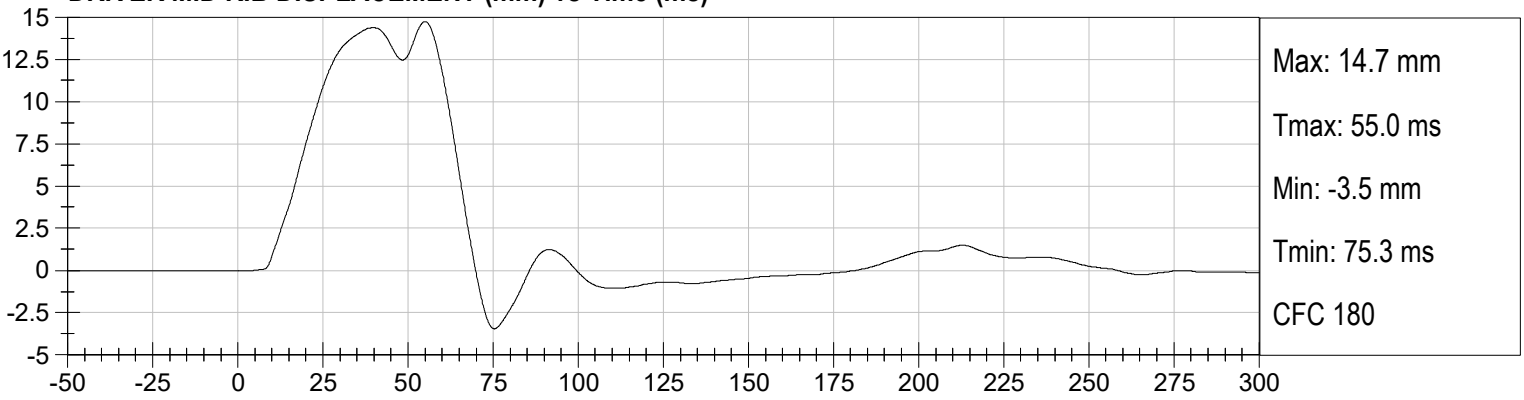

## DRIVER HEAD Resultant (g) vs Time (ms)



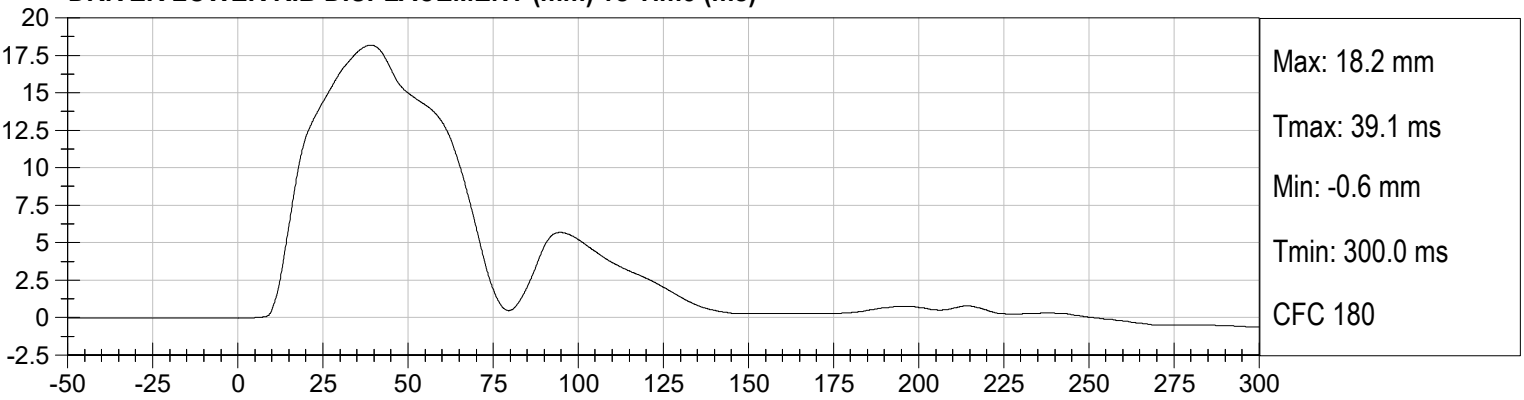
## DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



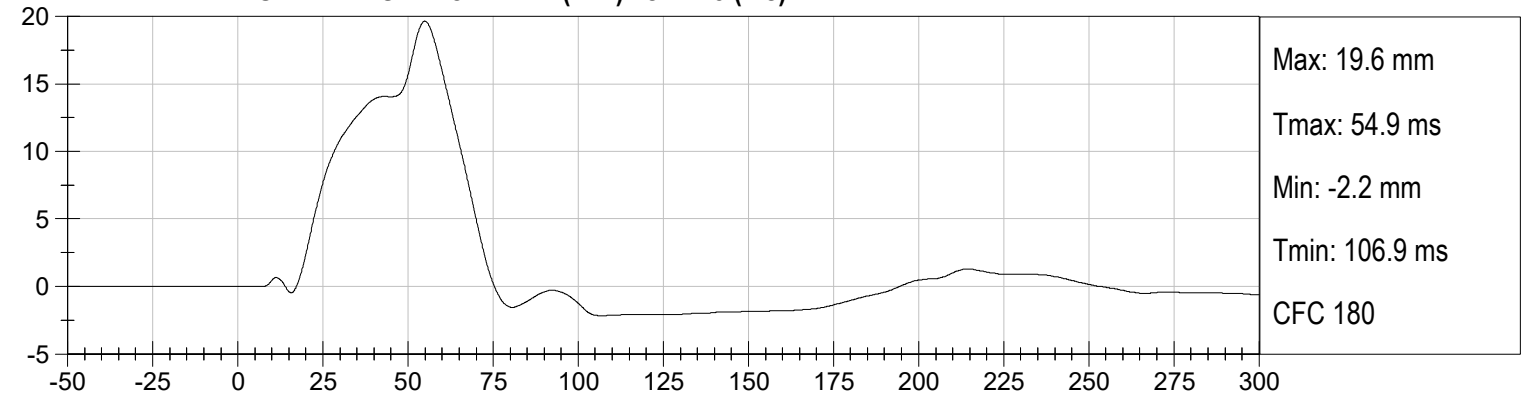

## DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)



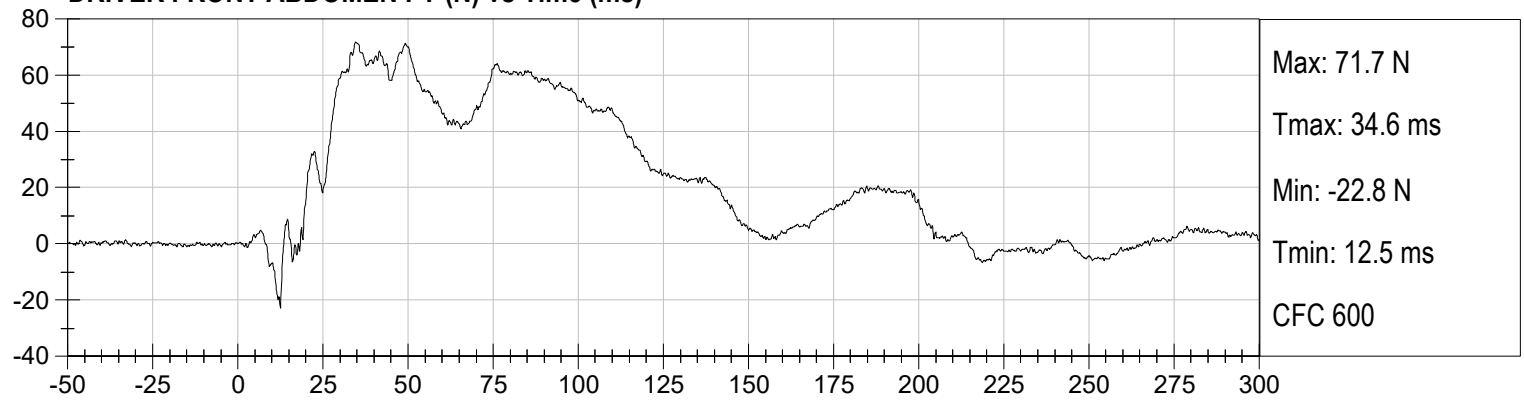

## DRIVER LOWER RIB DISPLACEMENT (mm) vs Time (ms)



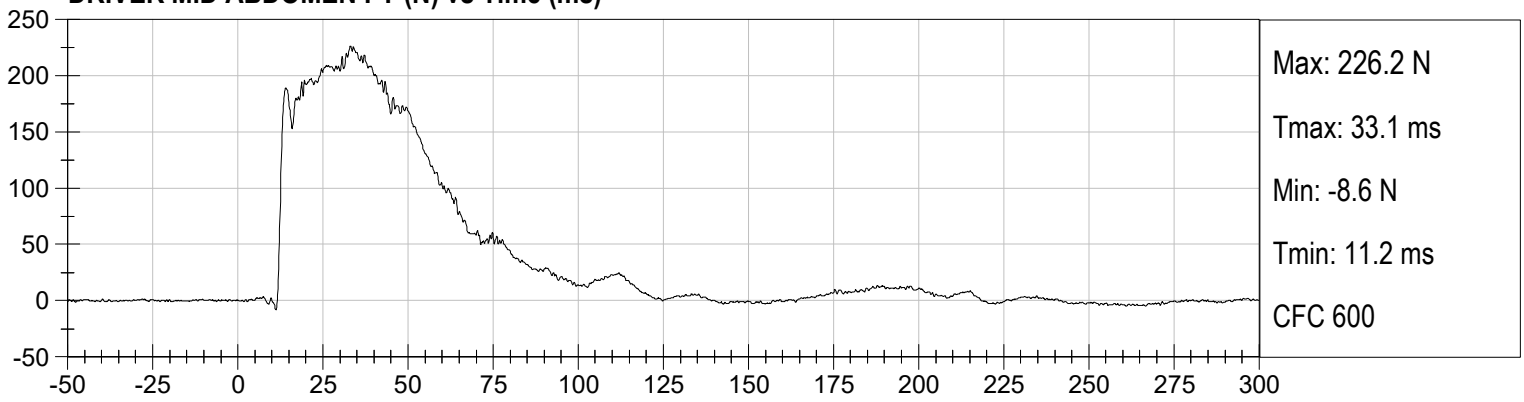

## DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)



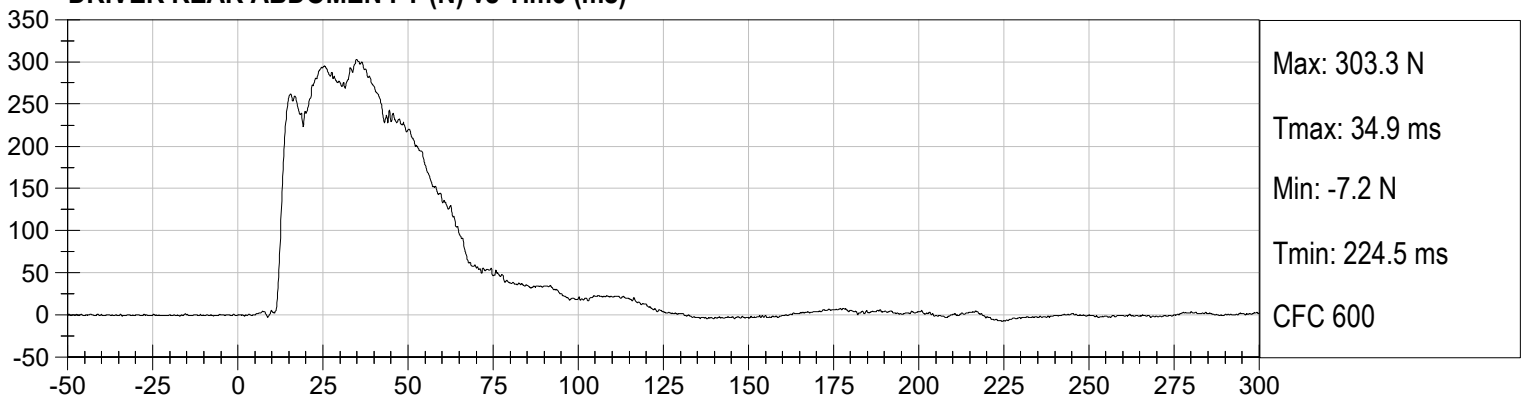
## DRIVER FRONT ABDOMEN FY (N) vs Time (ms)



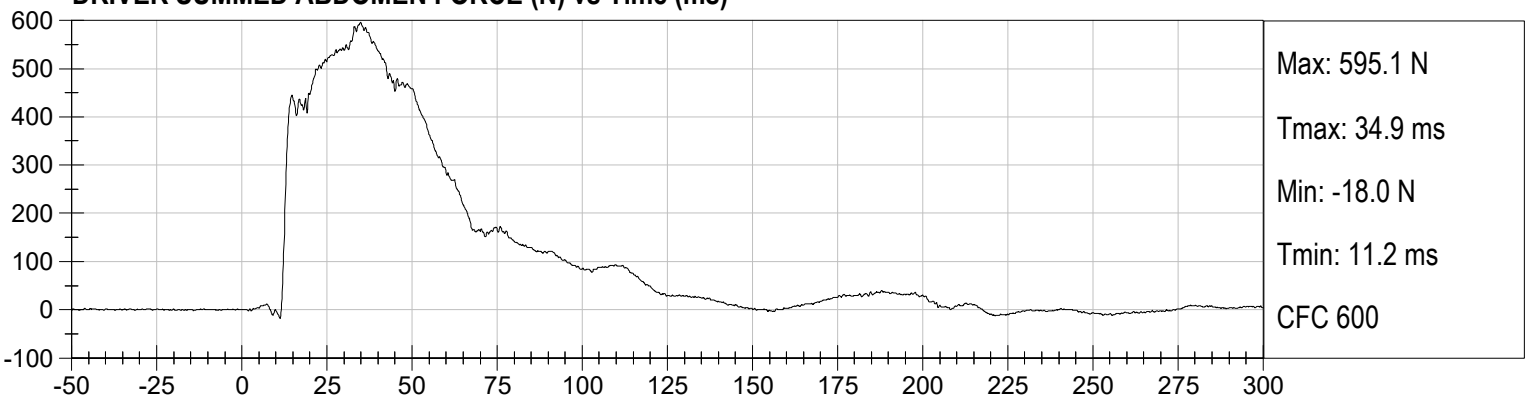

## DRIVER MID ABDOMEN FY (N) vs Time (ms)



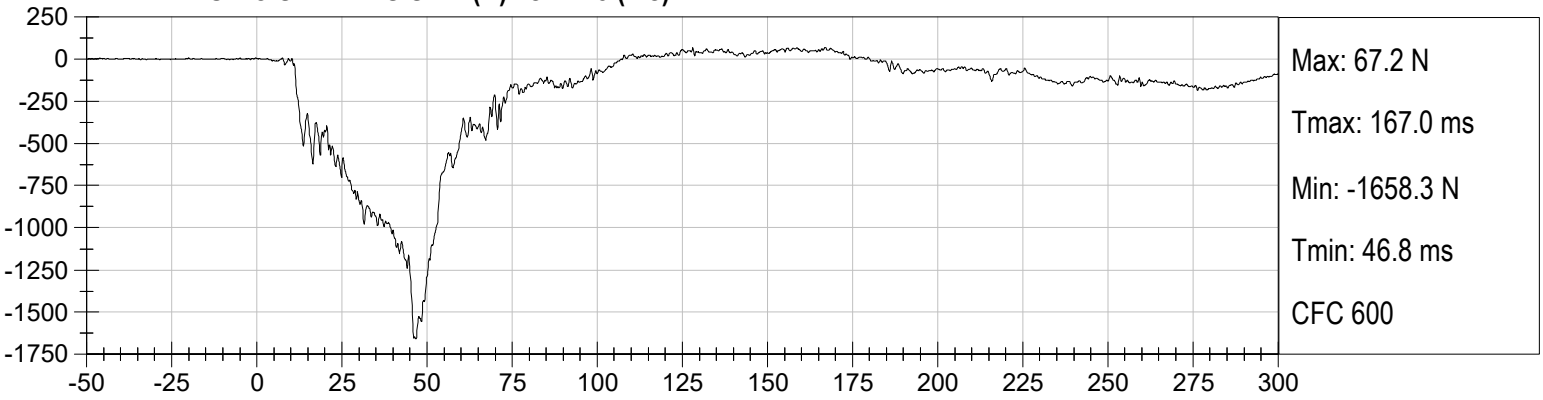

## DRIVER REAR ABDOMEN FY (N) vs Time (ms)



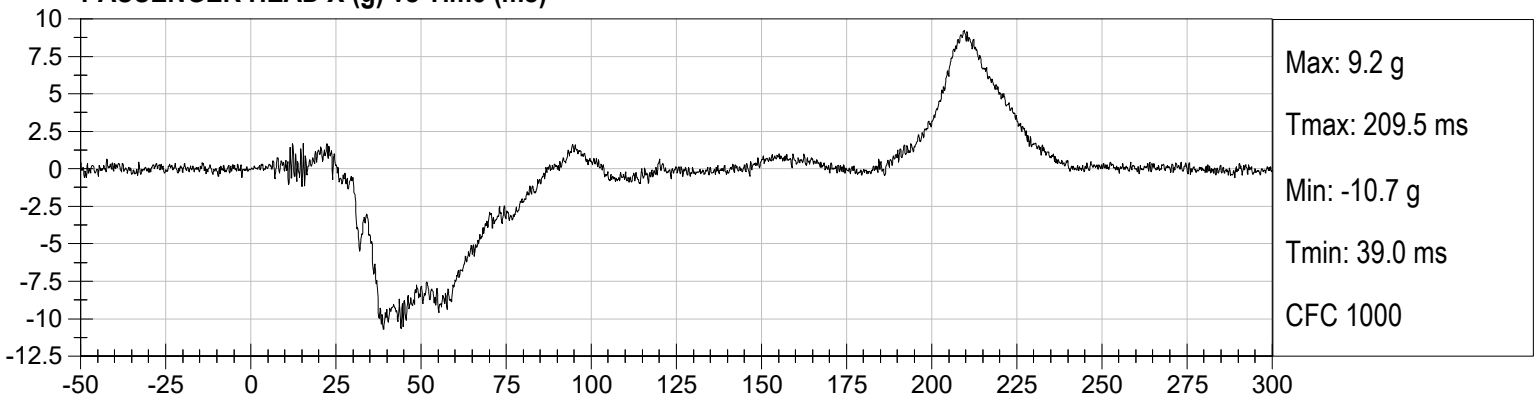

## DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)



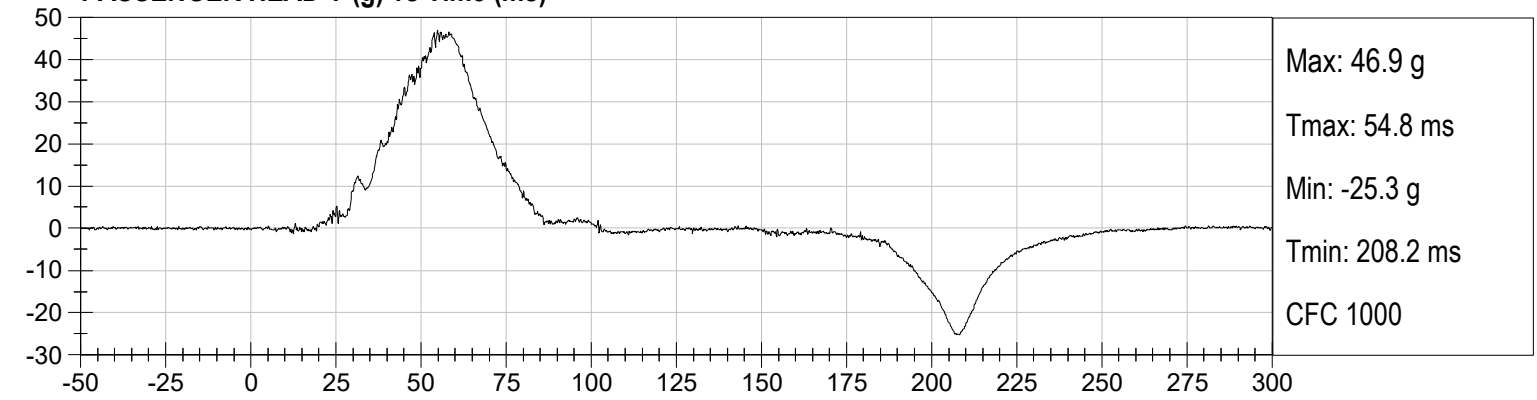
**DRIVER PUBIC SYMPHYSIS FY (N) vs Time (ms)**



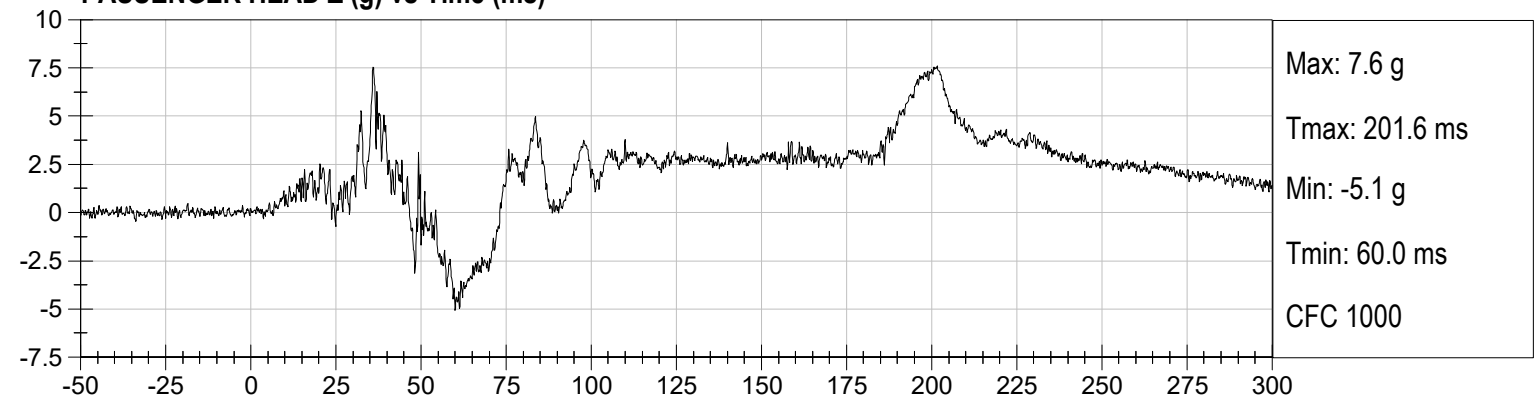
## PASSENGER HEAD X (g) vs Time (ms)



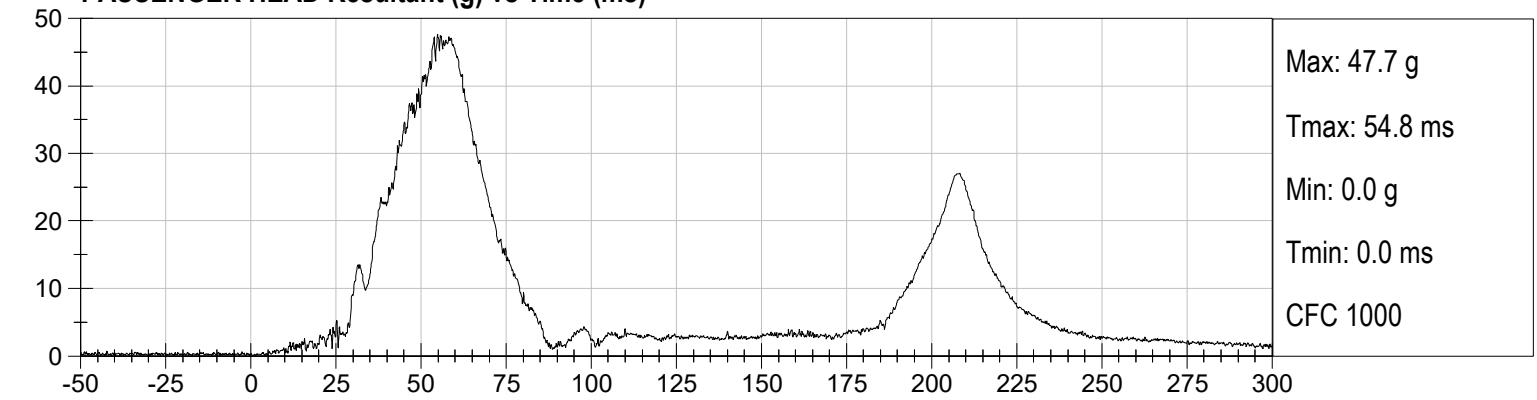

## PASSENGER HEAD Y (g) vs Time (ms)



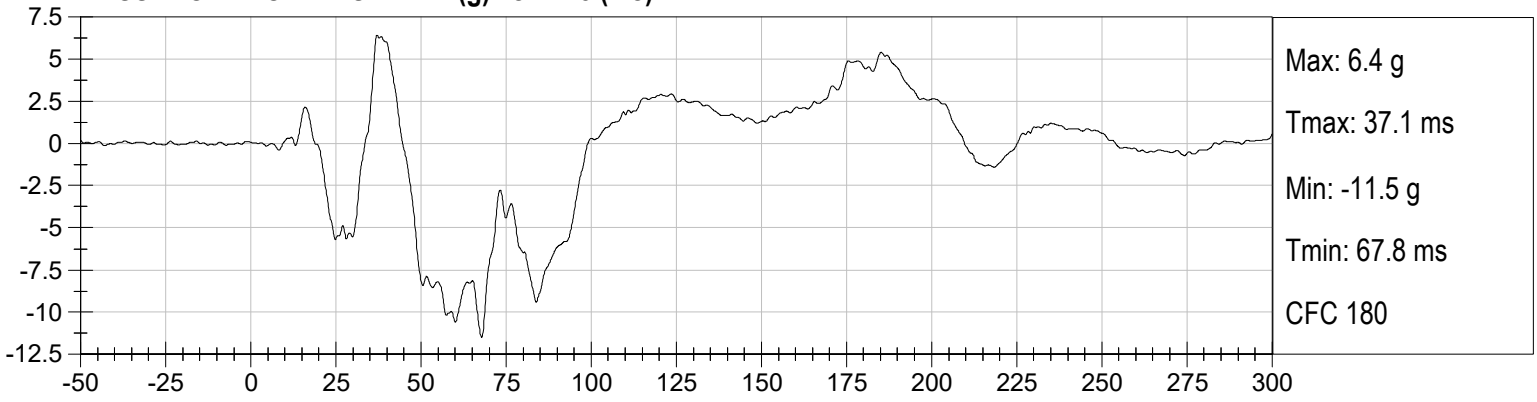

## PASSENGER HEAD Z (g) vs Time (ms)



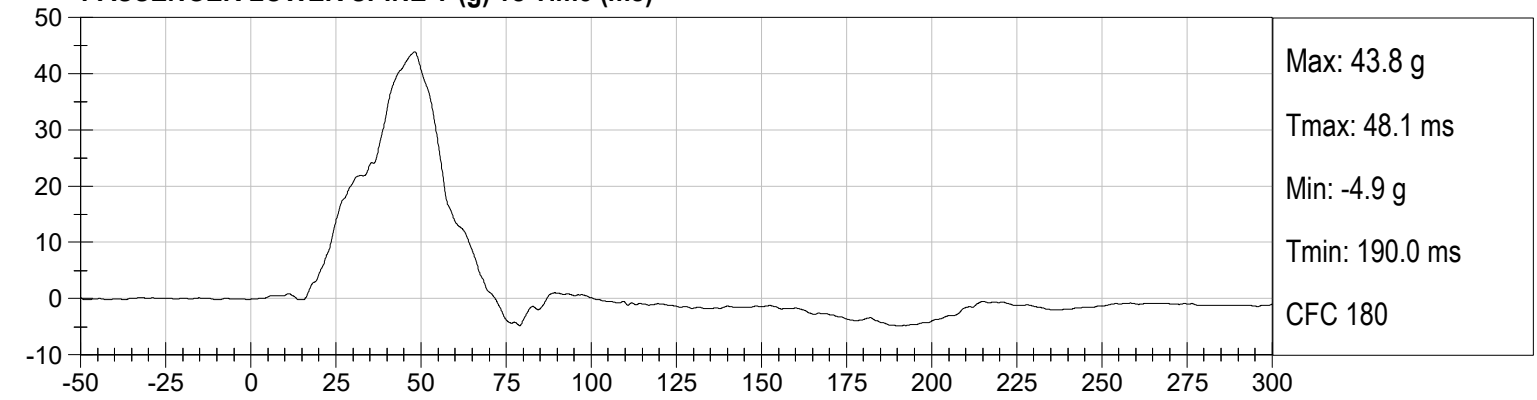

## PASSENGER HEAD Resultant (g) vs Time (ms)



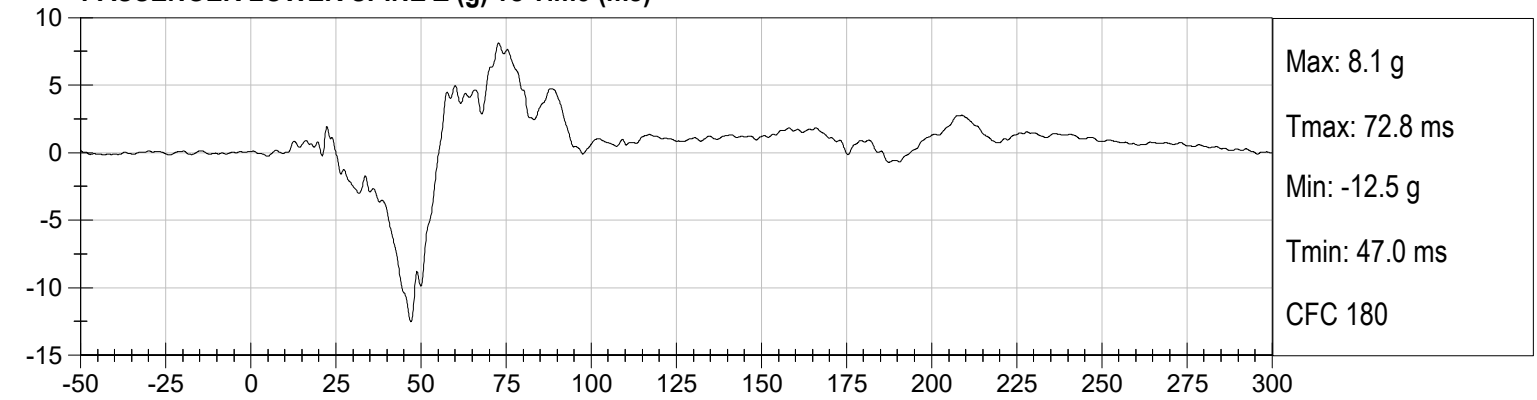
## PASSENGER LOWER SPINE X (g) vs Time (ms)



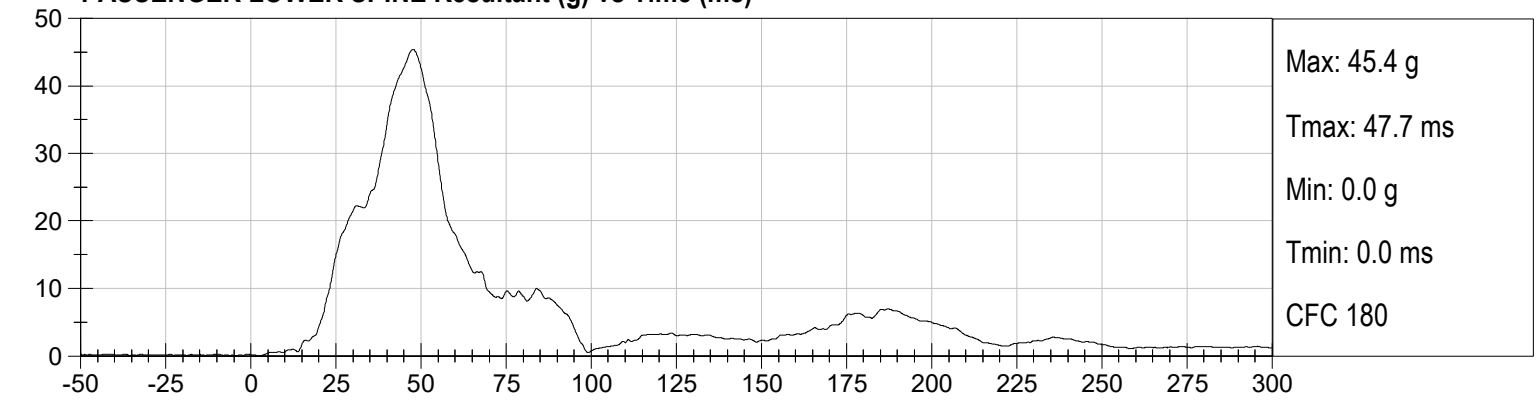

## PASSENGER LOWER SPINE Y (g) vs Time (ms)



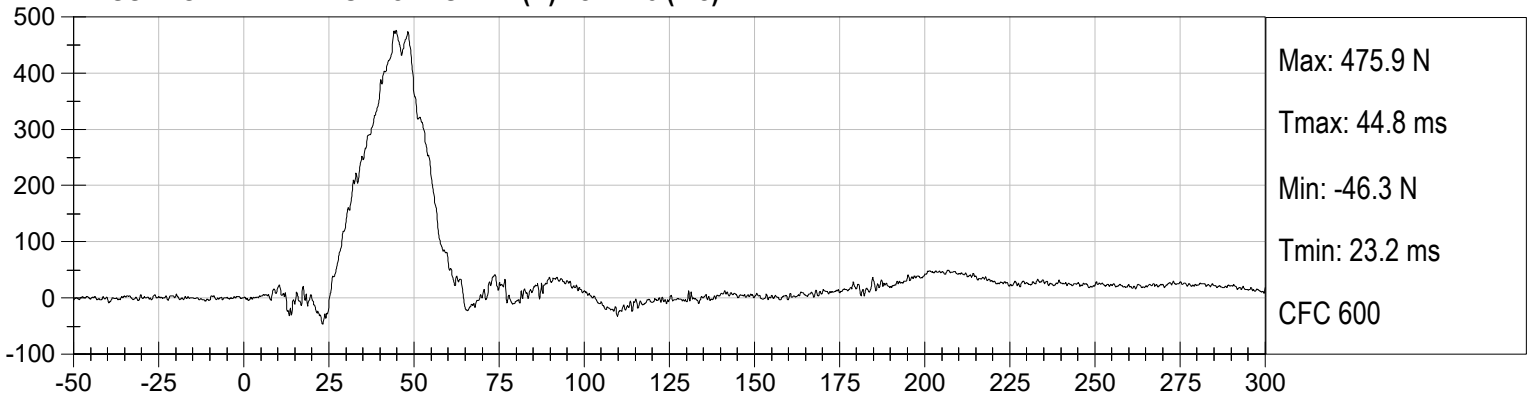

## PASSENGER LOWER SPINE Z (g) vs Time (ms)



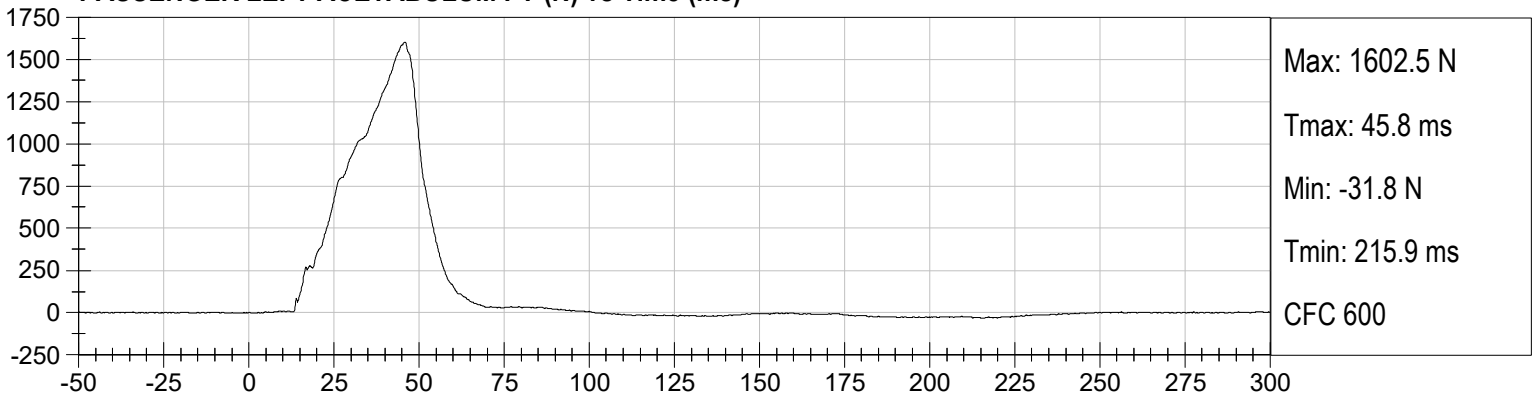

## PASSENGER LOWER SPINE Resultant (g) vs Time (ms)



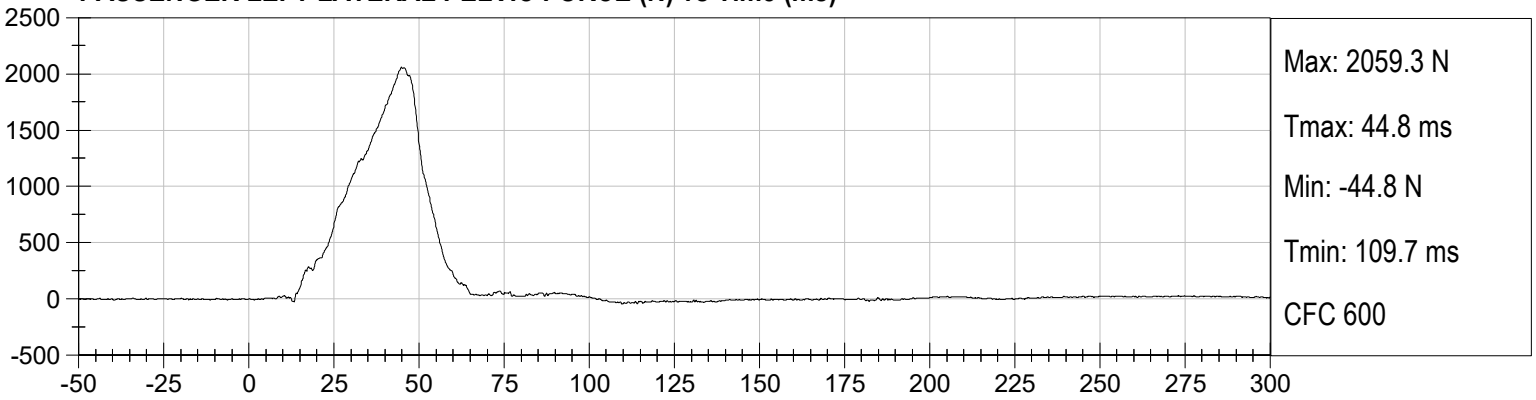
## PASSENGER LEFT ILIUM CREST FY (N) vs Time (ms)




## PASSENGER LEFT ACETABULUM FY (N) vs Time (ms)




## PASSENGER LEFT LATERAL PELVIC FORCE (N) vs Time (ms)



# APPENDIX C
# DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

**CALIBRATION TEST RESULTS**

**PRE-TEST**

**EUROSID 2 (ES-2RE) MALE – DRIVER ATD**

**ES-2re External Measurements**
**SN: F032**

| No. | Name | Spec. (mm) | Result | Pass/Fail |
|---|---|---|---|---|
| **1** | Sitting Height | 900 - 918 | 915 | Pass |
| **2** | Seat to Shoulder Joint | 558 - 572 | 568 | Pass |
| **3** | Seat to Lower Face of Thoracic Spine Box | 346 - 356 | 355 | Pass |
| **4** | Seat to Hip Joint (center of bolt) | 97 - 103 | 98 | Pass |
| **5** | Sole to Seat, Sitting | 333 - 451 | 440 | Pass |
| **6** | Head Width | 152 - 158 | 157 | Pass |
| **7** | Shoulder/Arm Width | 461 - 479 | 464 | Pass |
| **8** | Thorax Width | 322 - 332 | 323 | Pass |
| **9** | Abdomen Width | 273 - 287 | 281 | Pass |
| **10** | Pelvis Lap Width | 359 - 373 | 370 | Pass |
| **11** | Head Depth | 196 - 206 | 203 | Pass |
| **12** | Thorax Depth | 262 - 272 | 264 | Pass |
| **13** | Abdomen Depth | 194 - 204 | 196 | Pass |
| **14** | Pelvis Depth | 235 - 245 | 236 | Pass |
| **15** | Back of Buttocks to Hip Joint (center of bolt) | 150 - 160 | 151 | Pass |
| **16** | Back of Buttocks to Front Knee | 597 - 615 | 607 | Pass |

**MGA RESEARCH CORPORATION**

**HEAD DROP TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test ID:** D211361

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 22 | Pass |
| Peak Resultant Acceleration | G's | 125 to 155 | 127 | Pass |
| Peak Longitudinal Acceleration | G's | <= +/- 15.0 | 6.2 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 15% of peak | Yes | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

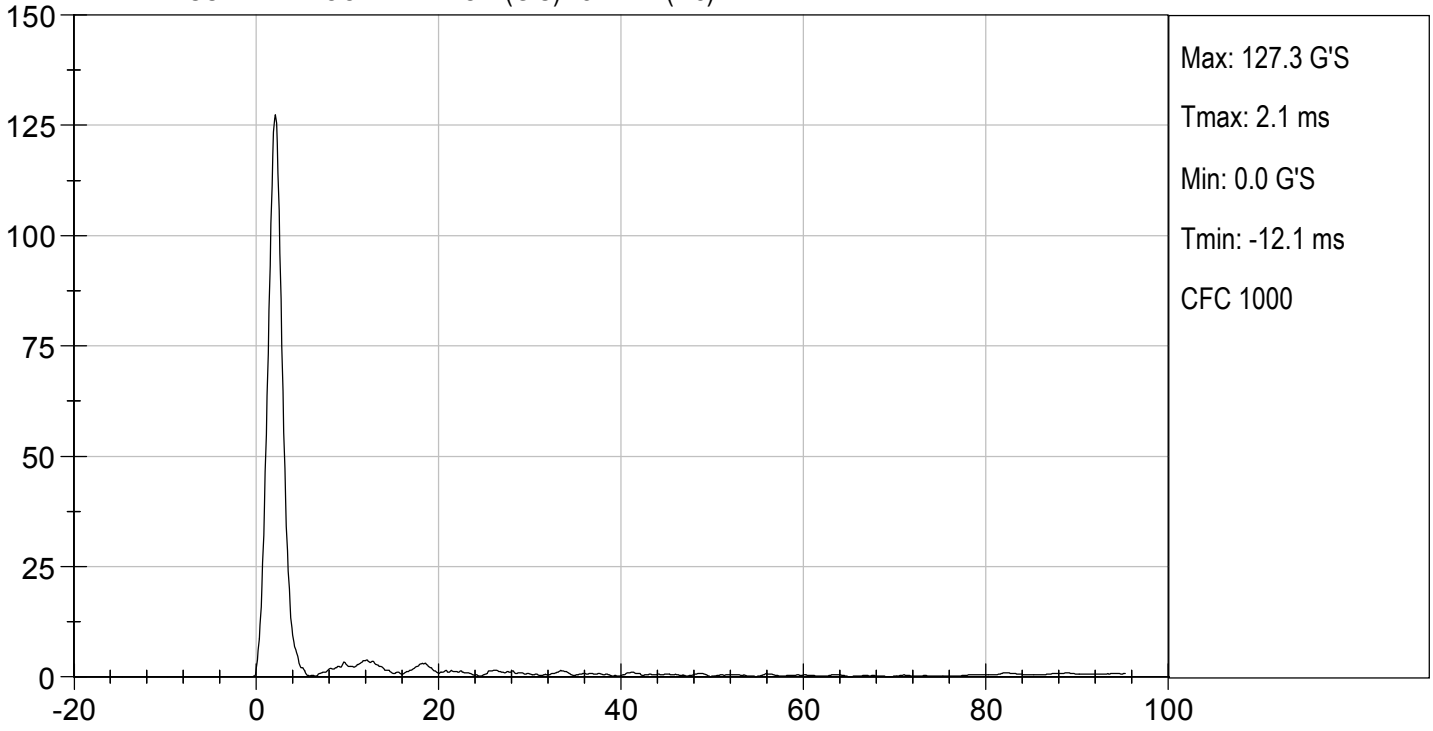
04/20/2021
Test Date

Approved By

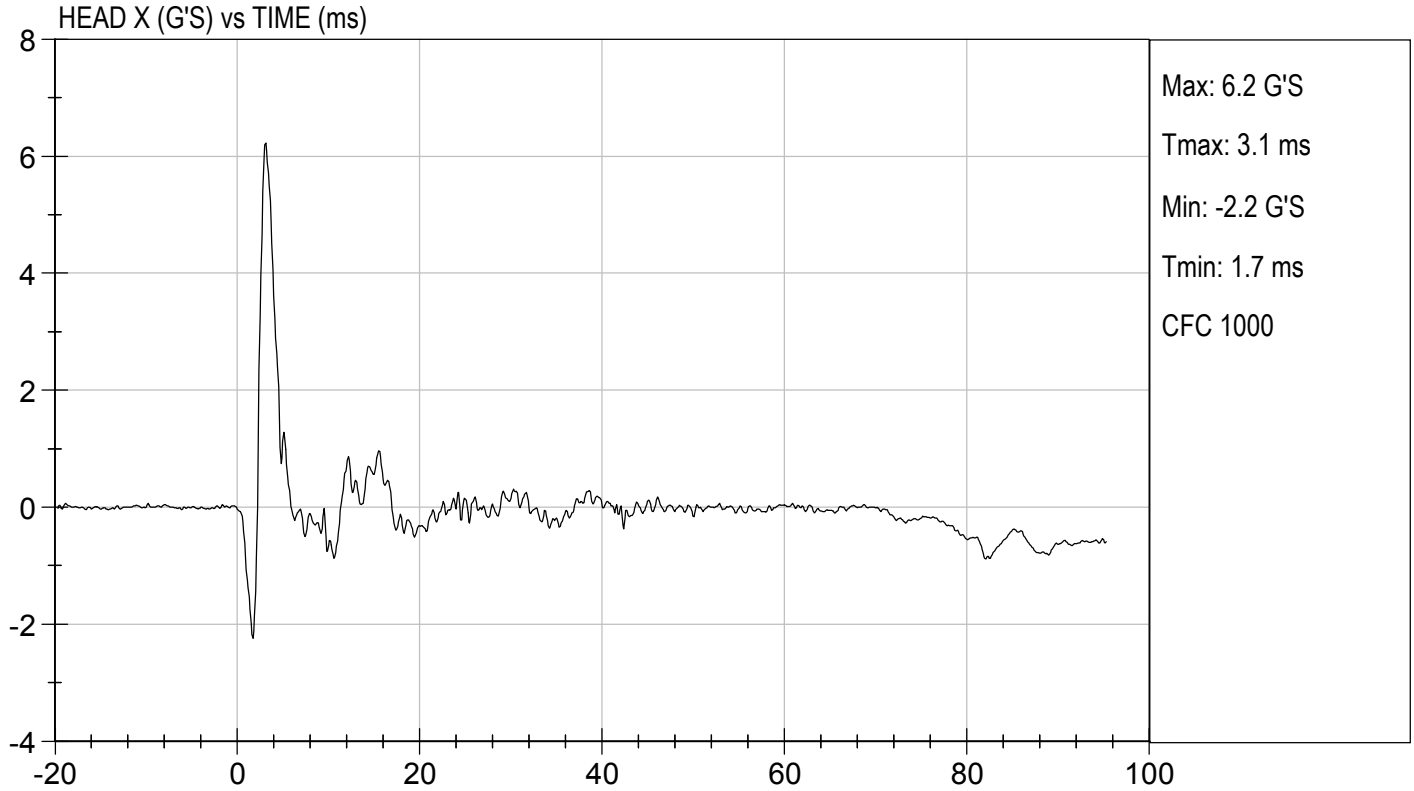
TEST DESC: HEAD DROP

TEST DATE: 04/20/2021
TEST #: D211361

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)

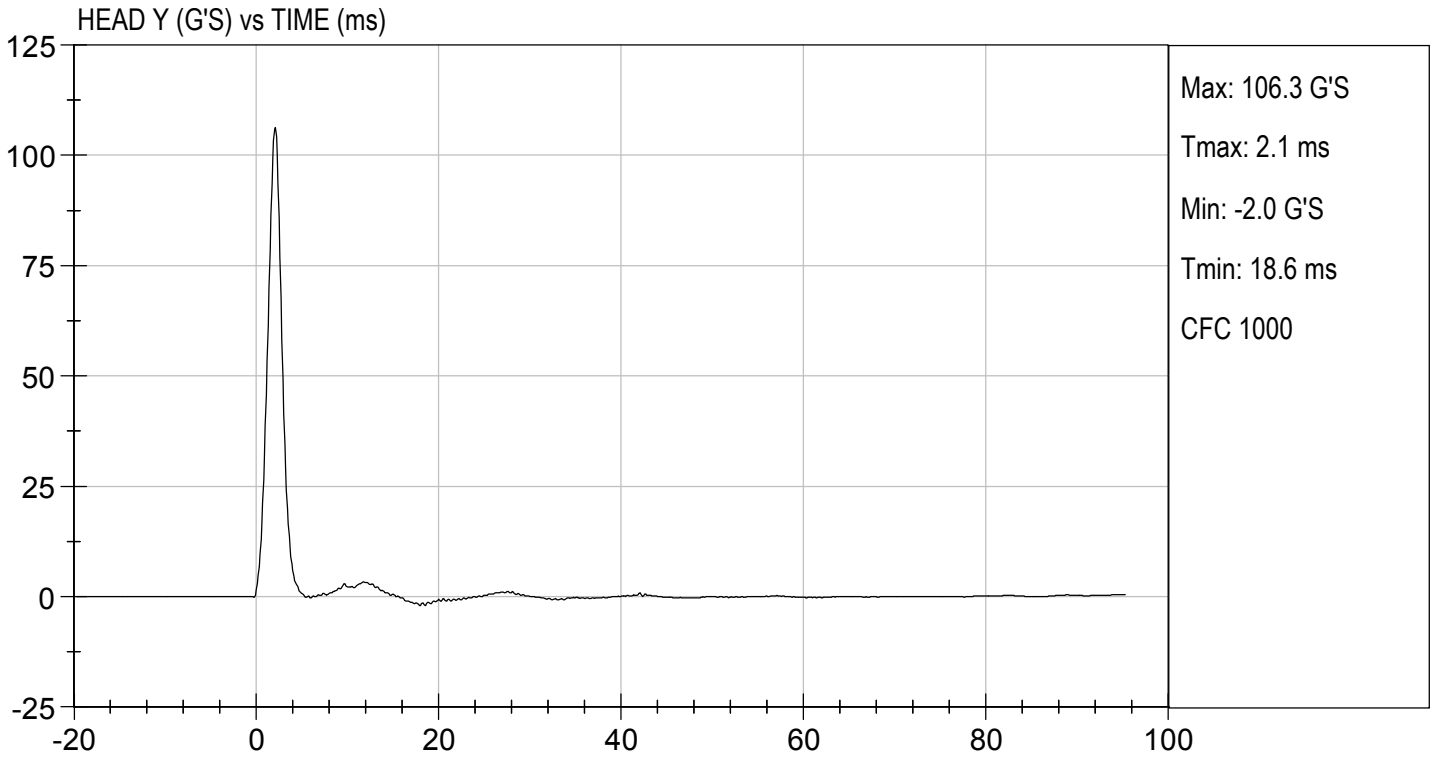


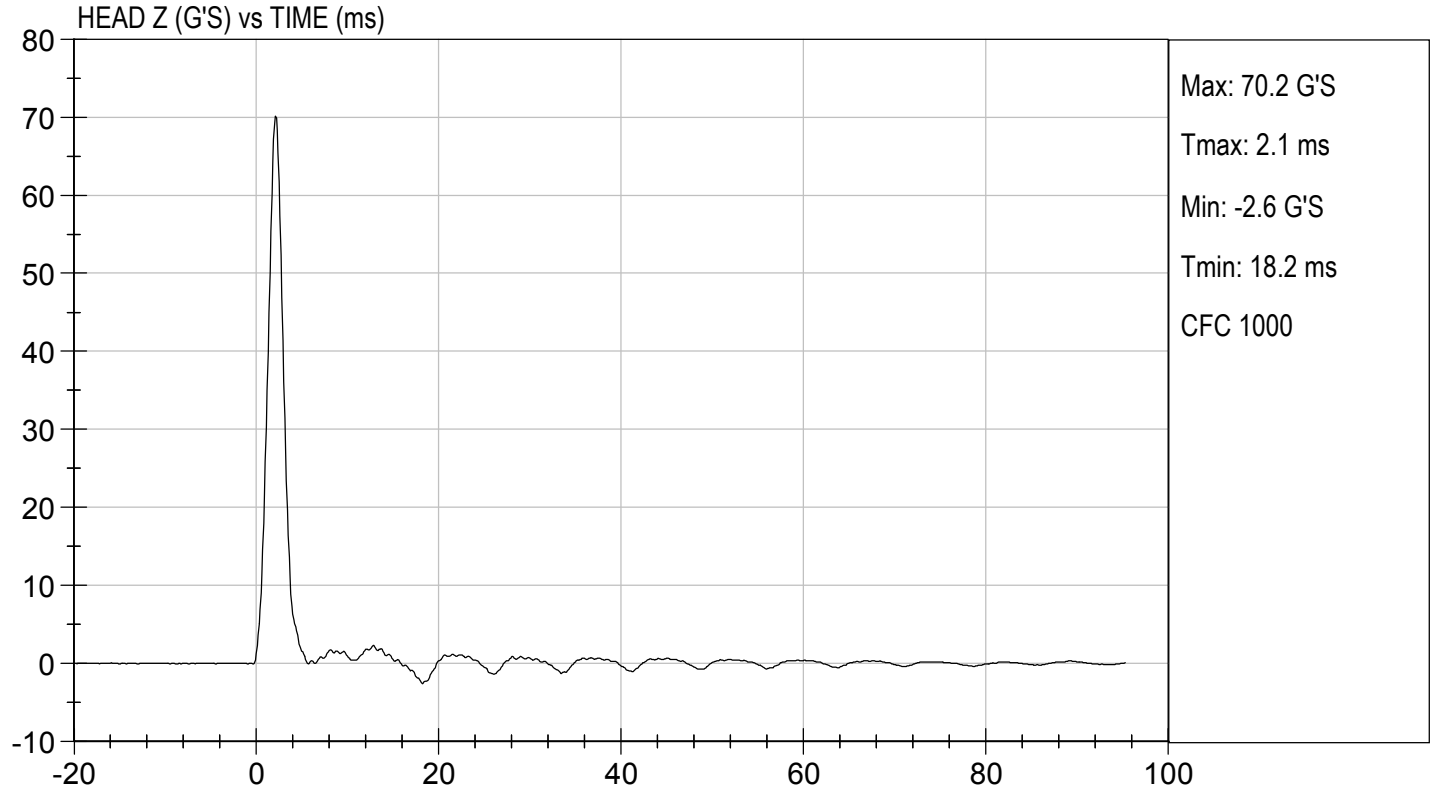

HEAD X (G'S) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 04/20/2021
TEST #: D211361



**MGA RESEARCH CORPORATION**

**NECK PENDULUM TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211362

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 22 | Pass |
| Pendulum Speed | | m/s | 3.30 to 3.50 | 3.50 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | -0.02 | Pass |
| | 3 ms | m/s | -0.25 to -0.375 | -0.35 | Pass |
| | 14 ms | m/s | -3.20 to -3.70 | -3.48 | Pass |
| | 17 ms | m/s | >= -3.70 | -3.50 | Pass |
| Maximum Flexion Angle | | deg | 49.0 to 59.0 | 49.8 | Pass |
| Time of Maximum Flexion Angle | | ms | 54.0 to 66.0 | 57.2 | Pass |
| Head Rotation Decay Time to 0 Degree | | ms | 53.0 to 88.0 | 59.7 | Pass |
| | | | Overall Results | | Pass |

Gerald Guerrero
Laboratory Technician

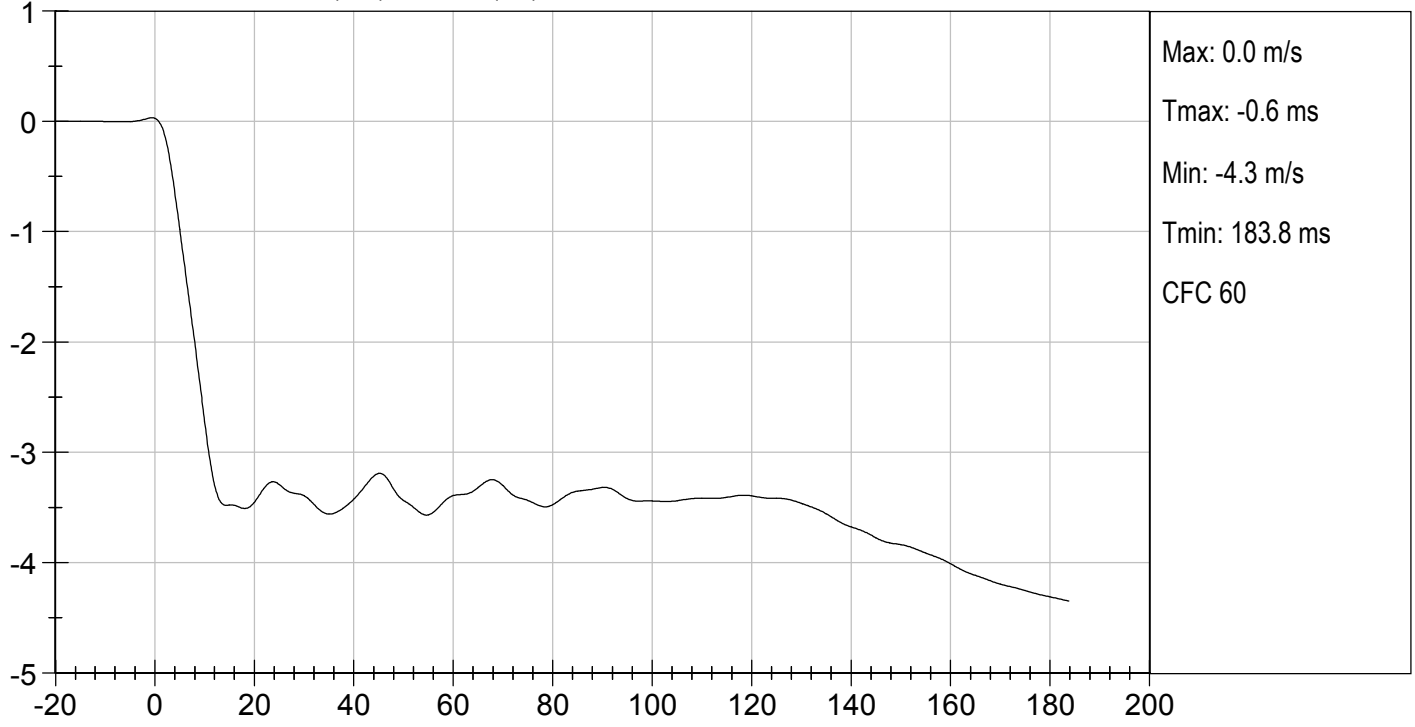
04/20/2021
Test Date

Approved By

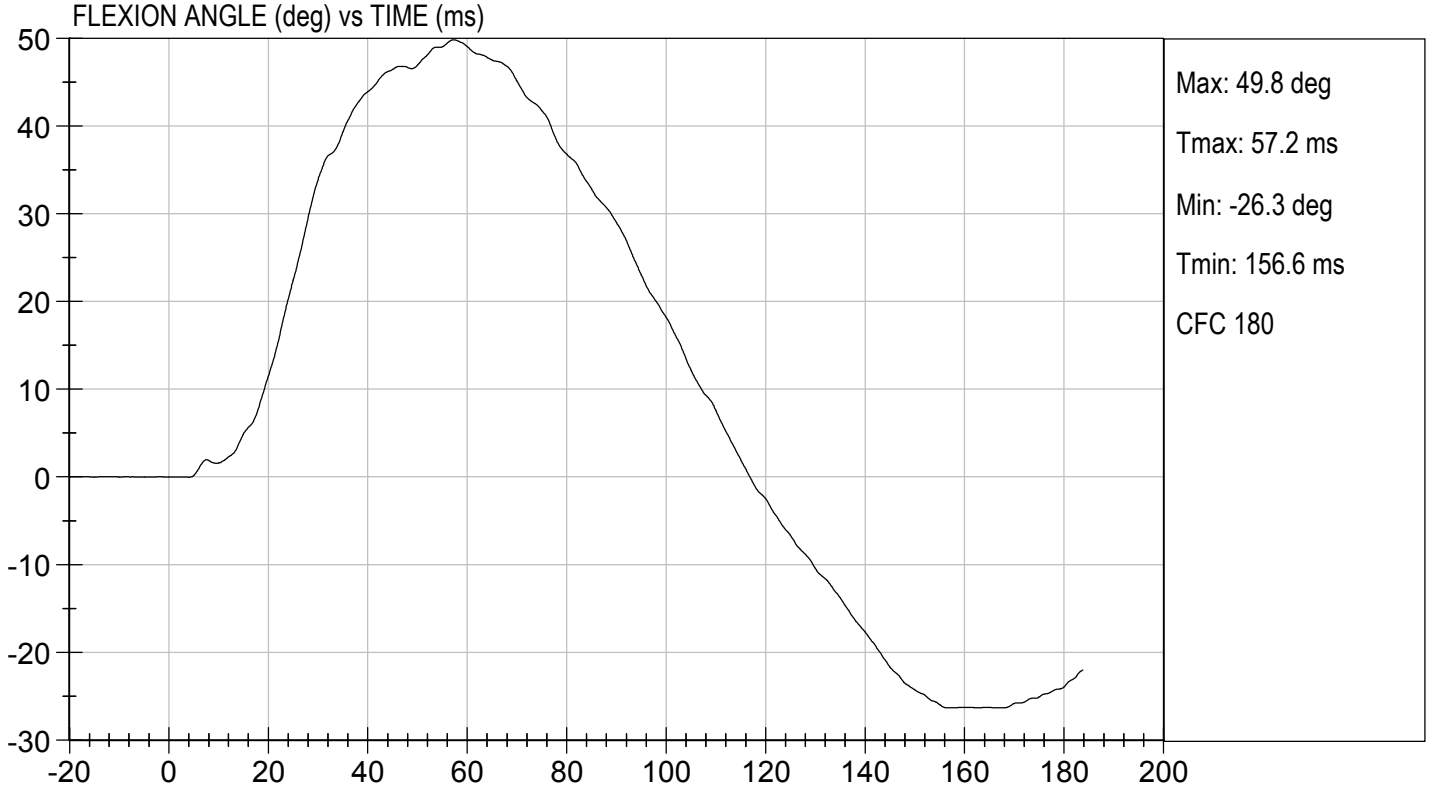
TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 04/20/2021
TEST #: D211362

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



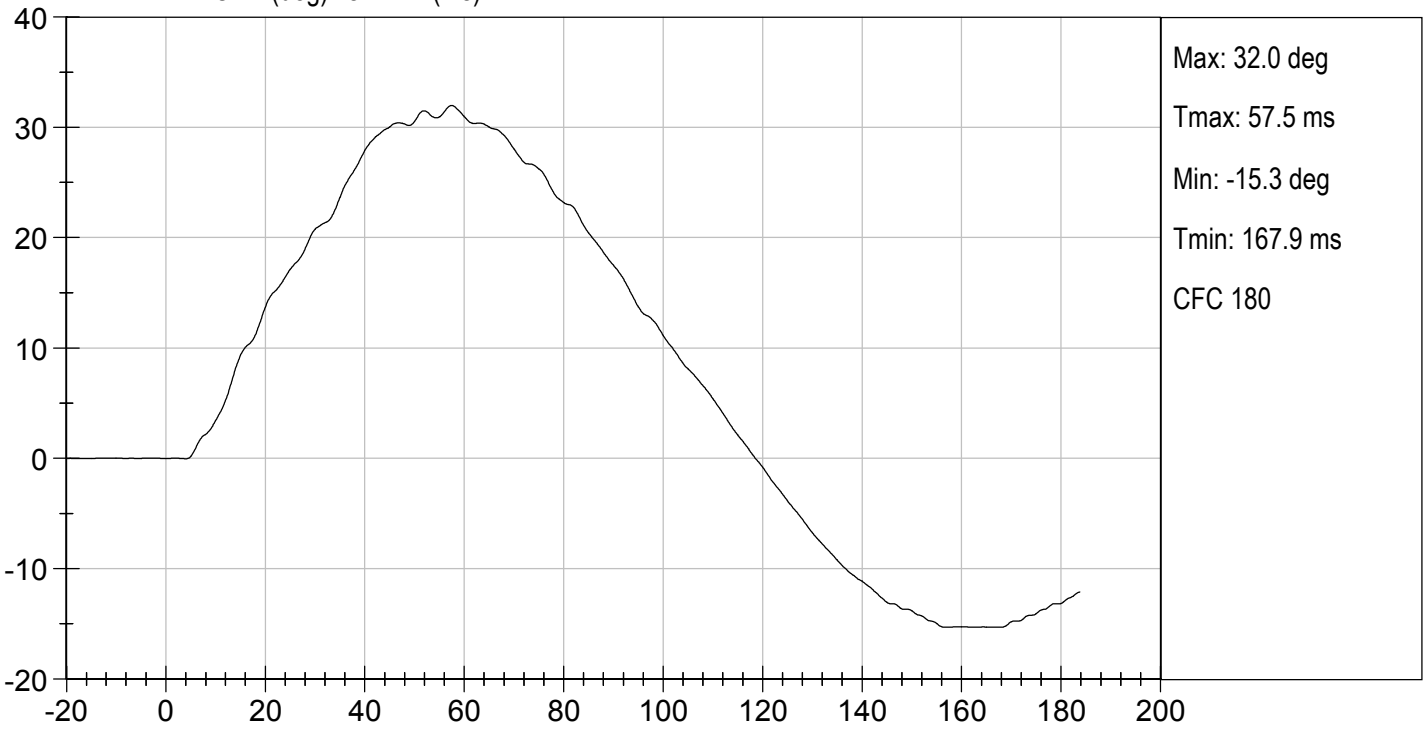

FLEXION ANGLE (deg) vs TIME (ms)



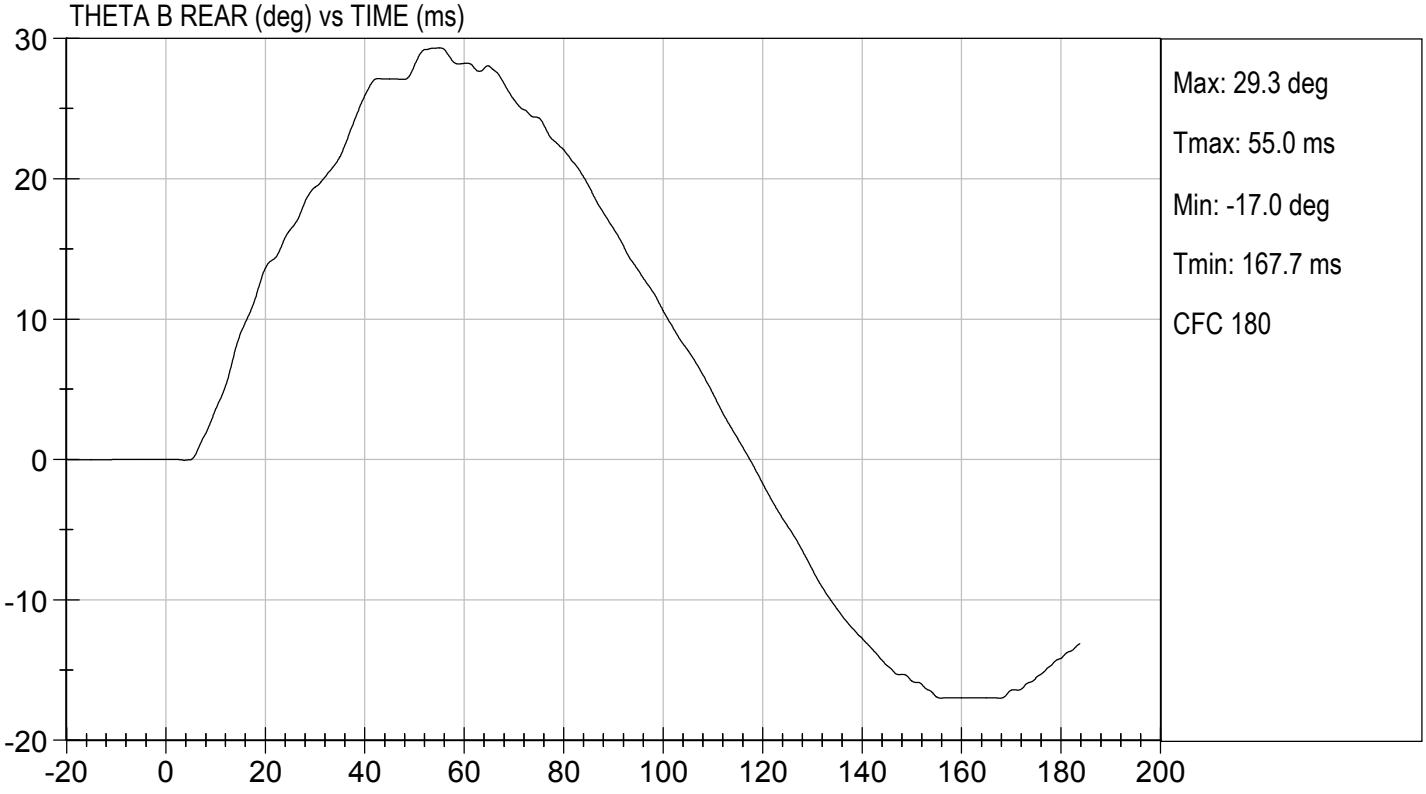
TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 04/20/2021
TEST #: D211362

THETA A FRONT (deg) vs TIME (ms)

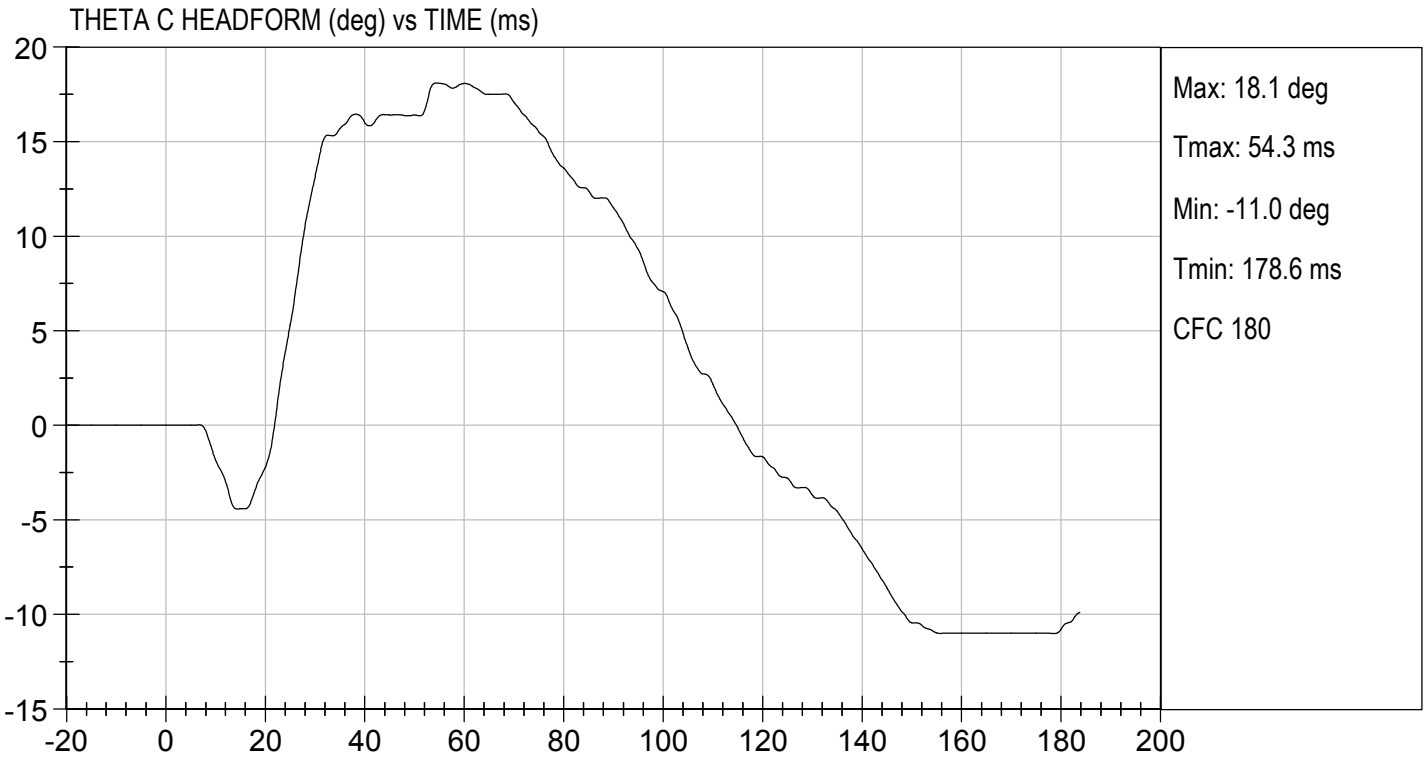



THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.49 ft/s, 3.50 m/s

TEST DATE: 04/20/2021
TEST #: D211362



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211363

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 21 | Pass |
| Pendulum Speed | m/s | 4.20 to 4.40 | 4.27 | Pass |
| Peak Impactor Acceleration | G's | 7.5 to 10.5 | 8.1 | Pass |
| | | Overall Test Results | | Pass |

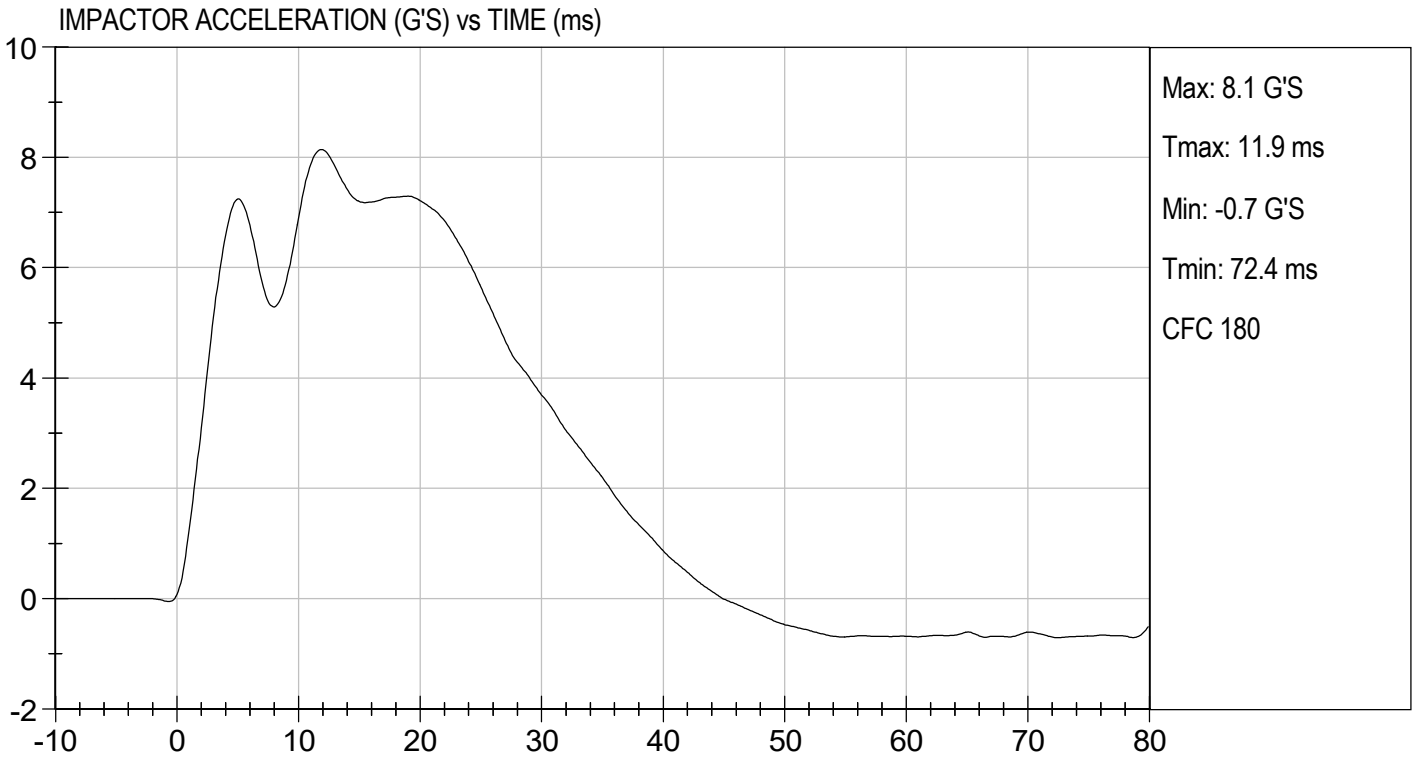
Gerald Guerrero
Laboratory Technician

04/21/2021
Test Date

Approved By

TEST DESC: SHOULDER IMPACT
VELOCITY: 14.01 ft/s, 4.27 m/s

TEST DATE: 04/21/2021
TEST #: D211363



**MGA RESEARCH CORPORATION**

**UPPER RIB TEST**

**ES-2re DUMMY**

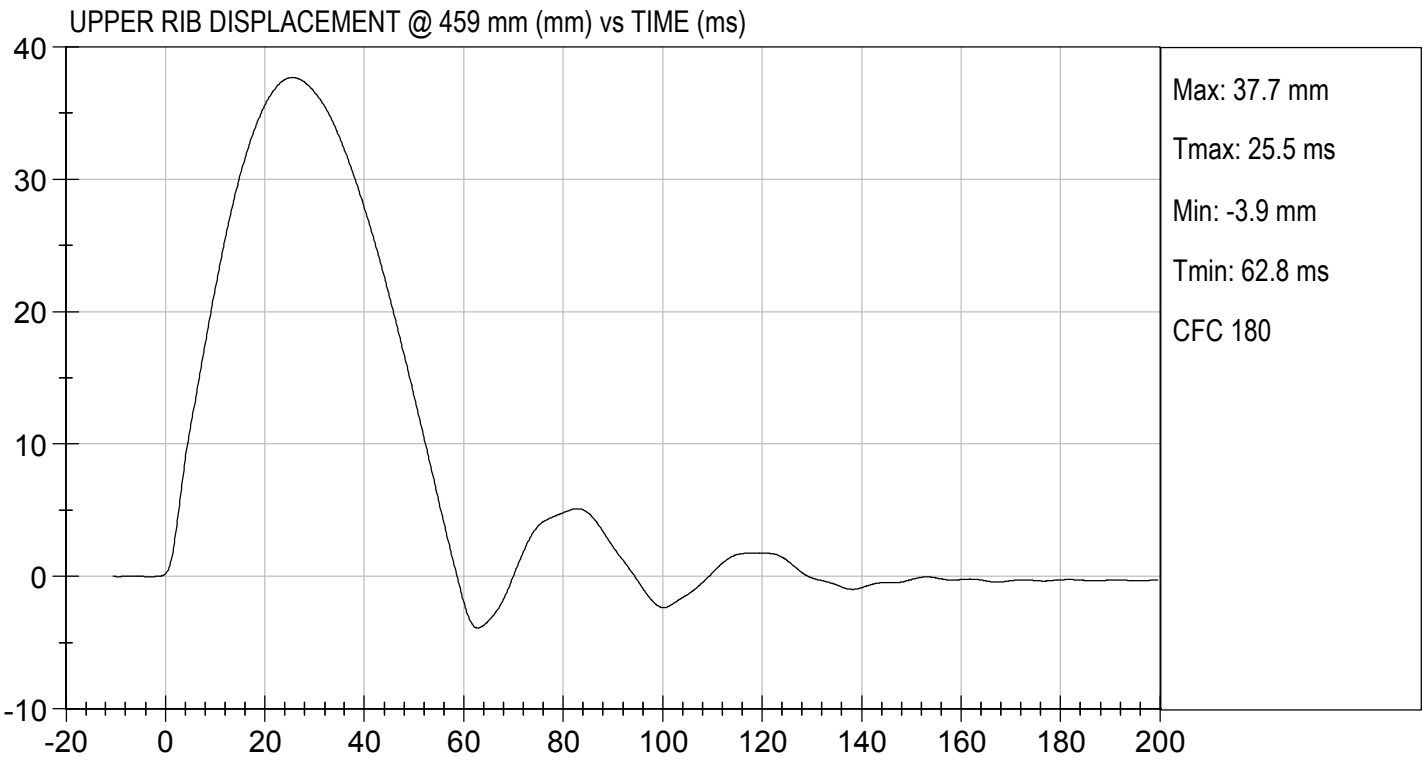
**ATD Serial No:** F032 **Test I.D:** D211364

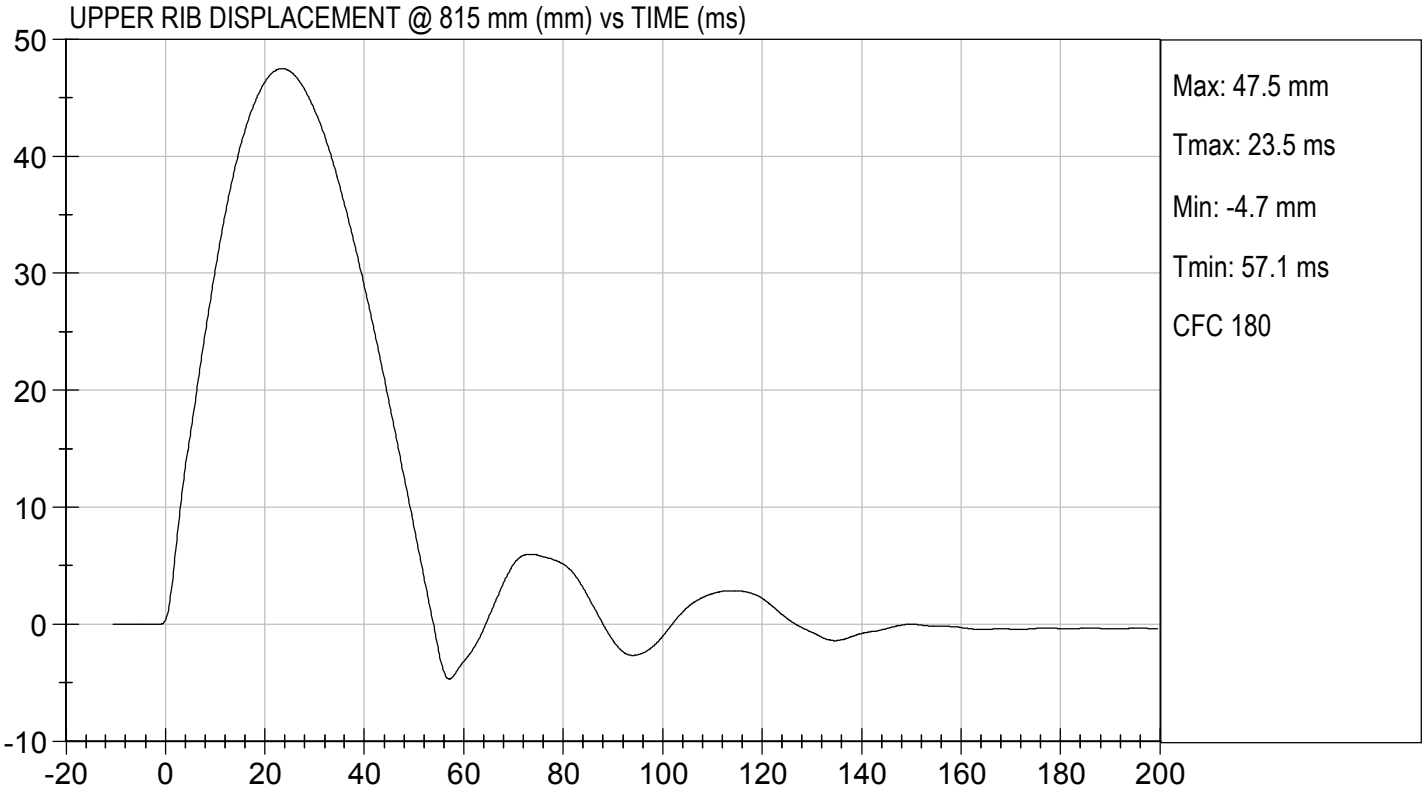
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 22 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 37.7 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 47.5 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

04/20/2021
Test Date

Approved By


UPPER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 37.7 mm
Tmax: 25.5 ms
Min: -3.9 mm
Tmin: 62.8 ms
CFC 180


UPPER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 47.5 mm
Tmax: 23.5 ms
Min: -4.7 mm
Tmin: 57.1 ms
CFC 180

**MGA RESEARCH CORPORATION**

**MID RIB TEST**

**ES-2re DUMMY**

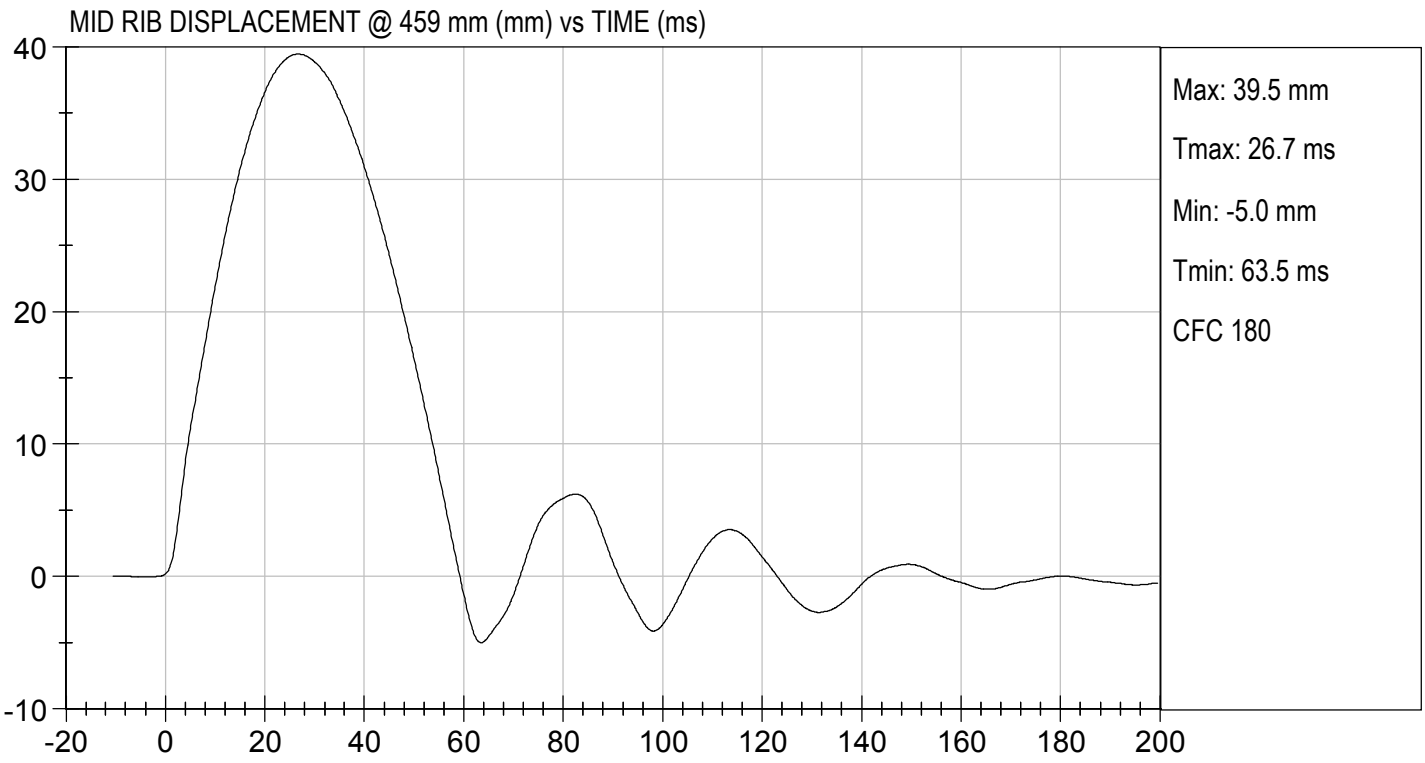
**ATD Serial No:** F032 **Test I.D:** D211365

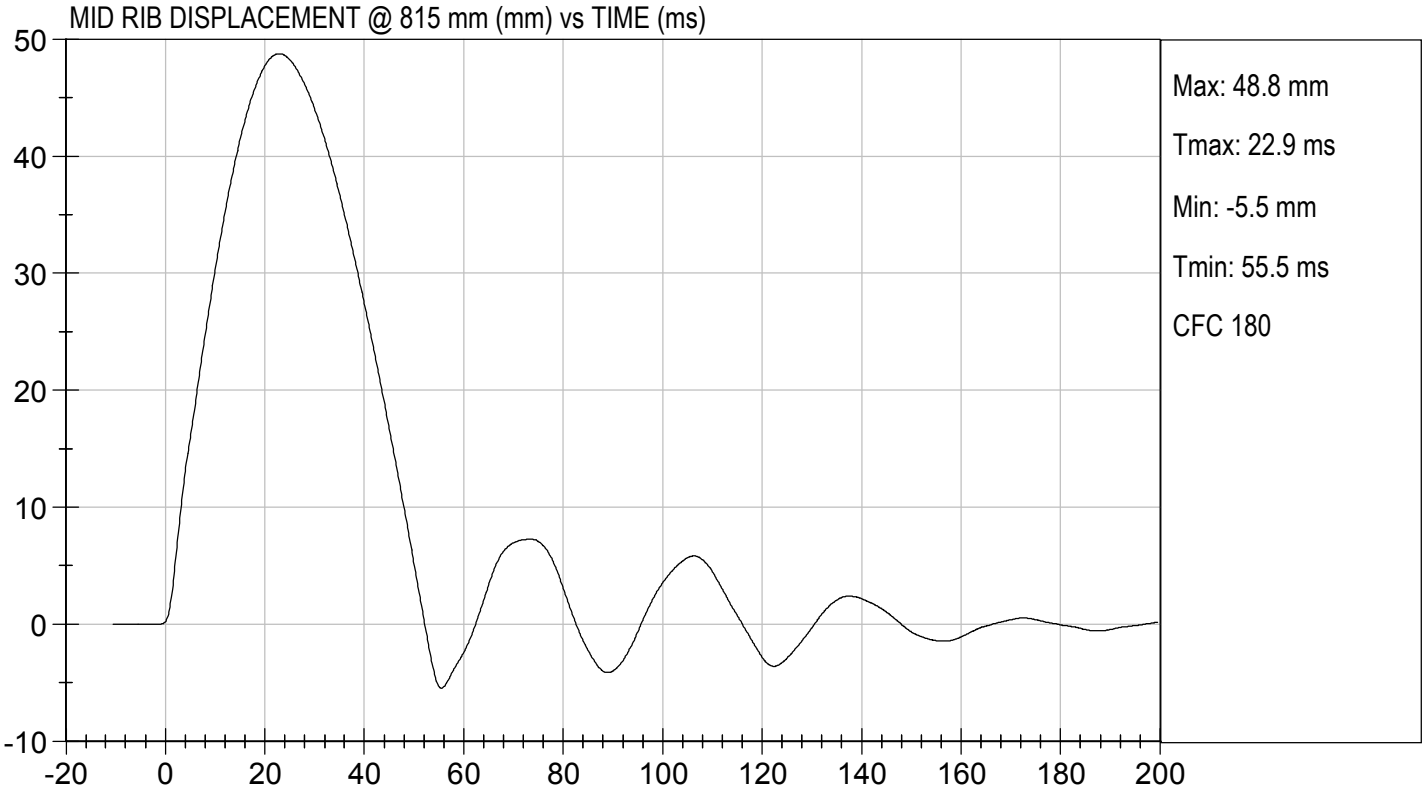
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 22 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 39.5 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 48.8 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

04/20/2021
Test Date

Approved By


MID RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 39.5 mm
Tmax: 26.7 ms
Min: -5.0 mm
Tmin: 63.5 ms
CFC 180


MID RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 48.8 mm
Tmax: 22.9 ms
Min: -5.5 mm
Tmin: 55.5 ms
CFC 180

**MGA RESEARCH CORPORATION**

**LOWER RIB TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211366

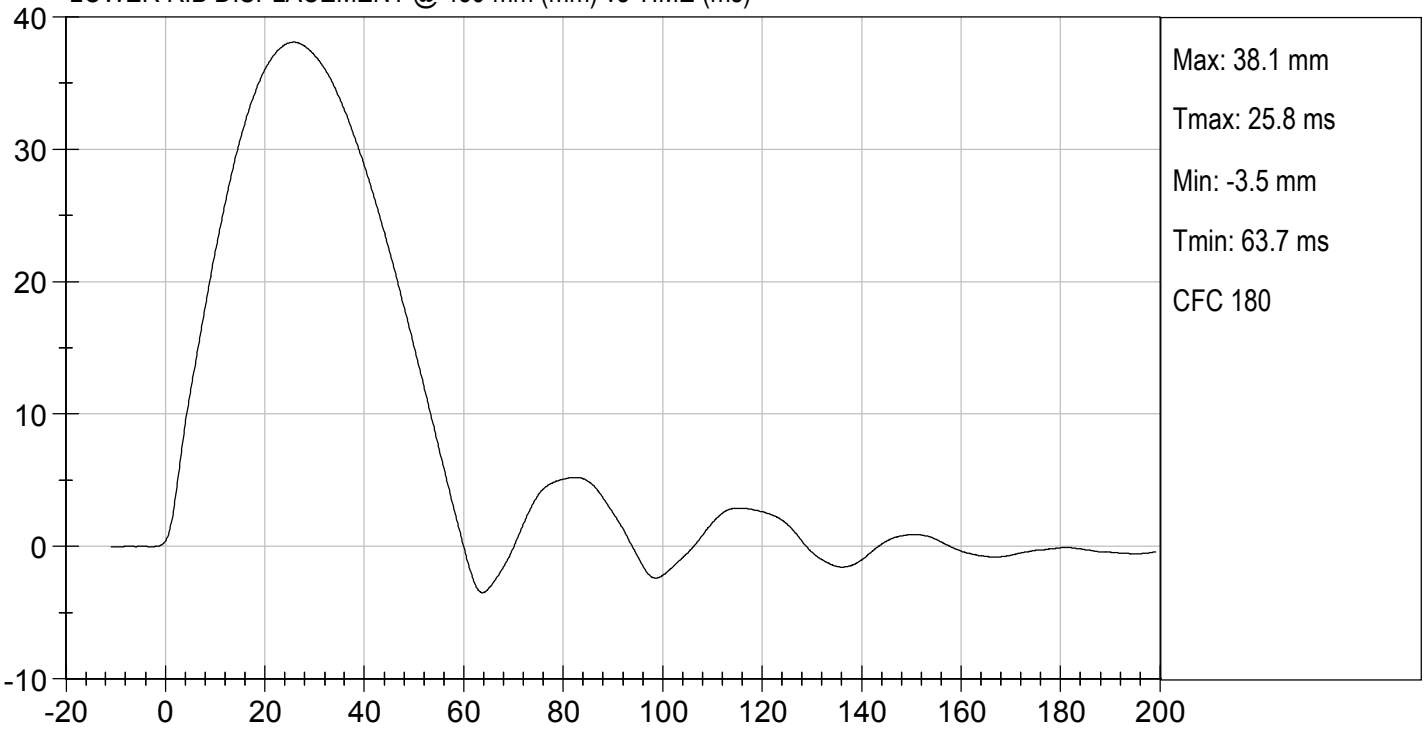
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 22 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 38.1 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 47.6 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

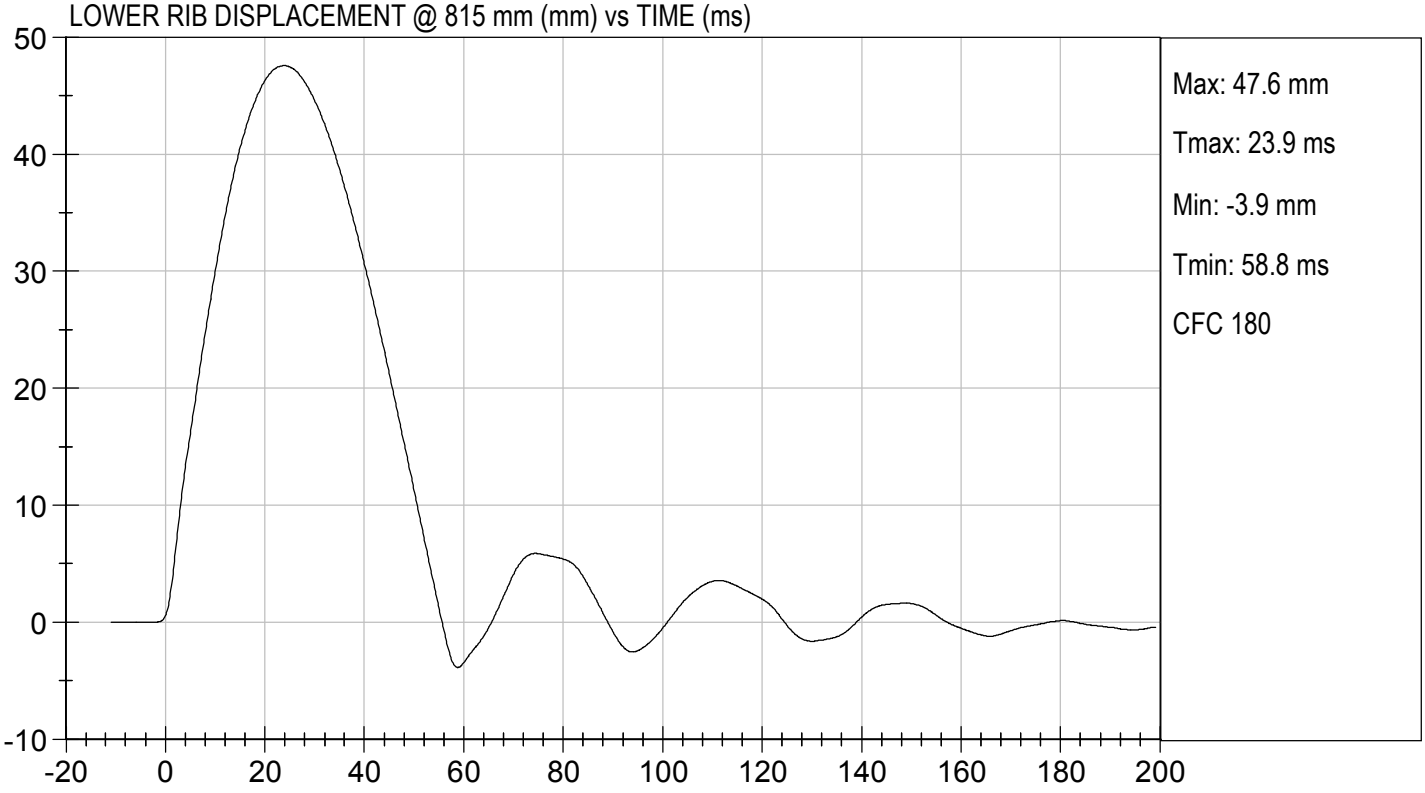
04/20/2021
Test Date

Approved By

LOWER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)




LOWER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**ABDOMEN TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211367

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 21 | Pass |
| Probe Speed | m/s | 3.90 to 4.10 | 4.03 | Pass |
| Maximum Impactor Force | N | 4000 to 4800 | 4096 | Pass |
| Time of Maximum Impactor Force | ms | 10.6 to 13.0 | 11.3 | Pass |
| Maximum Total Abdomen Force | N | 2200 to 2700 | 2313 | Pass |
| Time of Maximum Abdomen Force | ms | 10.0 to 12.3 | 10.6 | Pass |
| | | Overall Test Results | | Pass |

Gerald Guerrero
Laboratory Technician

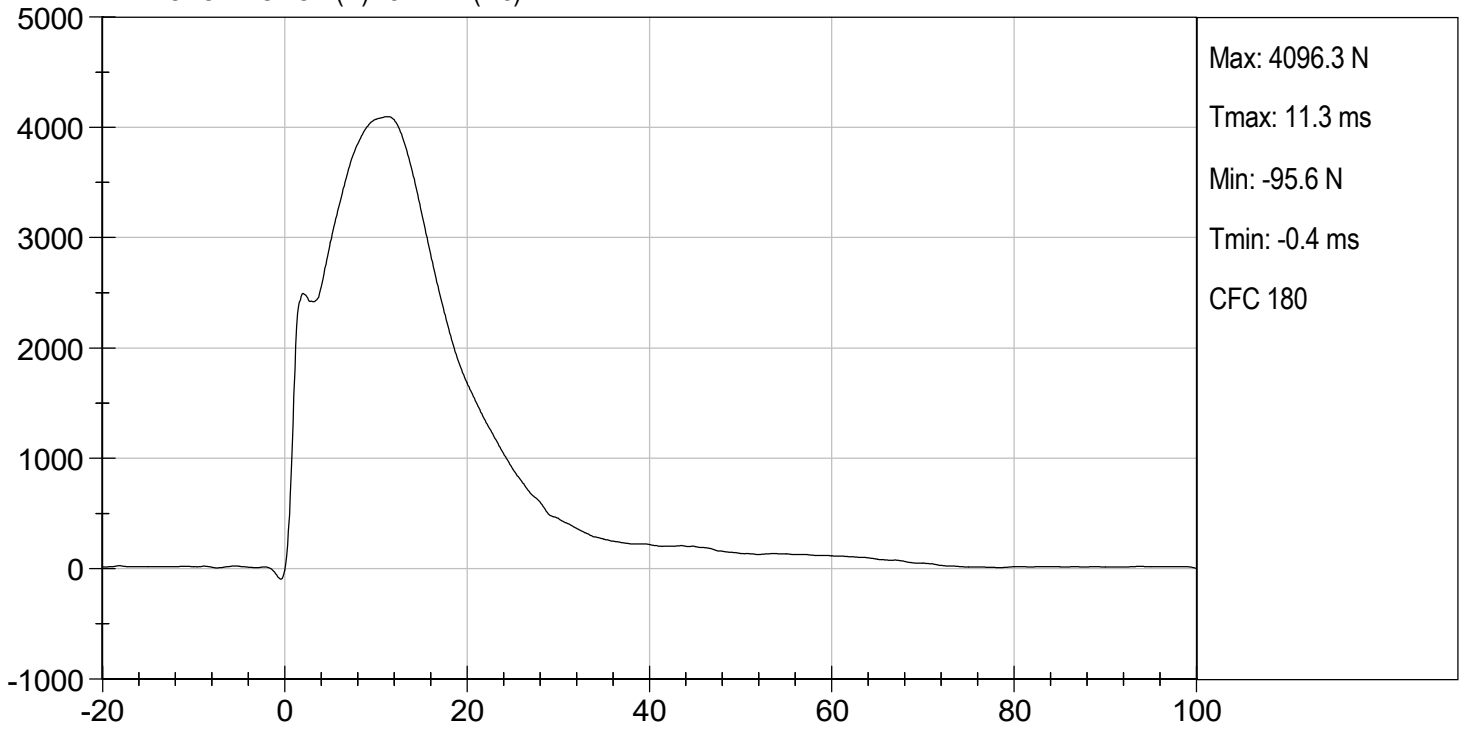
04/21/2021
Test Date

Approved By

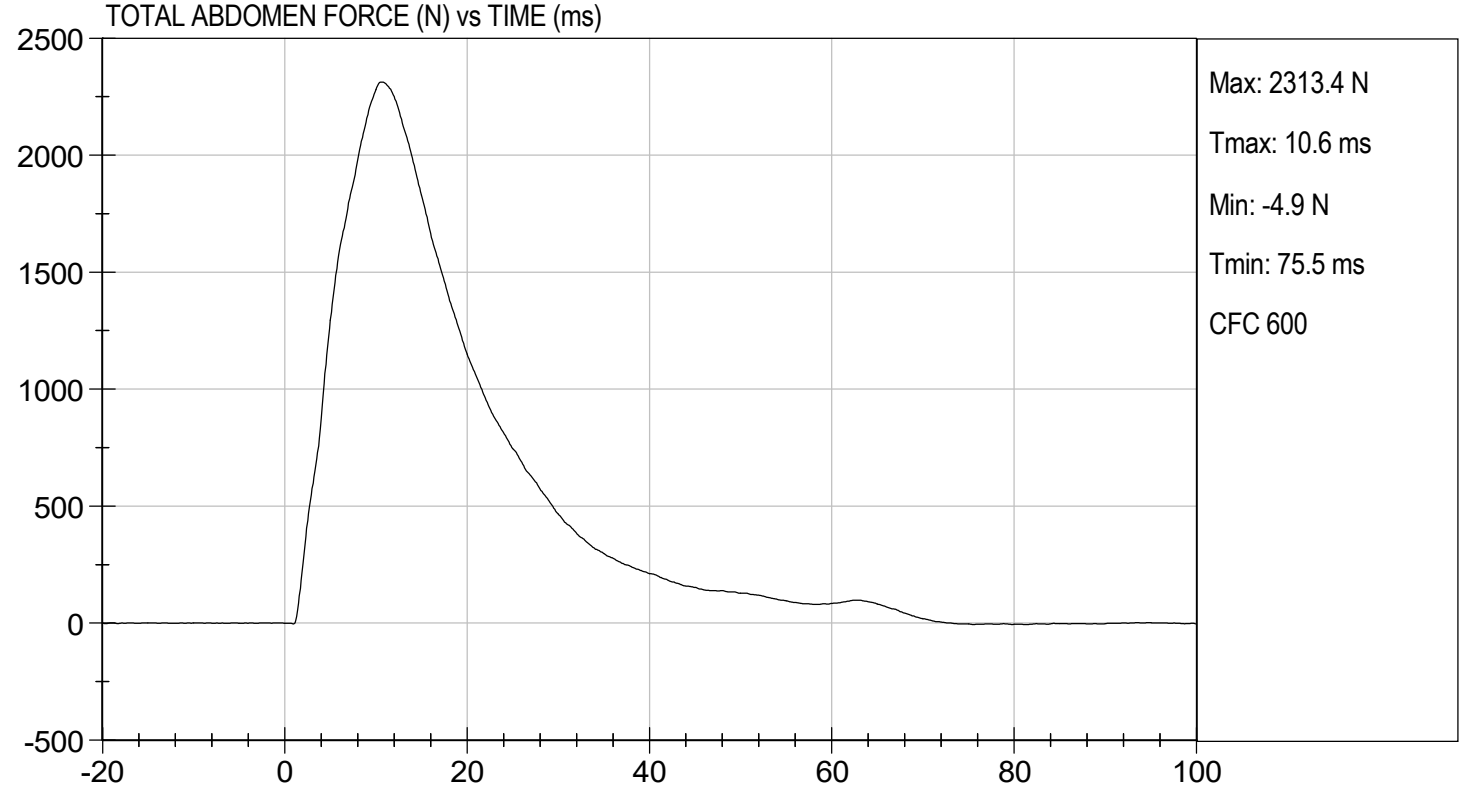
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.23 ft/s, 4.03 m/s

TEST DATE: 04/21/2021
TEST #: D211367

IMPACTOR FORCE (N) vs TIME (ms)



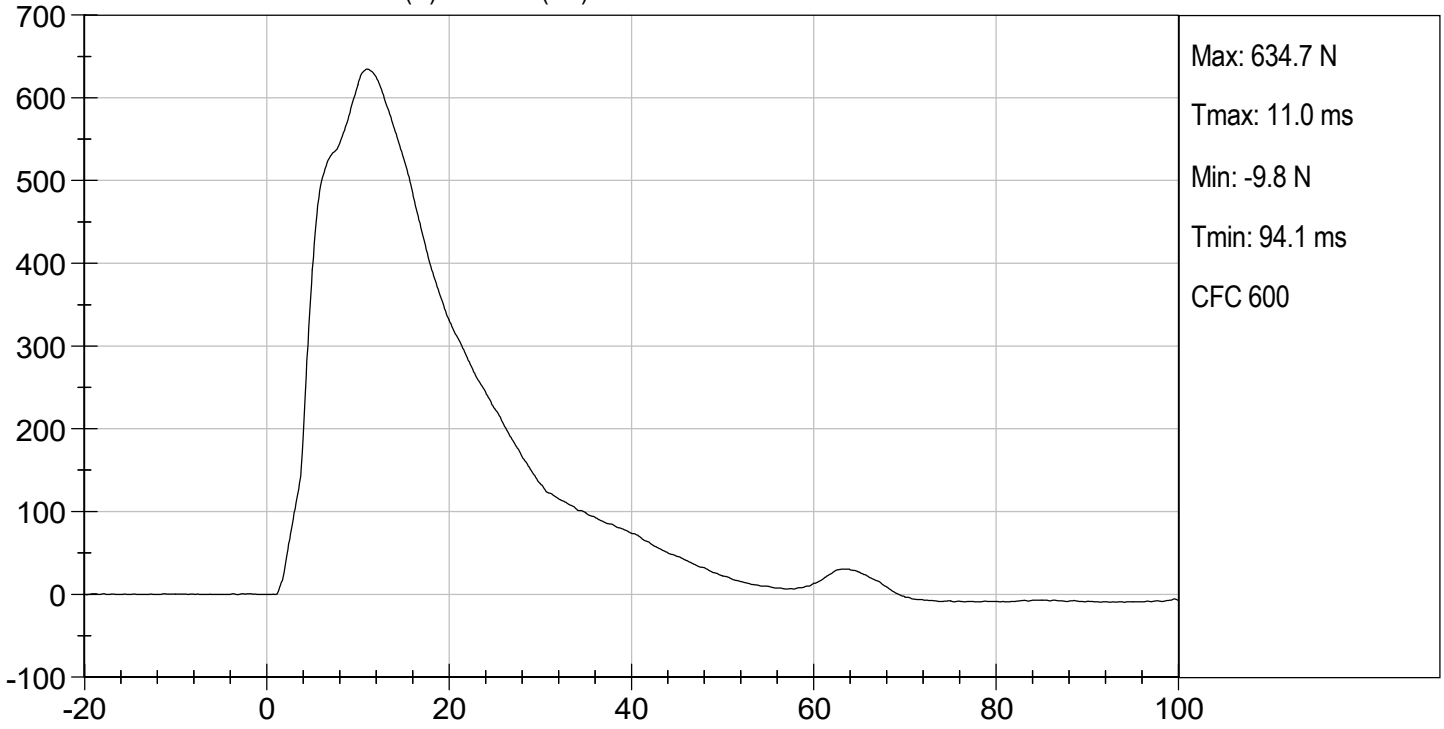

TOTAL ABDOMEN FORCE (N) vs TIME (ms)



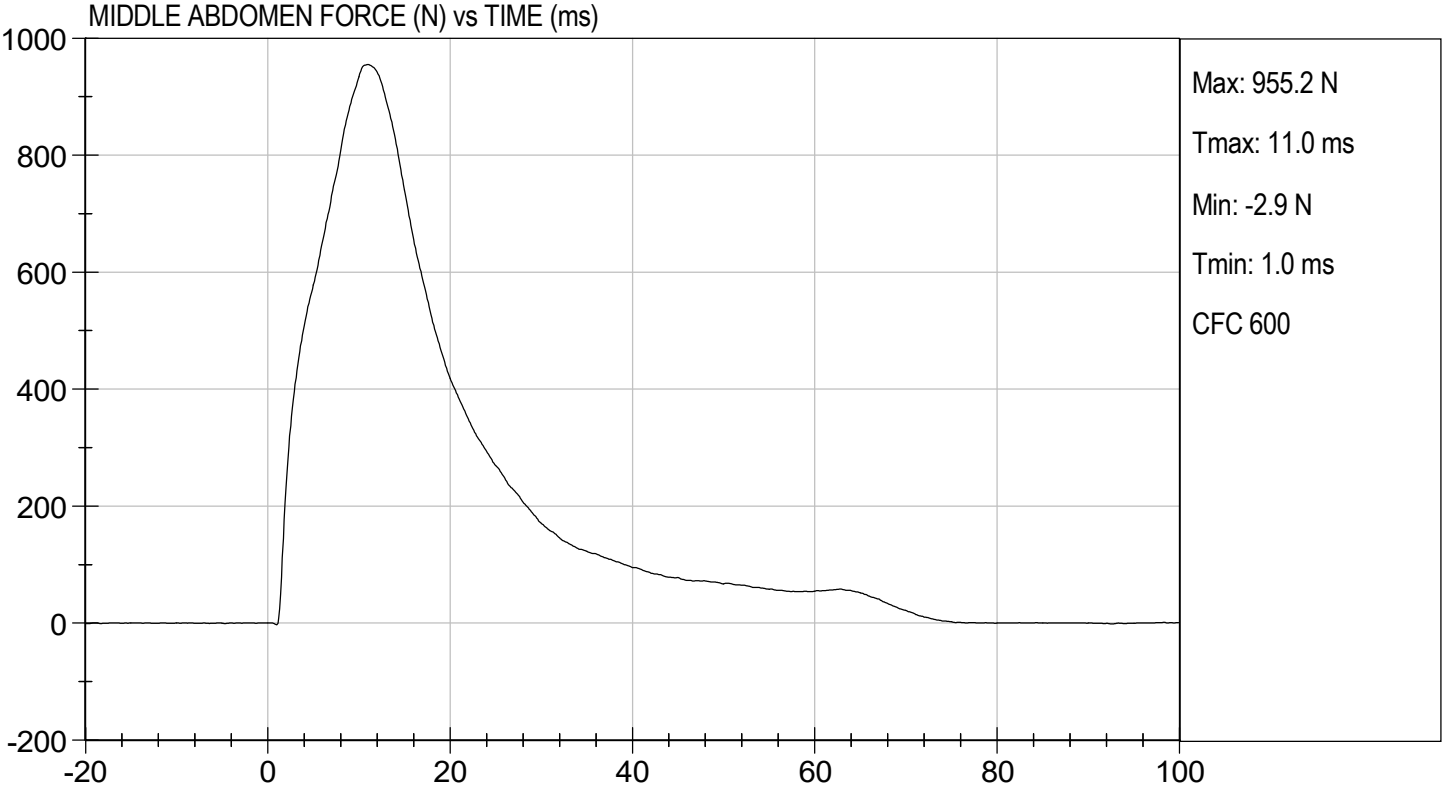
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.23 ft/s, 4.03 m/s

TEST DATE: 04/21/2021
TEST #: D211367

FRONT ABDOMEN FORCE (N) vs TIME (ms)



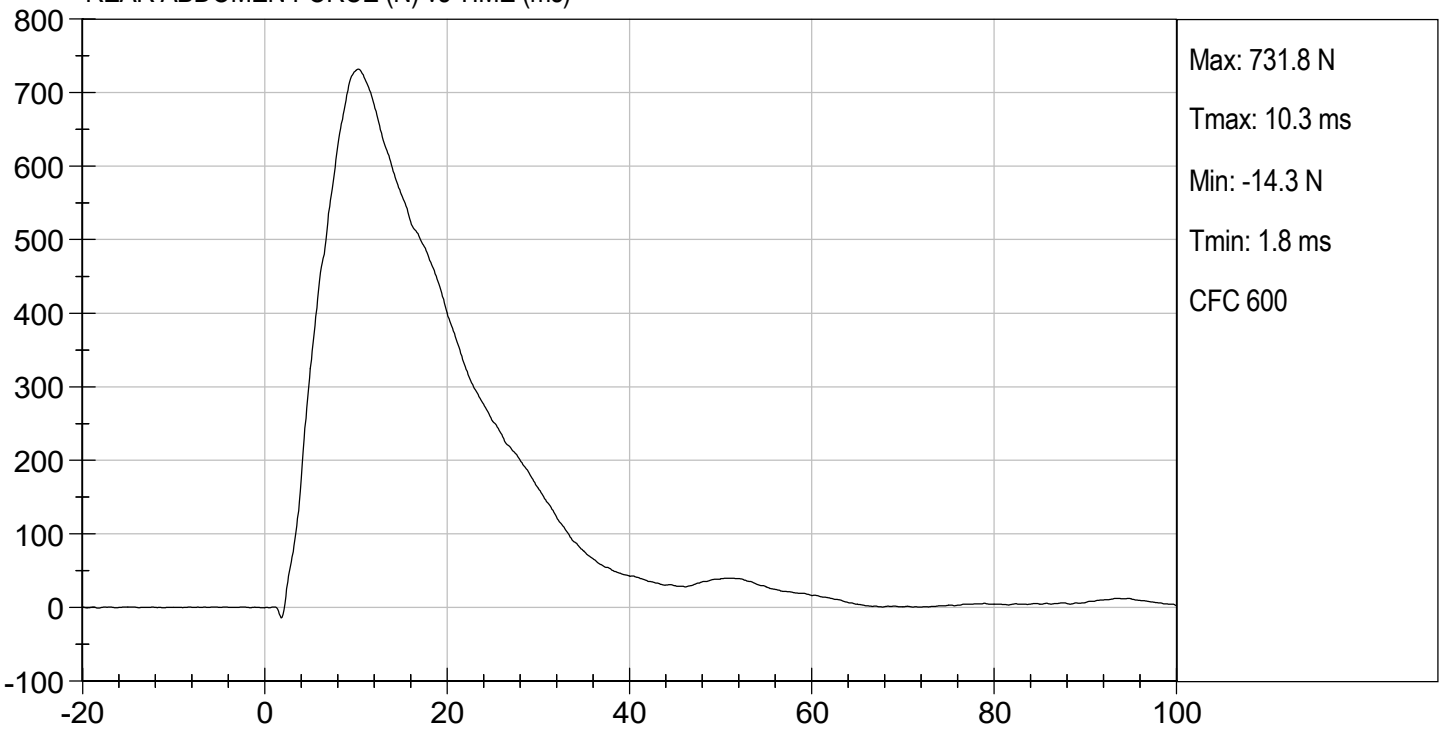

MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.23 ft/s, 4.03 m/s

TEST DATE: 04/21/2021
TEST #: D211367

REAR ABDOMEN FORCE (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**LUMBAR SPINE TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211368

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 22 | Pass |
| Pendulum Speed | | m/s | 5.95 to 6.15 | 6.12 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | -0.03 | Pass |
| | 3.7 ms | m/s | -0.425 to -0.24 | -0.385 | Pass |
| | 27 ms | m/s | -6.50 to -5.80 | -5.94 | Pass |
| | 30 ms | m/s | >= -6.50 | -6.04 | Pass |
| Maximum Flexion Angle | | deg | 45.0 to 55.0 | 45.7 | Pass |
| Time of Maximum Flexion Angle | | ms | 39.0 to 53.0 | 44.4 | Pass |
| Headform Rotation Decay to Initial Position | | ms | 37 to 57 | 40 | Pass |
| | | | Overall Results | | Pass |

Gerald Guerrero
Laboratory Technician

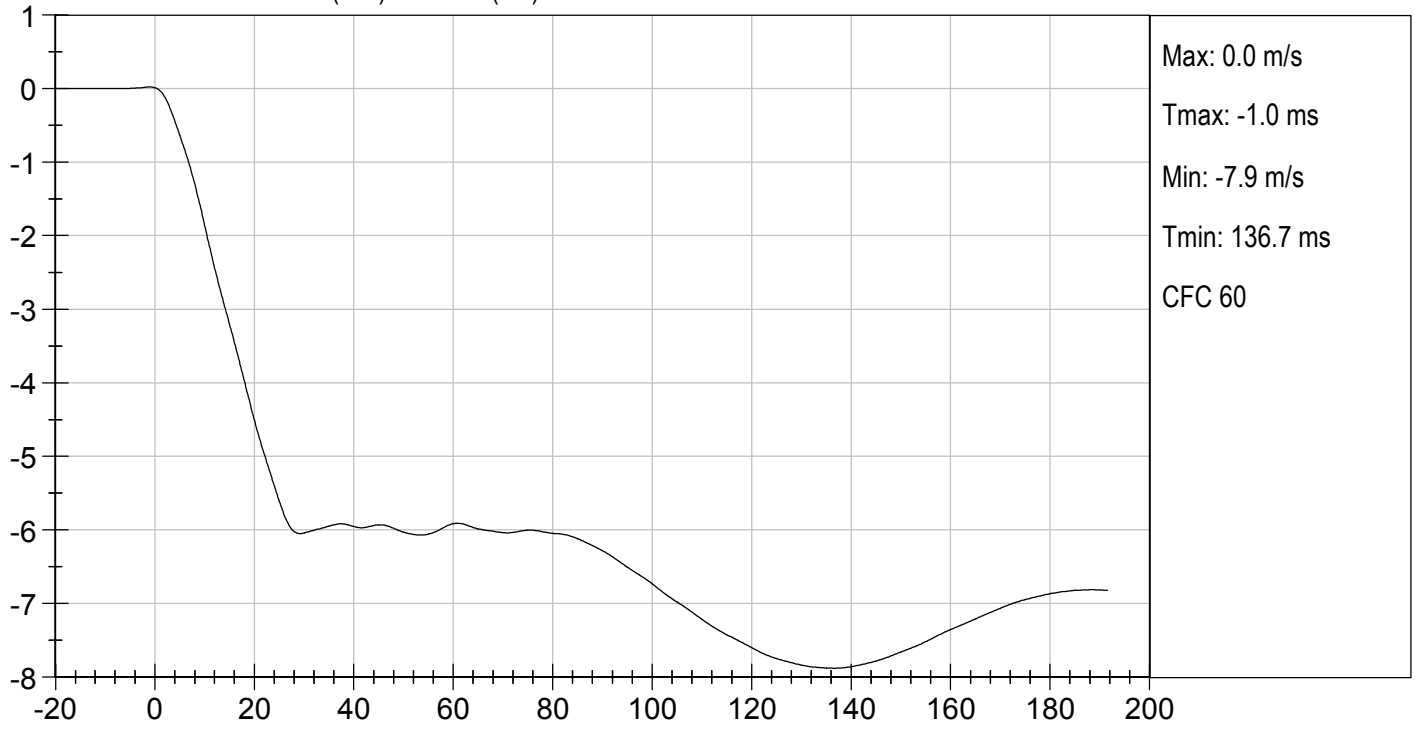
04/20/2021
Test Date

Approved By

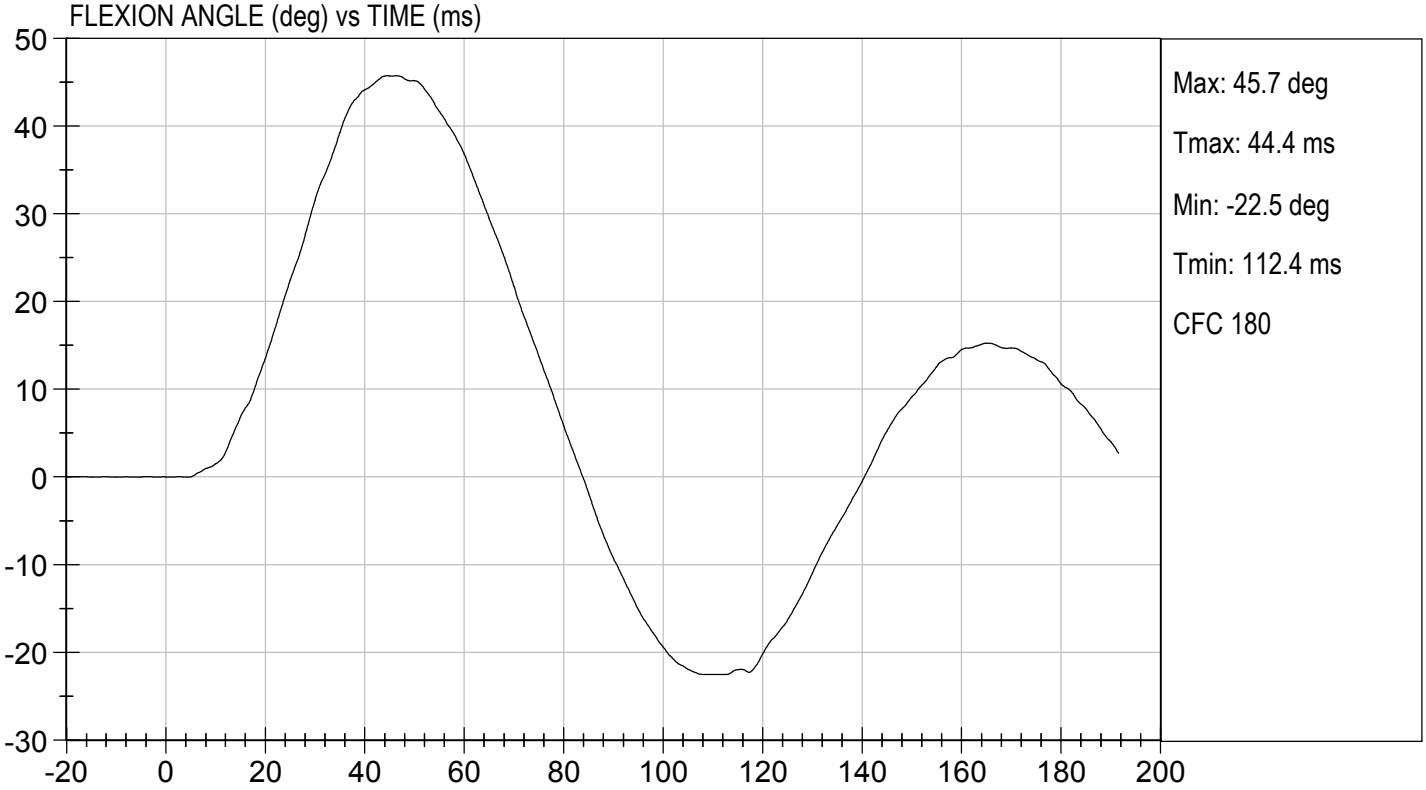
TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 04/20/2021
TEST #: D211368

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



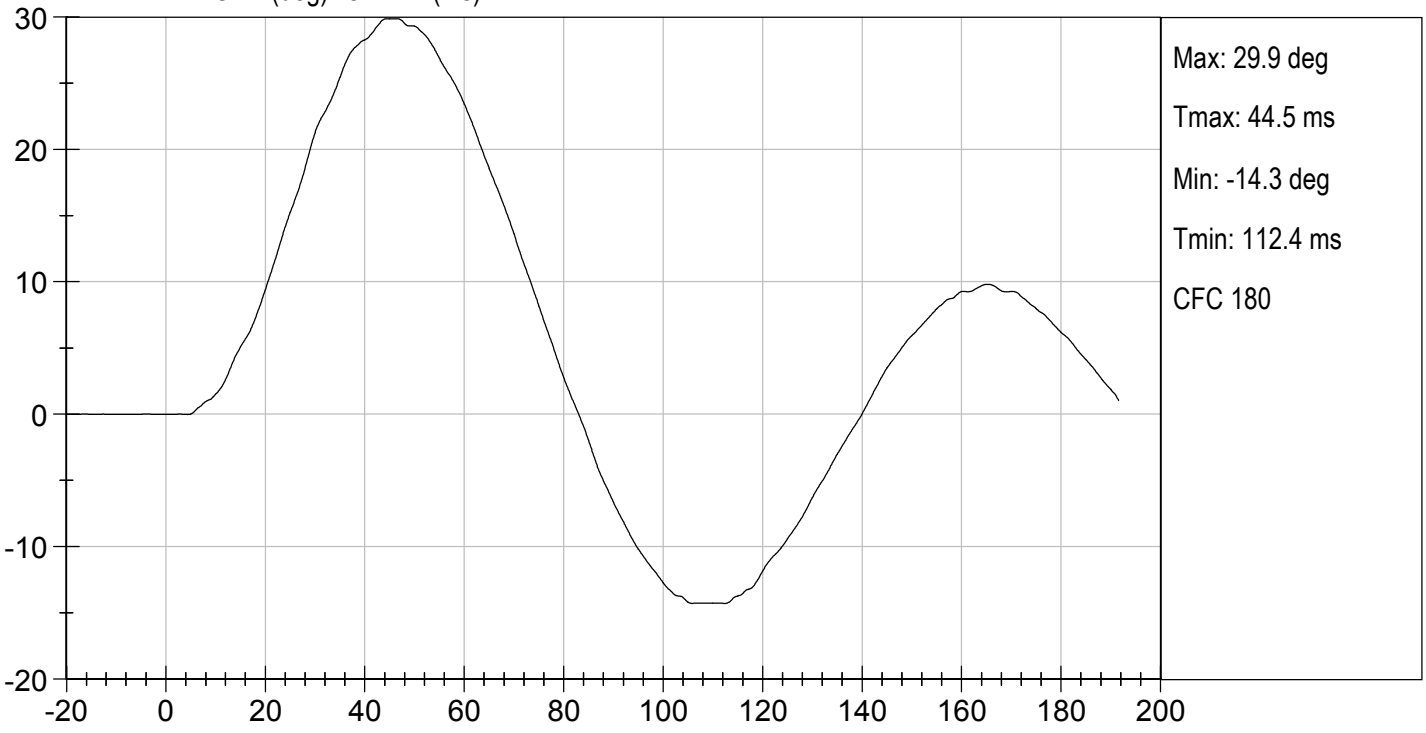

FLEXION ANGLE (deg) vs TIME (ms)



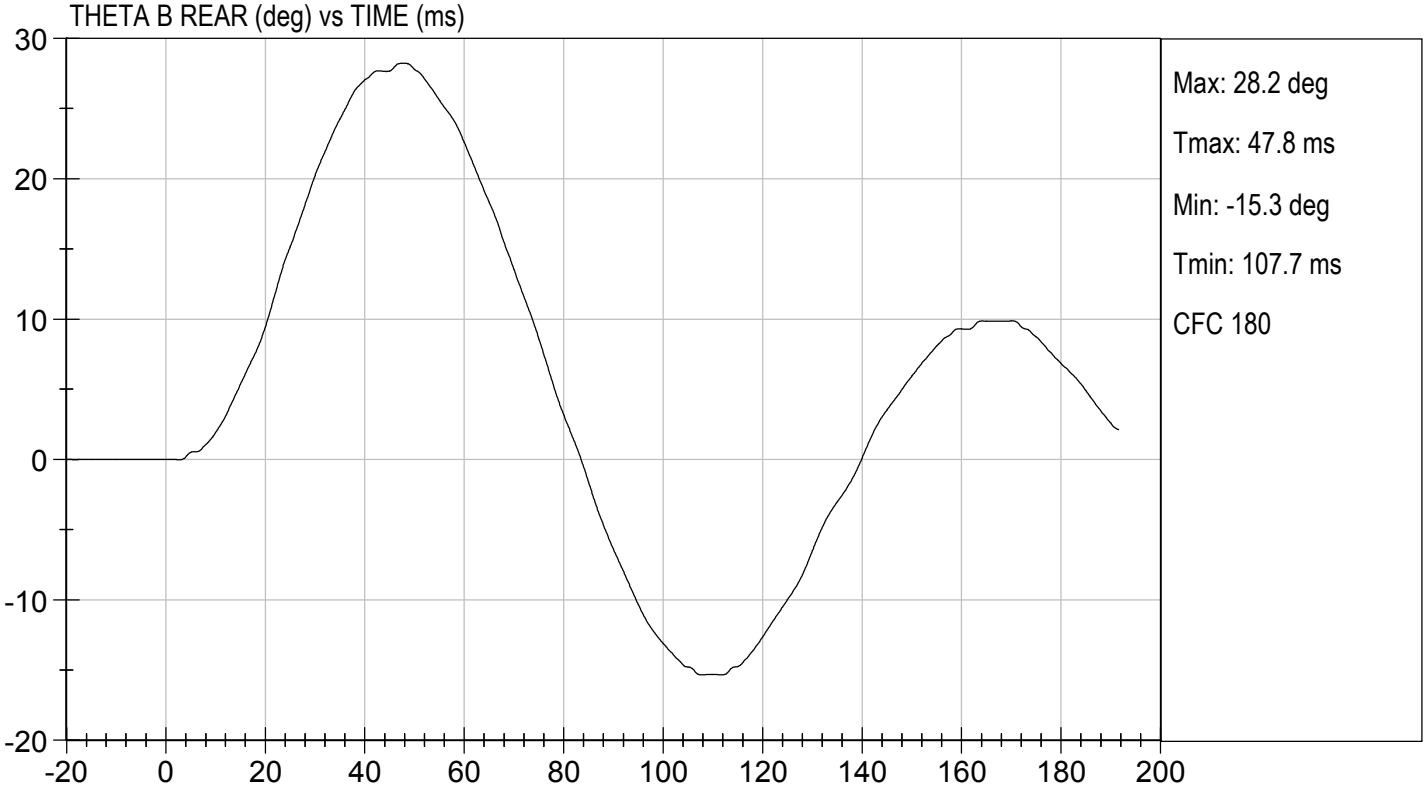
TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 04/20/2021
TEST #: D211368

THETA A FRONT (deg) vs TIME (ms)

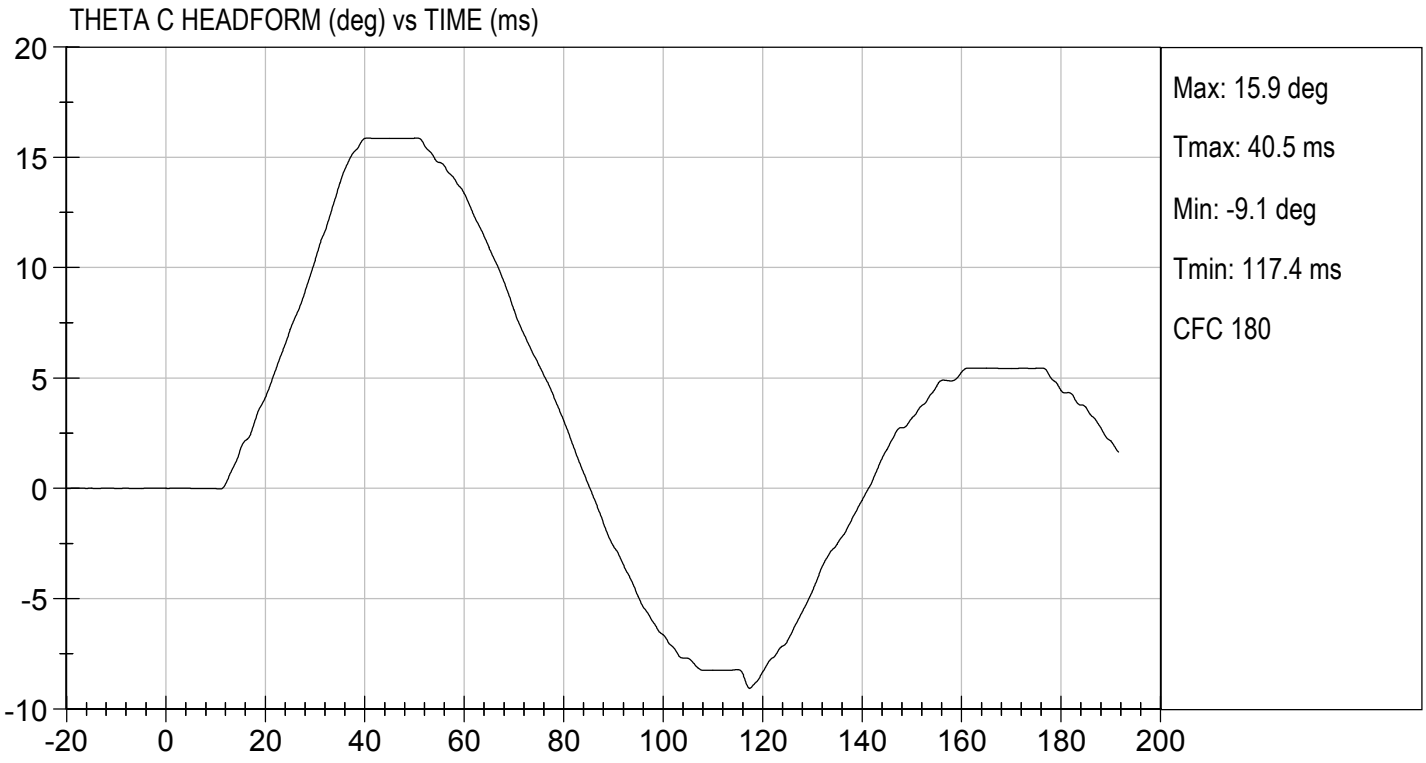



THETA B REAR (deg) vs TIME (ms)



TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 04/20/2021
TEST #: D211368



**MGA RESEARCH CORPORATION**

**PELVIS TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211369

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 23 | Pass |
| Probe Speed | m/s | 4.20 to 4.40 | 4.20 | Pass |
| Maximum Impactor Force | N | 4700 to 5400 | 5013 | Pass |
| Time of Maximum Impactor Force | ms | 11.8 to 16.1 | 12.8 | Pass |
| Maximum Pubic Force | N | 1230 to 1590 | 1370 | Pass |
| Time of Maximum Pubic Force | ms | 12.2 to 17.0 | 12.3 | Pass |
| | | Overall Test Results | | Pass |

Gerald Guerrero
Laboratory Technician

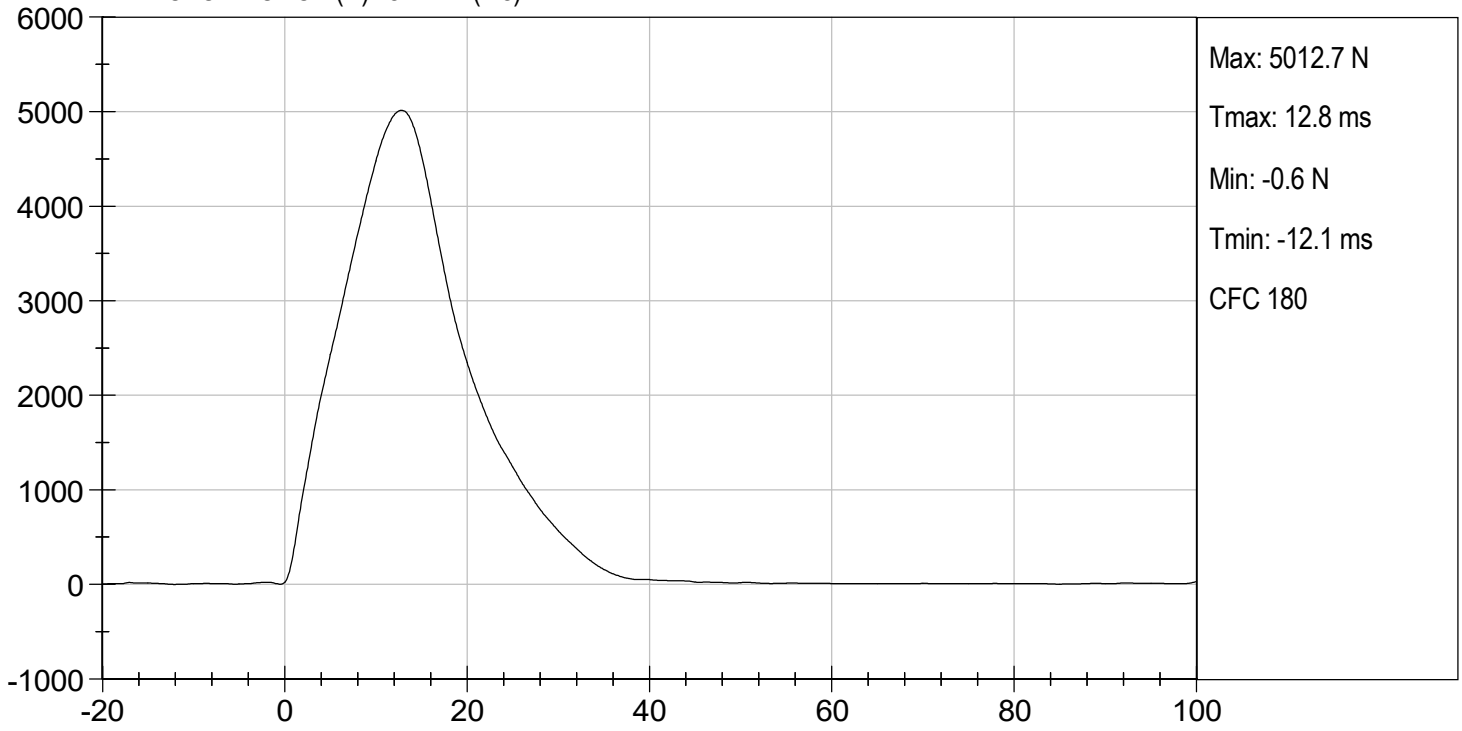
04/20/2021
Test Date

Approved By

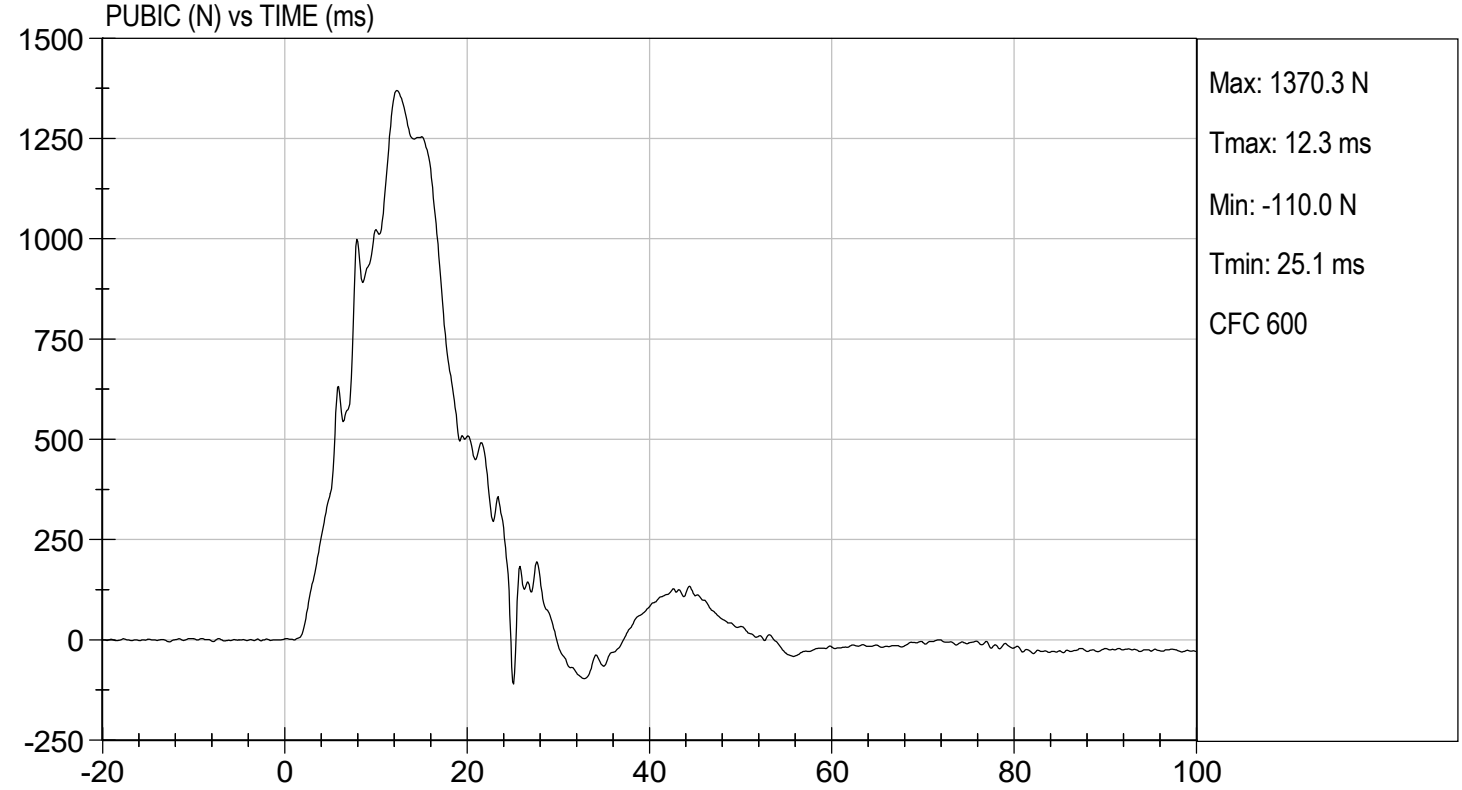
TEST DESC: PELVIS IMPACT
VELOCITY: 13.77 ft/s, 4.2 m/s

TEST DATE: 04/20/2021
TEST #: D211369

IMPACTOR FORCE (N) vs TIME (ms)




PUBIC (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**THORAX IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211360

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21 | Pass |
| Humidity | % | 10 to 70 | 21 | Pass |
| Probe Speed | m/s | 5.40 to 5.60 | 5.46 | Pass |
| Maximum Impactor Force (after 6 ms) | N | 5100 to 6200 | 6009 | Pass |
| Upper Rib Displacement | mm | 34.0 to 41.0 | 40.9 | Pass |
| Middle Rib Displacement | mm | 37.0 to 45.0 | 40.9 | Pass |
| Lower Rib Displacement | mm | 37.0 to 44.0 | 38.5 | Pass |
| | | Overall Test Results | | Pass |

Gerald Guerrero
Laboratory Technician

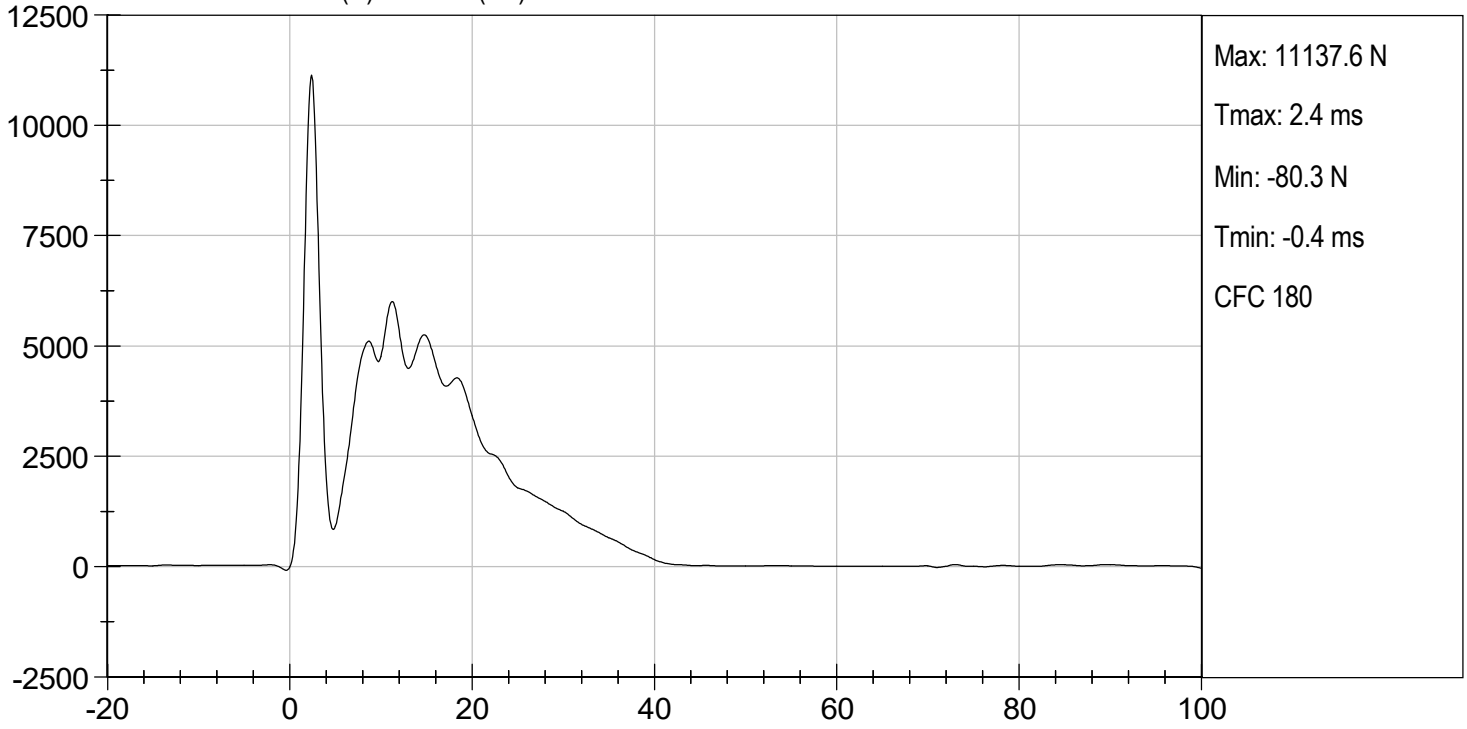
04/21/2021
Test Date

Approved By

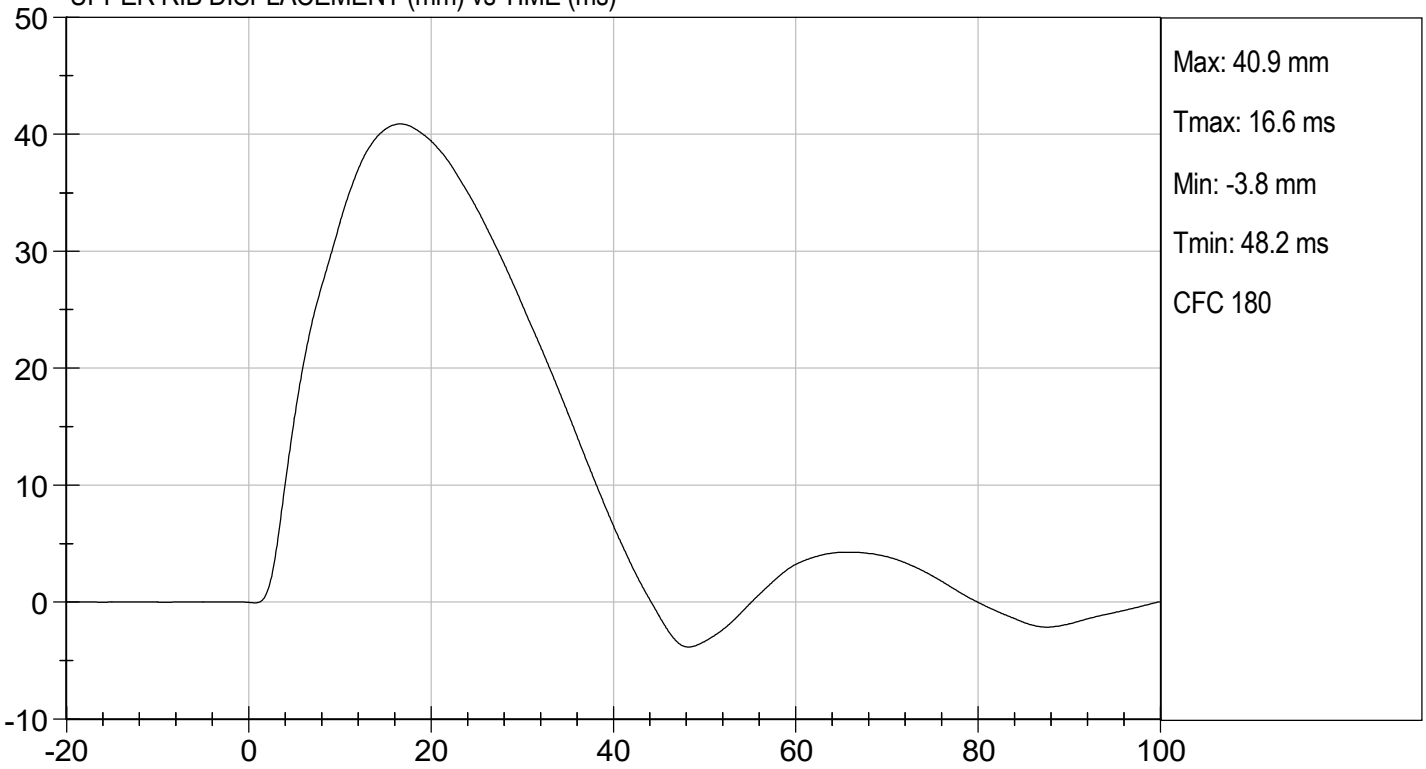
TEST DESC: THORAX IMPACT
VELOCITY: 17.92 ft/s, 5.46 m/s

TEST DATE: 04/21/2021
TEST #: D211360

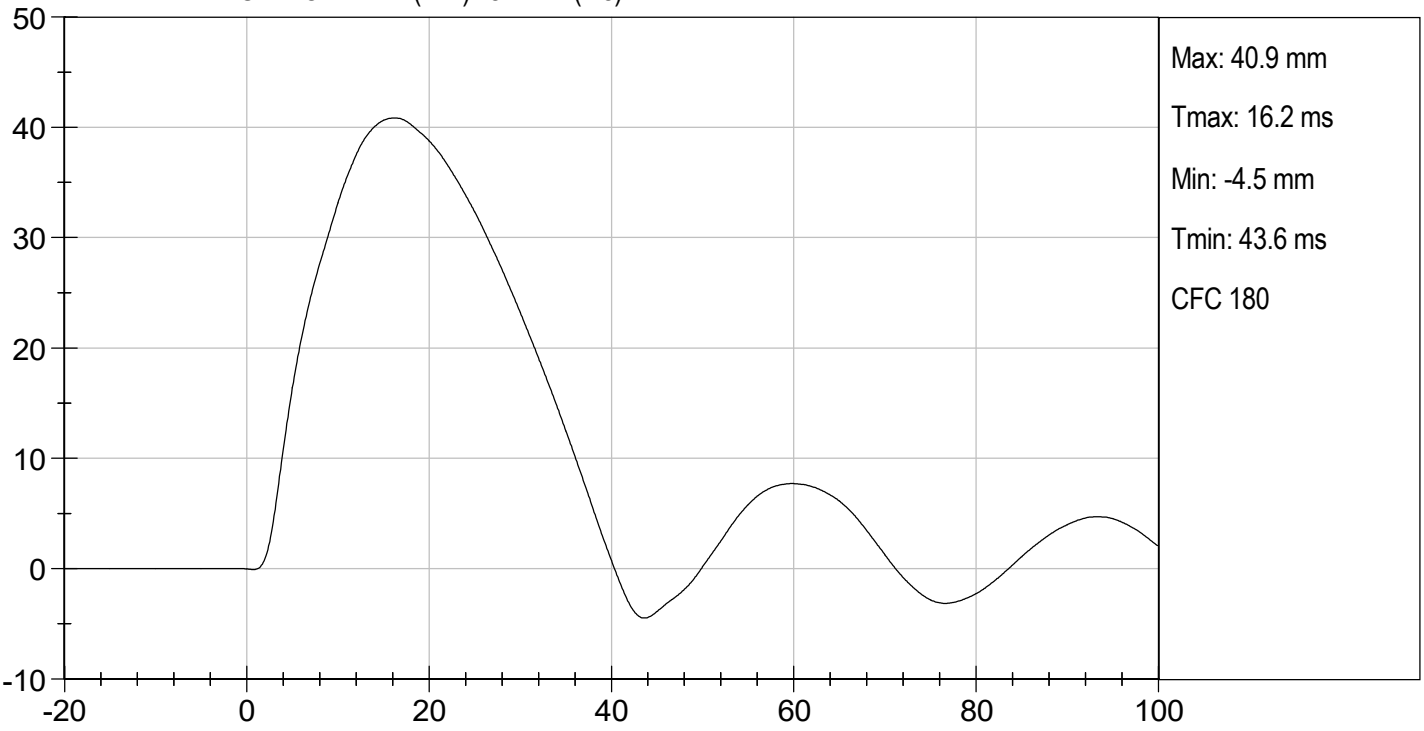
IMPACTOR FORCE (N) vs TIME (ms)



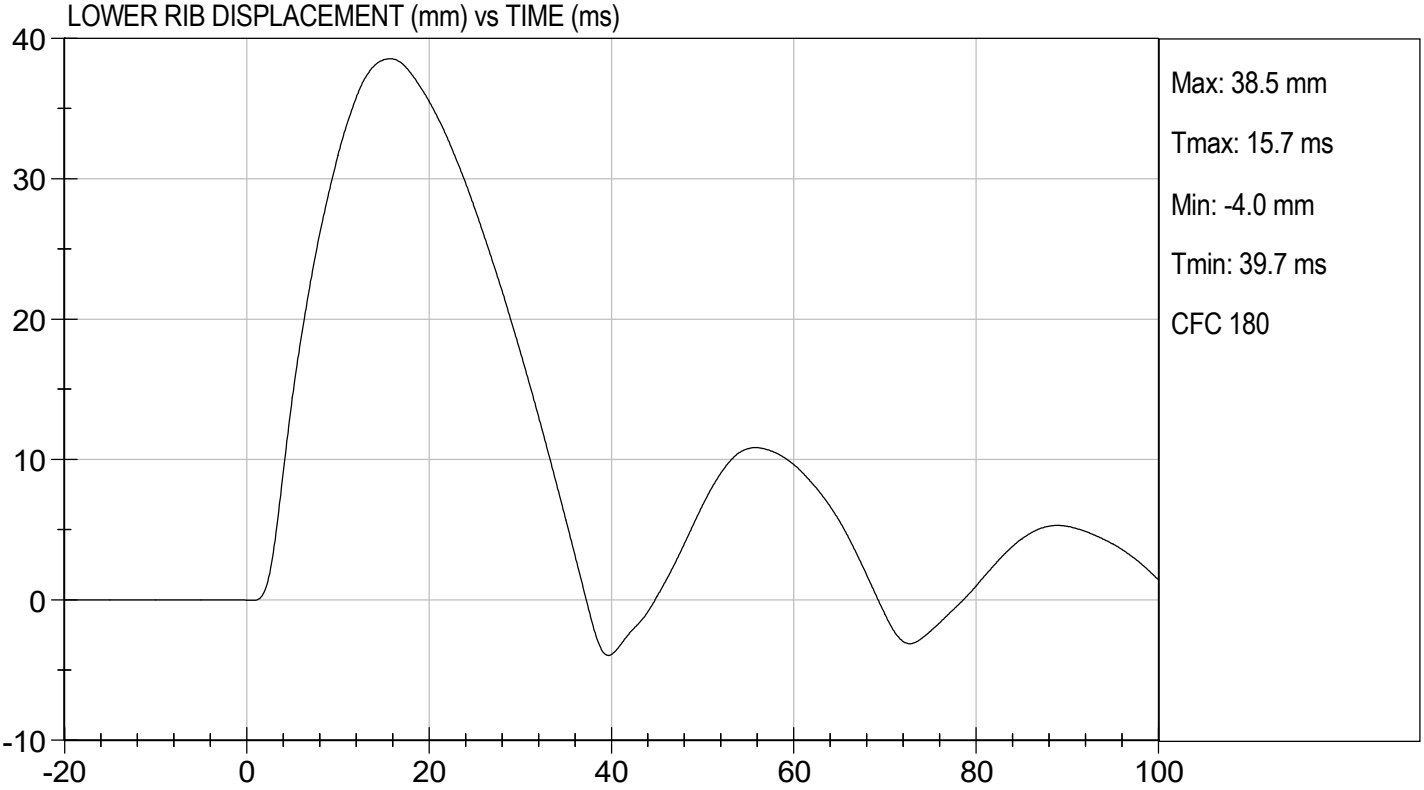

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)




LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



**CALIBRATION TEST RESULTS**

**POST-TEST**

**EUROSID 2 (ES-2RE) MALE – DRIVER ATD**

**ES-2re External Measurements**
**SN: F032**

| No. | Name | Spec. (mm) | Result | Pass/Fail |
|---|---|---|---|---|
| **1** | Sitting Height | 900 - 918 | 915 | Pass |
| **2** | Seat to Shoulder Joint | 558 - 572 | 568 | Pass |
| **3** | Seat to Lower Face of Thoracic Spine Box | 346 - 356 | 355 | Pass |
| **4** | Seat to Hip Joint (center of bolt) | 97 - 103 | 98 | Pass |
| **5** | Sole to Seat, Sitting | 333 - 451 | 440 | Pass |
| **6** | Head Width | 152 - 158 | 157 | Pass |
| **7** | Shoulder/Arm Width | 461 - 479 | 464 | Pass |
| **8** | Thorax Width | 322 - 332 | 323 | Pass |
| **9** | Abdomen Width | 273 - 287 | 281 | Pass |
| **10** | Pelvis Lap Width | 359 - 373 | 370 | Pass |
| **11** | Head Depth | 196 - 206 | 203 | Pass |
| **12** | Thorax Depth | 262 - 272 | 264 | Pass |
| **13** | Abdomen Depth | 194 - 204 | 196 | Pass |
| **14** | Pelvis Depth | 235 - 245 | 236 | Pass |
| **15** | Back of Buttocks to Hip Joint (center of bolt) | 150 - 160 | 151 | Pass |
| **16** | Back of Buttocks to Front Knee | 597 - 615 | 607 | Pass |

**MGA RESEARCH CORPORATION**

**HEAD DROP TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test ID:** D211561

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.7 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 39 | Pass |
| Peak Resultant Acceleration | G's | 125 to 155 | 134 | Pass |
| Peak Longitudinal Acceleration | G's | <= +/- 15.0 | 6.5 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 15% of peak | Yes | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

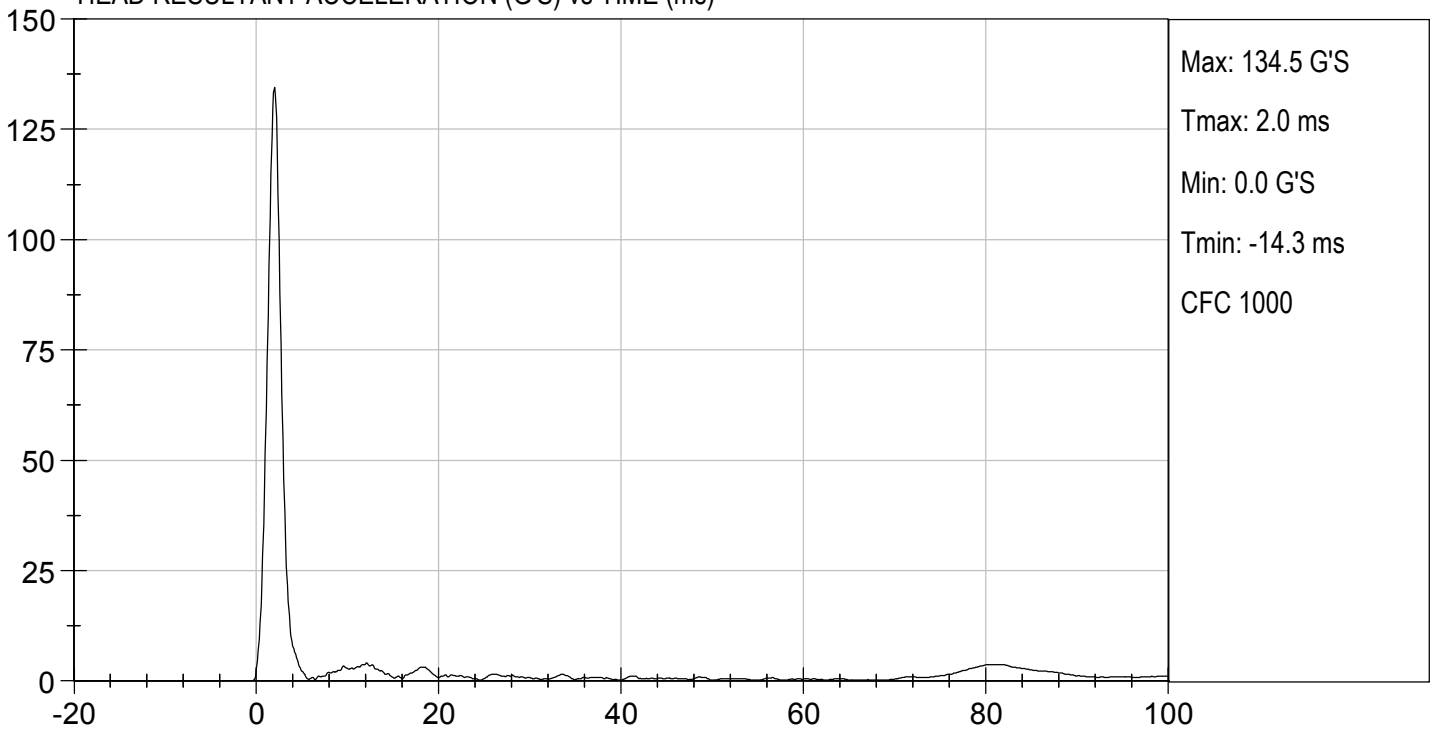
04/30/2021
Test Date

Approved By

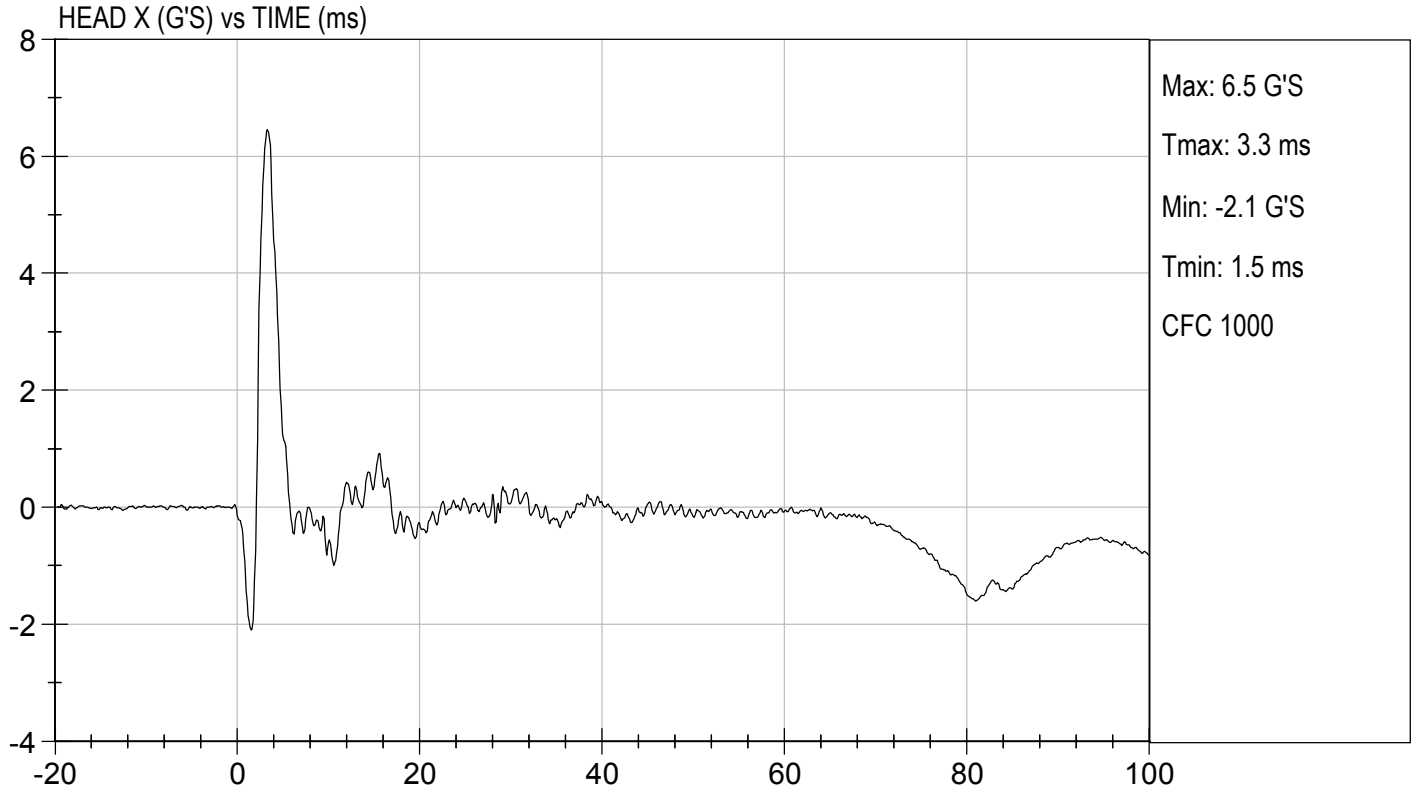
TEST DESC: HEAD DROP

TEST DATE: 04/30/2021
TEST #: D211561

HEAD RESULTANT ACCELERATION (G'S) vs TIME (ms)

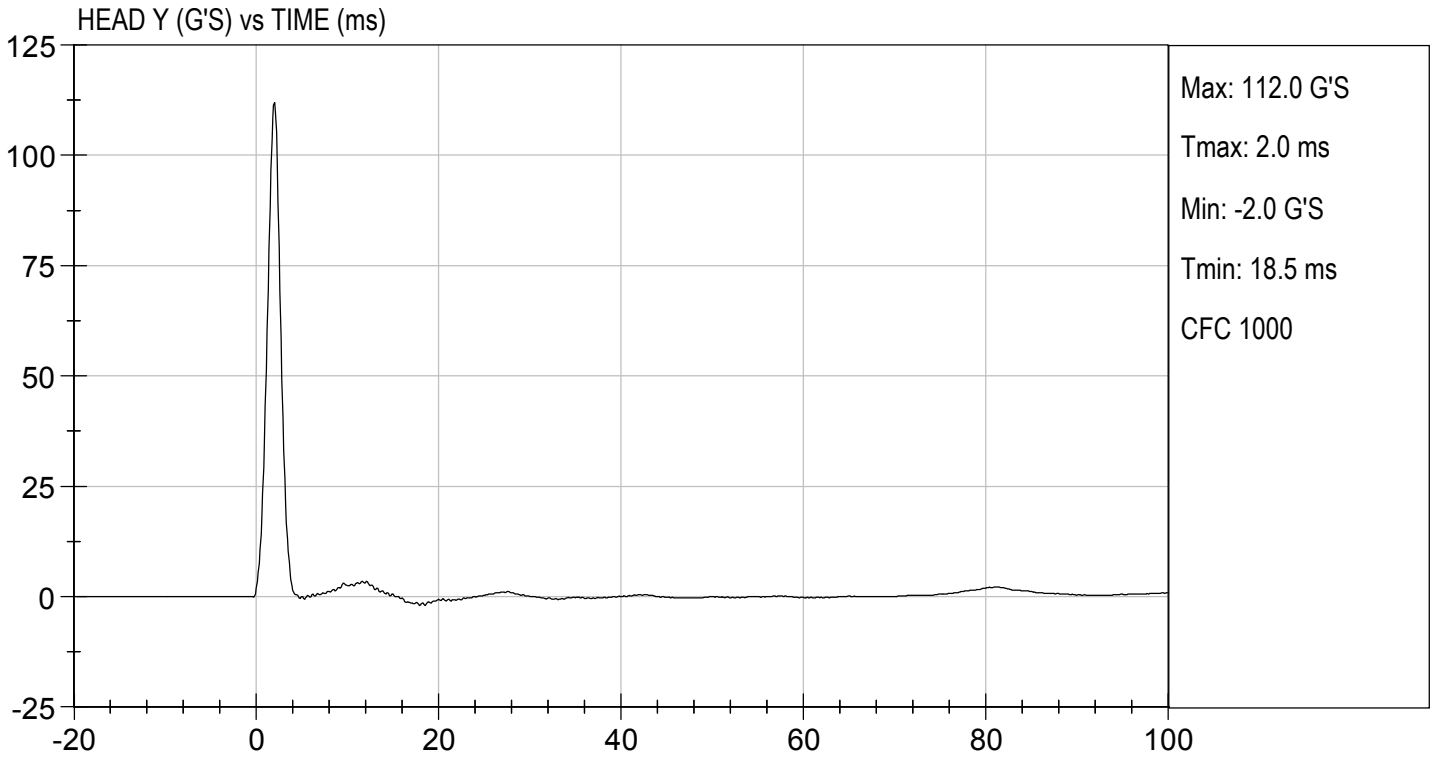


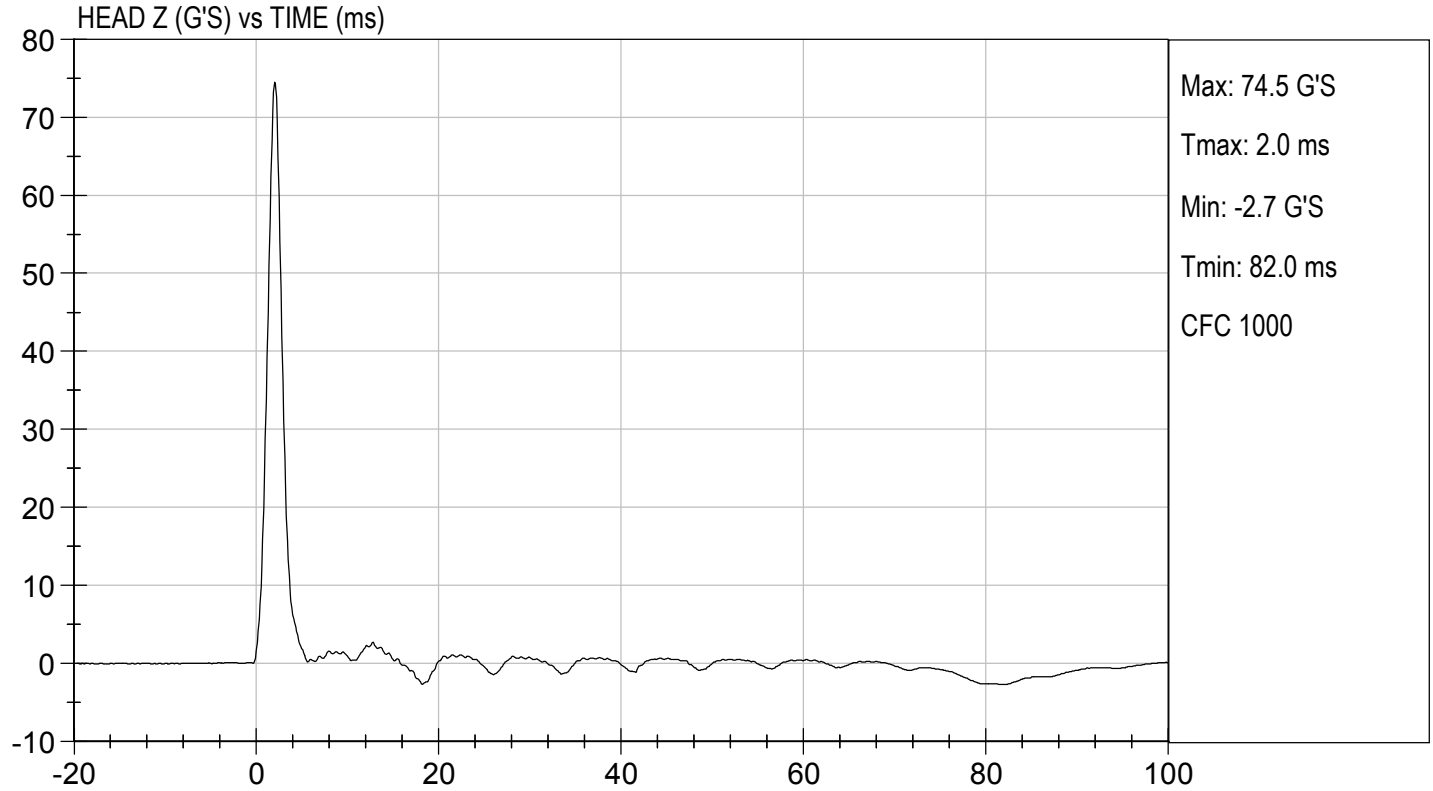

HEAD X (G'S) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 04/30/2021
TEST #: D211561



**MGA RESEARCH CORPORATION**

**NECK PENDULUM TEST**

**ES-2re DUMMY**

**ATD Serial No:** f032 **Test I.D:** D211562

| 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 | 44 | Pass |
| Pendulum Speed | | m/s | 3.30 to 3.50 | 3.46 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | -0.00 | Pass |
| | 3 ms | m/s | -0.25 to -0.375 | -0.33 | Pass |
| | 14 ms | m/s | -3.20 to -3.70 | -3.53 | Pass |
| | 17 ms | m/s | >= -3.70 | -3.42 | Pass |
| Maximum Flexion Angle | | deg | 49.0 to 59.0 | 49.2 | Pass |
| Time of Maximum Flexion Angle | | ms | 54.0 to 66.0 | 58.5 | Pass |
| Head Rotation Decay Time to 0 Degree | | ms | 53.0 to 88.0 | 57.4 | Pass |
| | | | Overall Results | | Pass |

Laboratory Technician

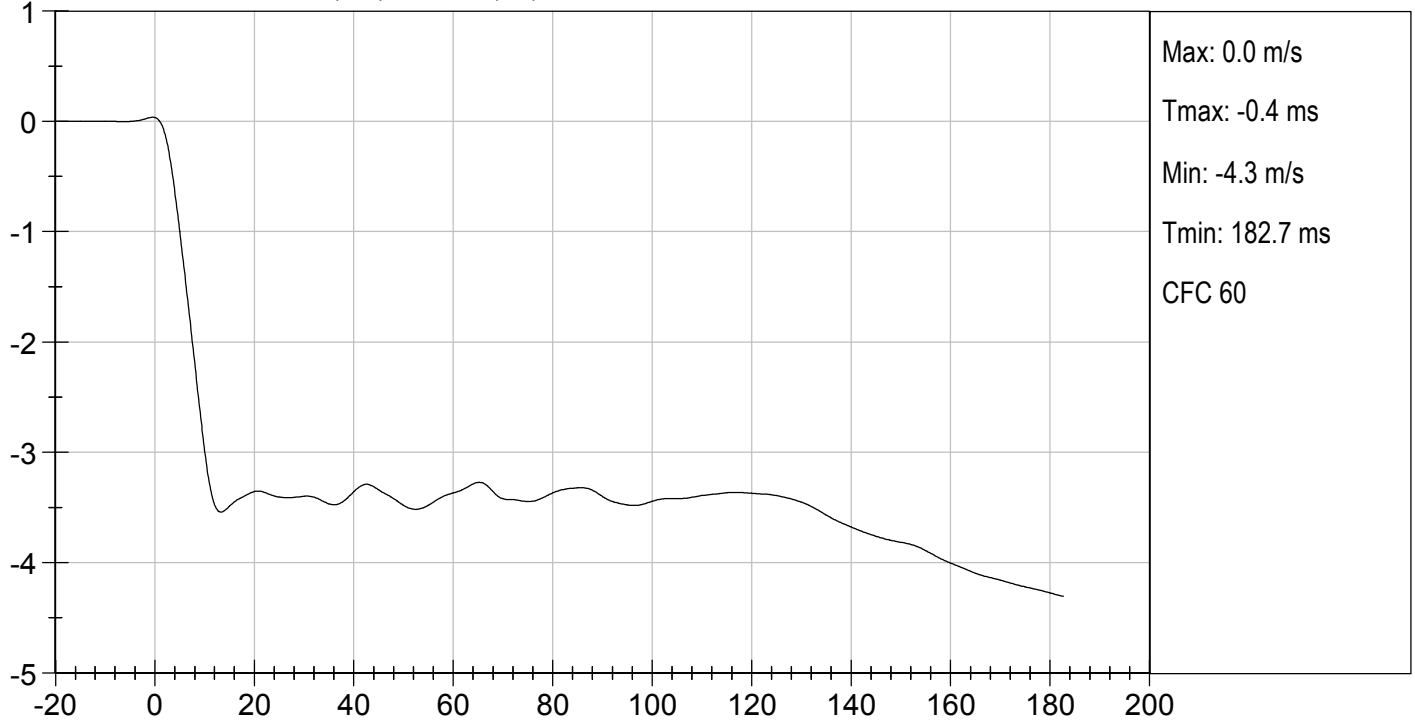
05/03/2021
Test Date

Approved By

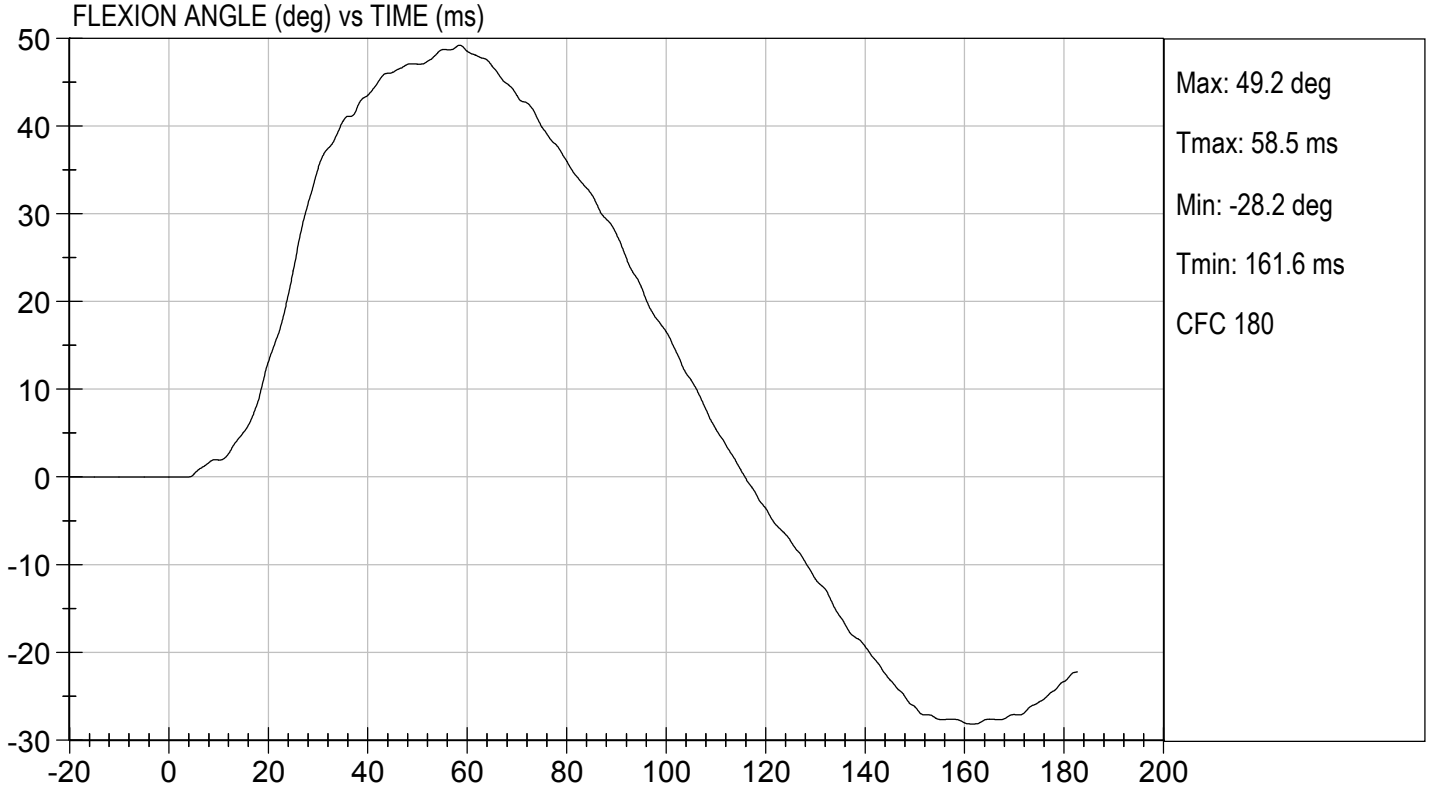
TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

TEST DATE: 05/03/2021
TEST #: D211562

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



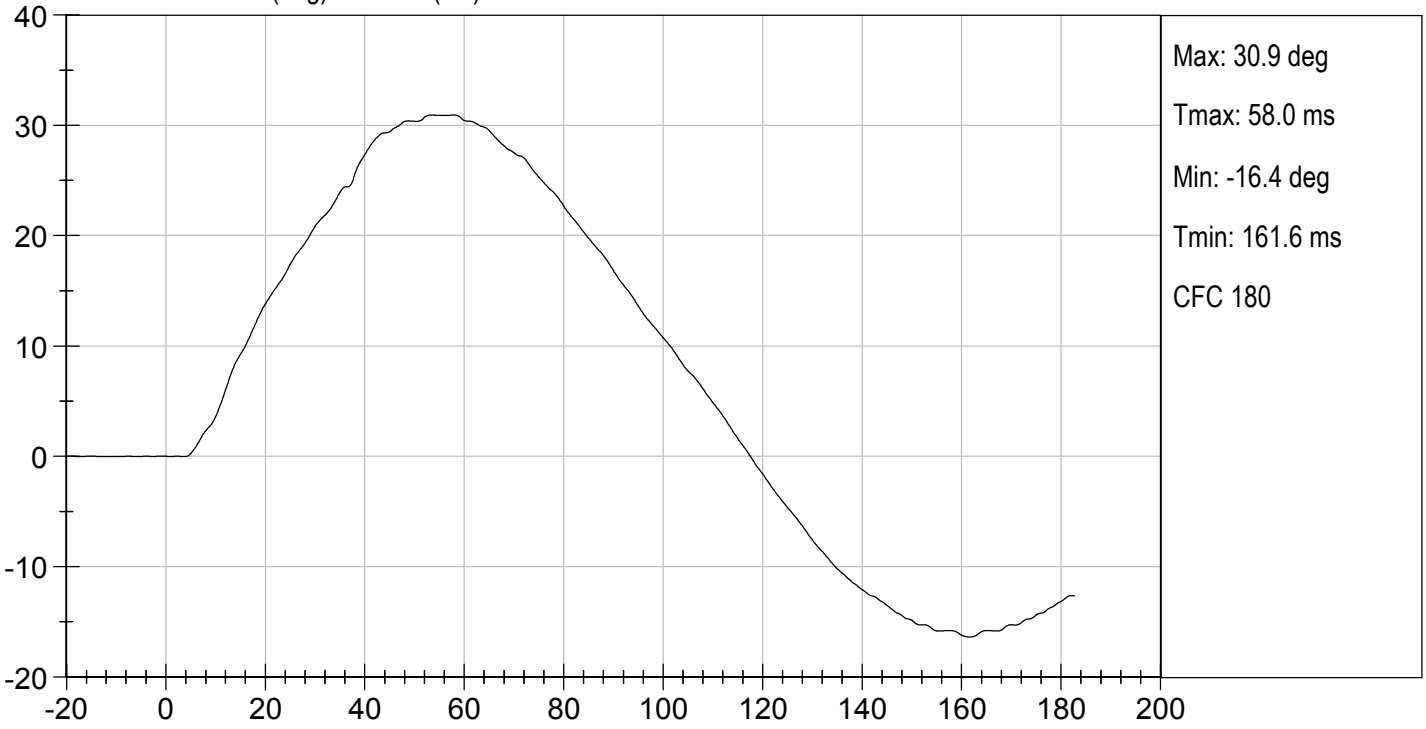

FLEXION ANGLE (deg) vs TIME (ms)



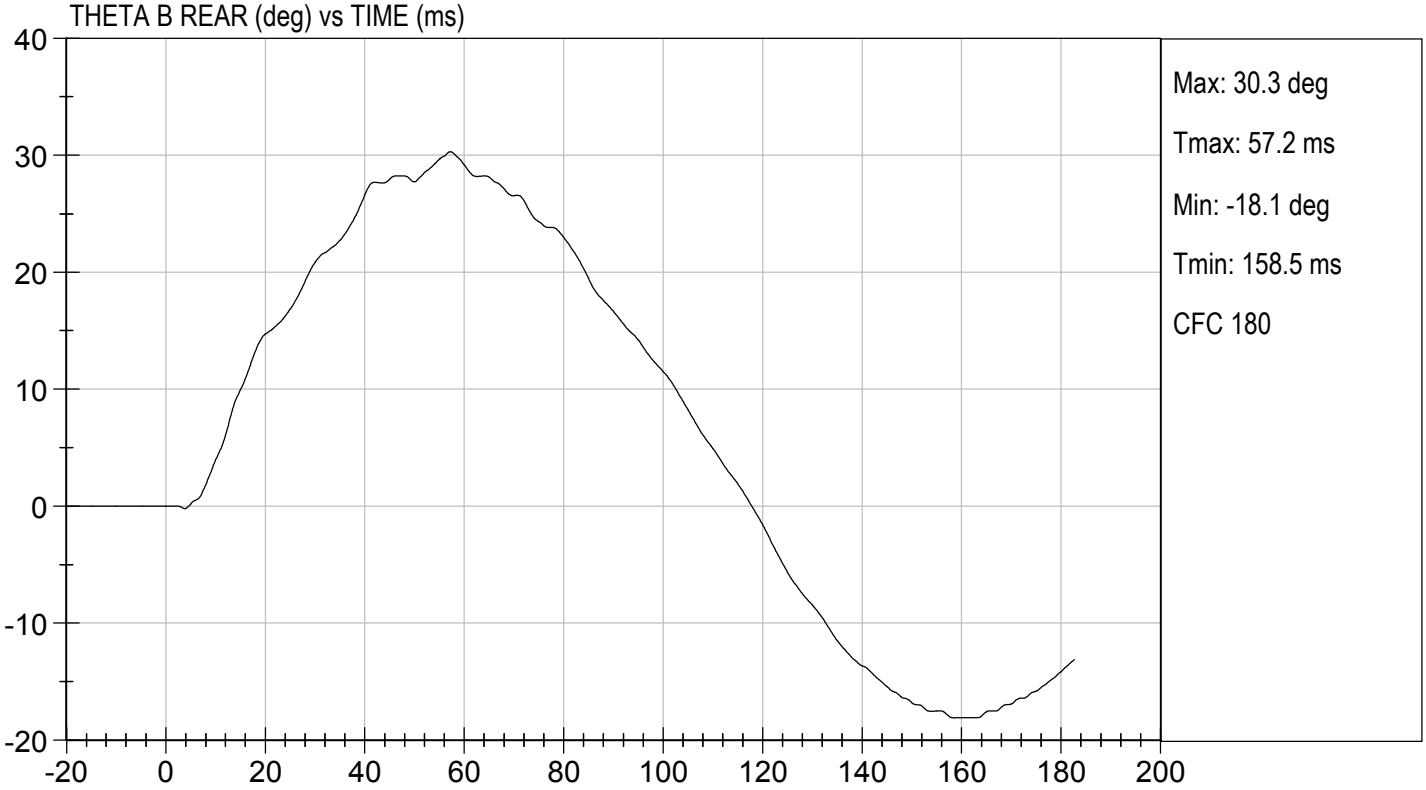
TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

TEST DATE: 05/03/2021
TEST #: D211562

THETA A FRONT (deg) vs TIME (ms)

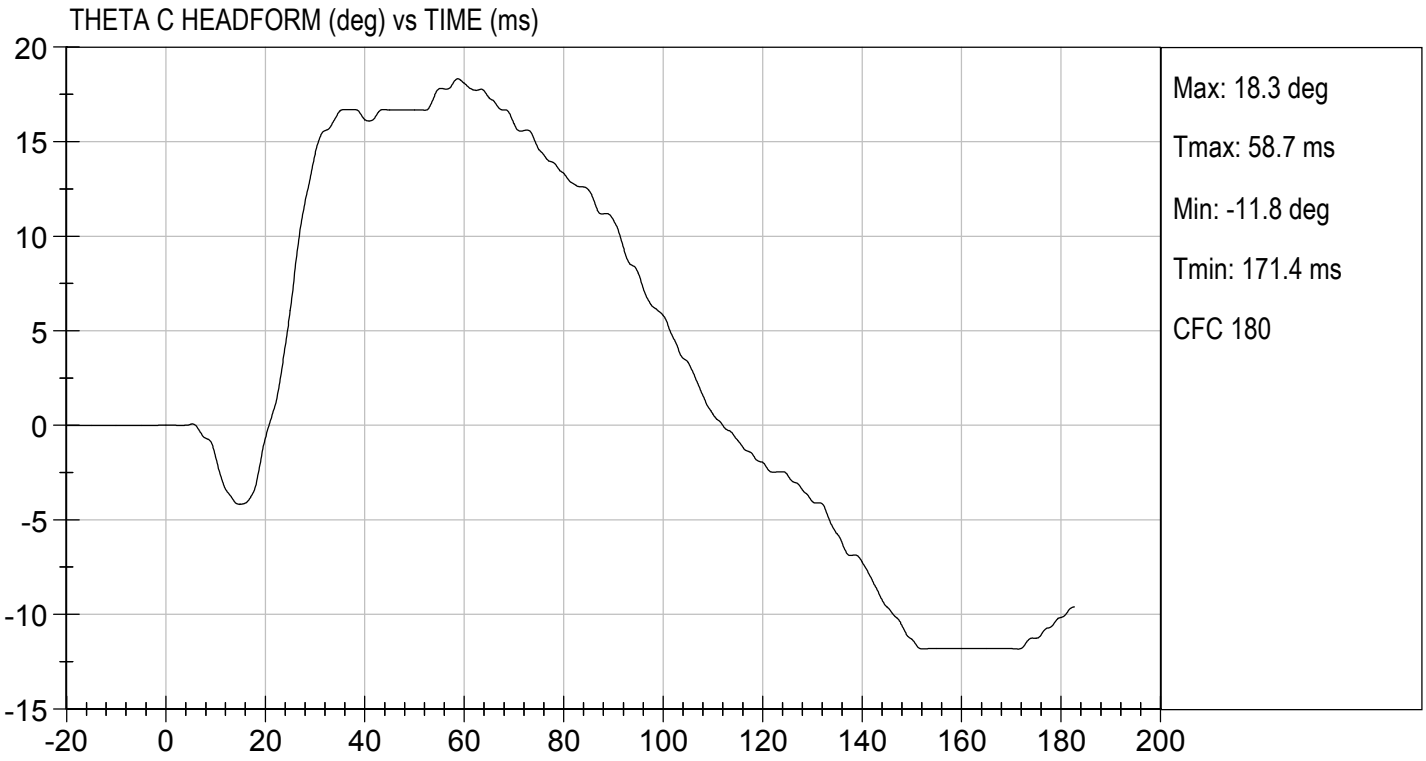



THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.34 ft/s, 3.46 m/s

TEST DATE: 05/03/2021
TEST #: D211562



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211563

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 33 | Pass |
| Pendulum Speed | m/s | 4.20 to 4.40 | 4.3 | Pass |
| Peak Impactor Acceleration | G's | 7.5 to 10.5 | 10.4 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

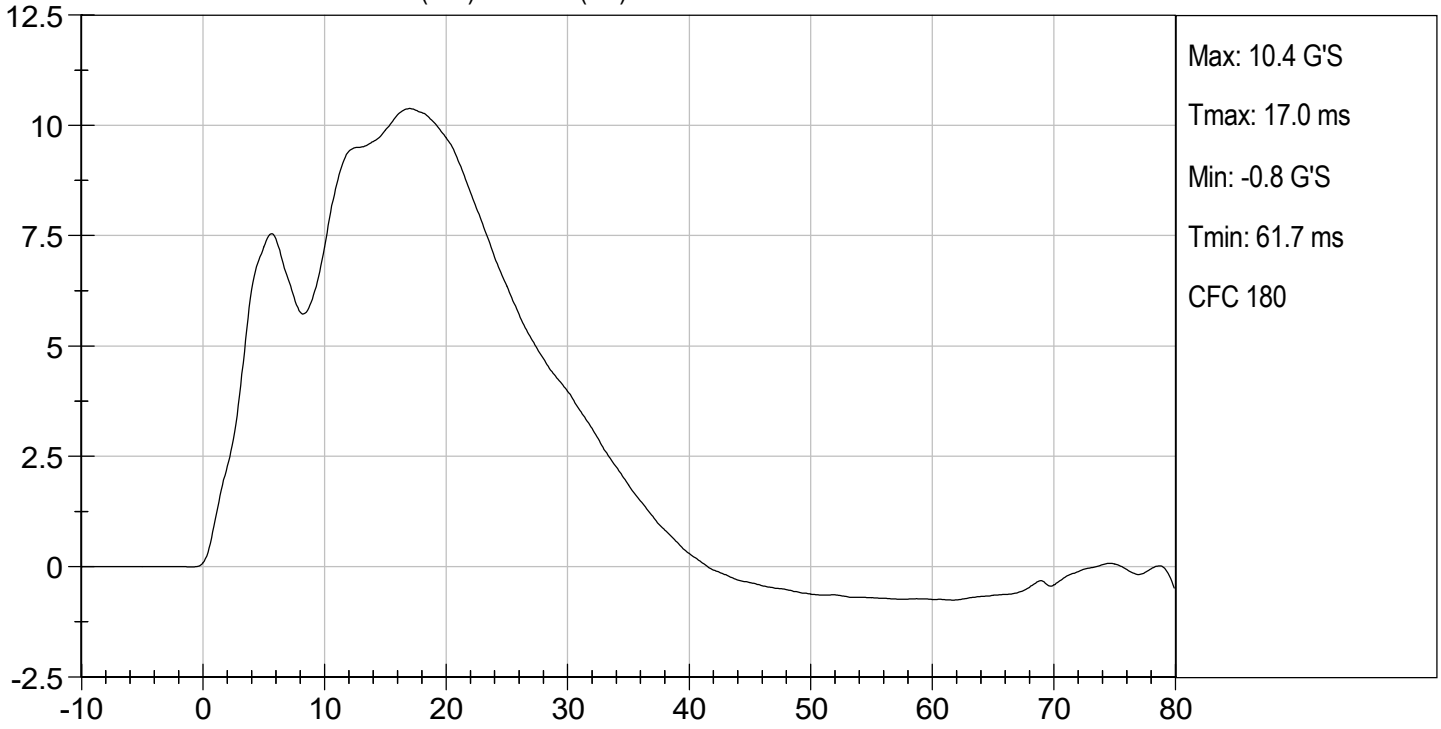
04/30/2021
Test Date

Approved By

TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.3 m/s

TEST DATE: 04/30/2021
TEST #: D211563

IMPACTOR ACCELERATION (G'S) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**UPPER RIB TEST**

**ES-2re DUMMY**

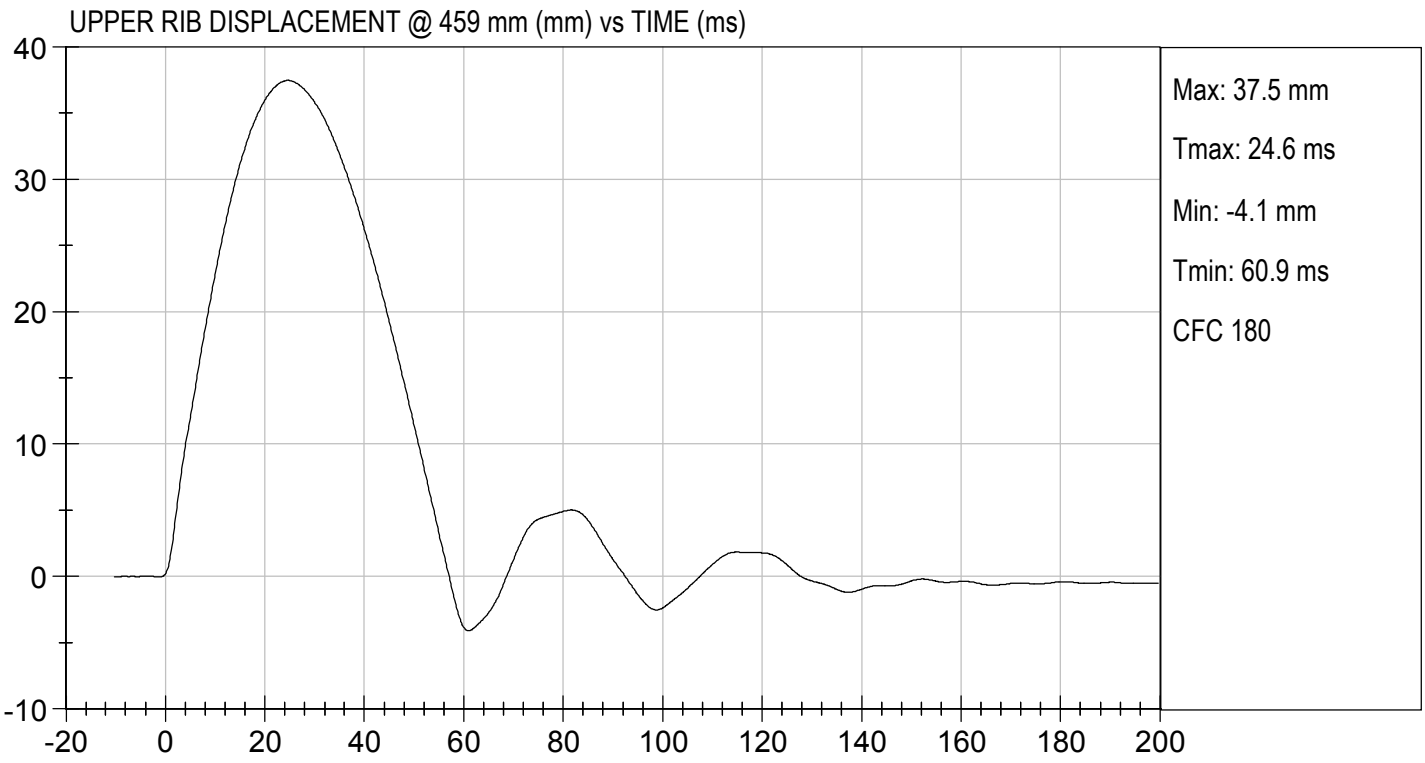
**ATD Serial No:** F032 **Test I.D:** D211564

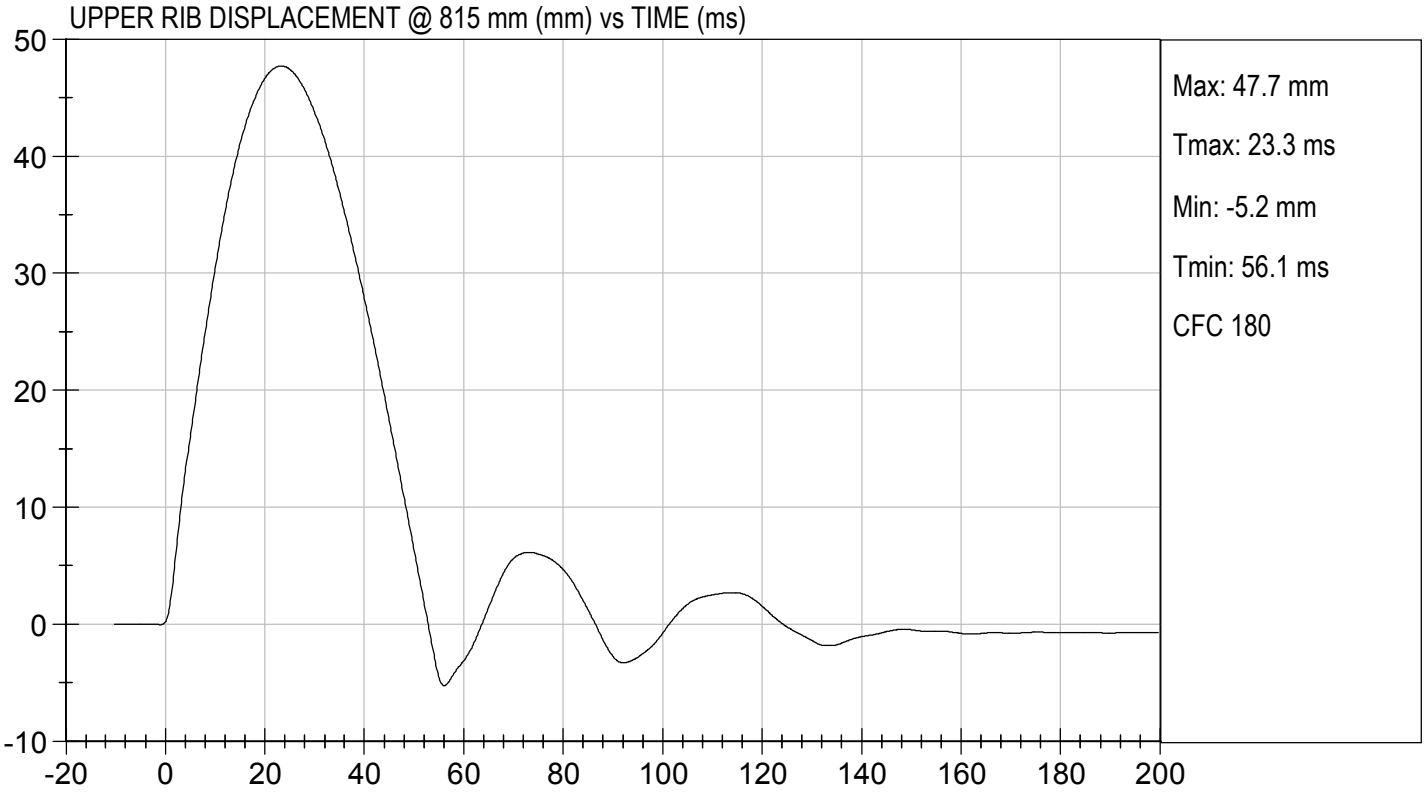
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.7 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 39 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 37.5 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 47.7 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

04/30/2021
Test Date

Approved By


UPPER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 37.5 mm
Tmax: 24.6 ms
Min: -4.1 mm
Tmin: 60.9 ms
CFC 180


UPPER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 47.7 mm
Tmax: 23.3 ms
Min: -5.2 mm
Tmin: 56.1 ms
CFC 180

**MGA RESEARCH CORPORATION**

**MID RIB TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211565

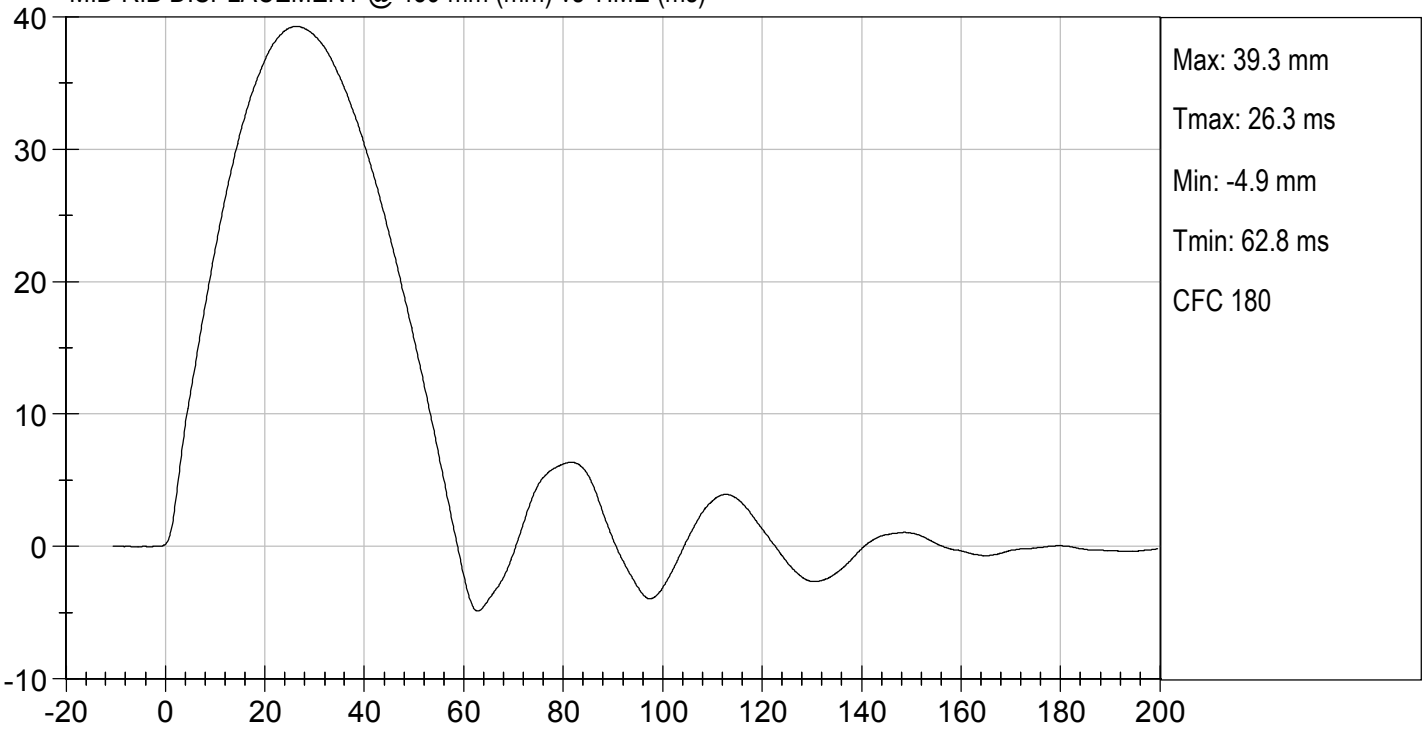
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.7 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 39 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 39.3 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 48.2 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

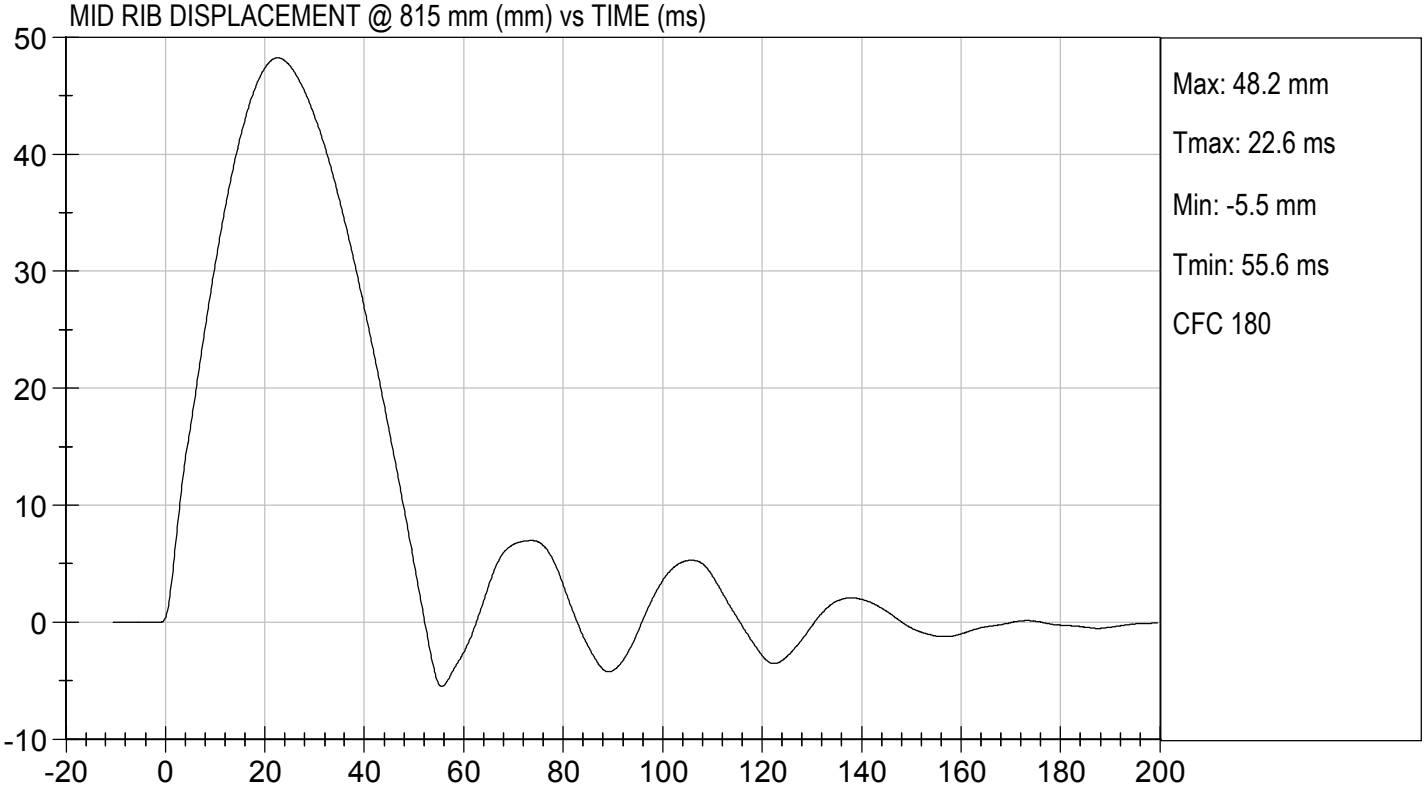
04/30/2021
Test Date

Approved By

MID RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)




MID RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**LOWER RIB TEST**

**ES-2re DUMMY**

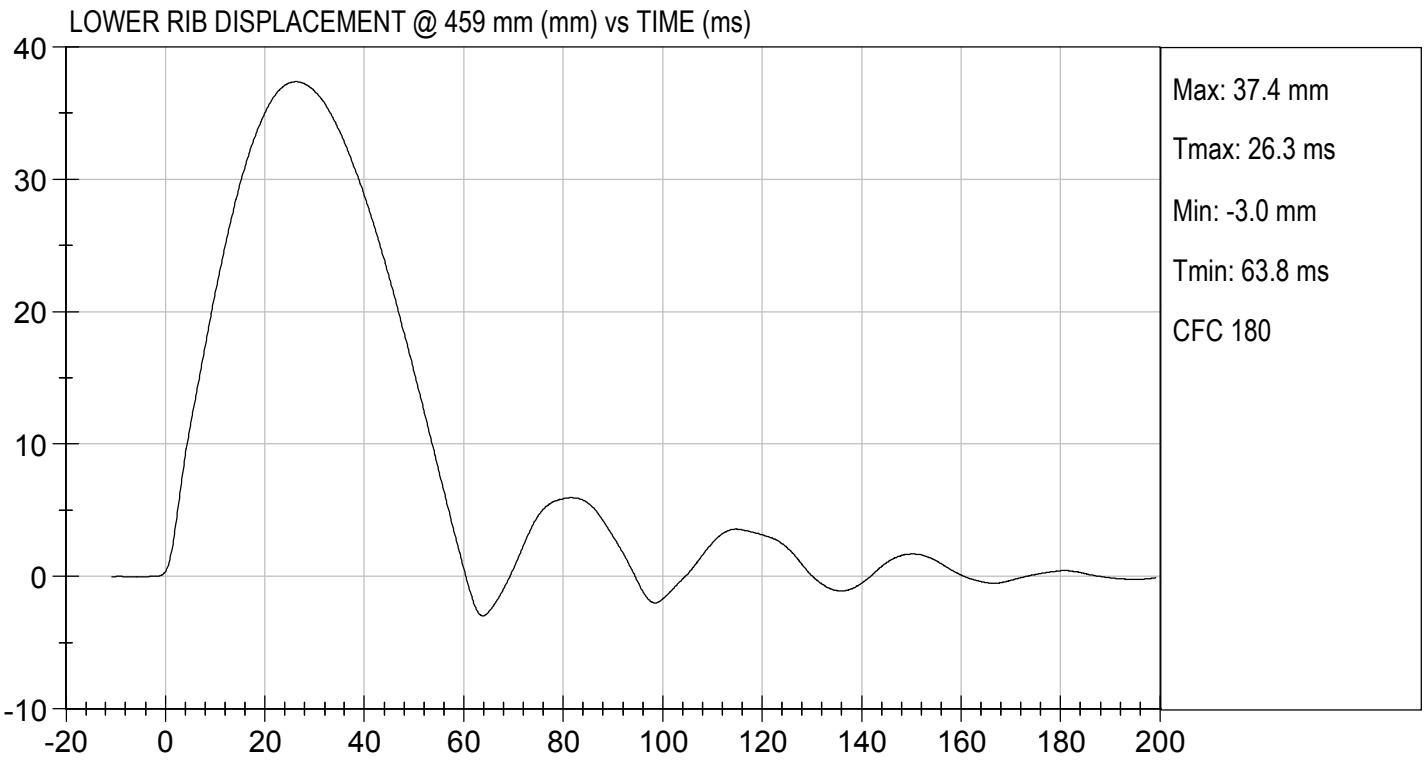
**ATD Serial No:** F032 **Test I.D:** D211566

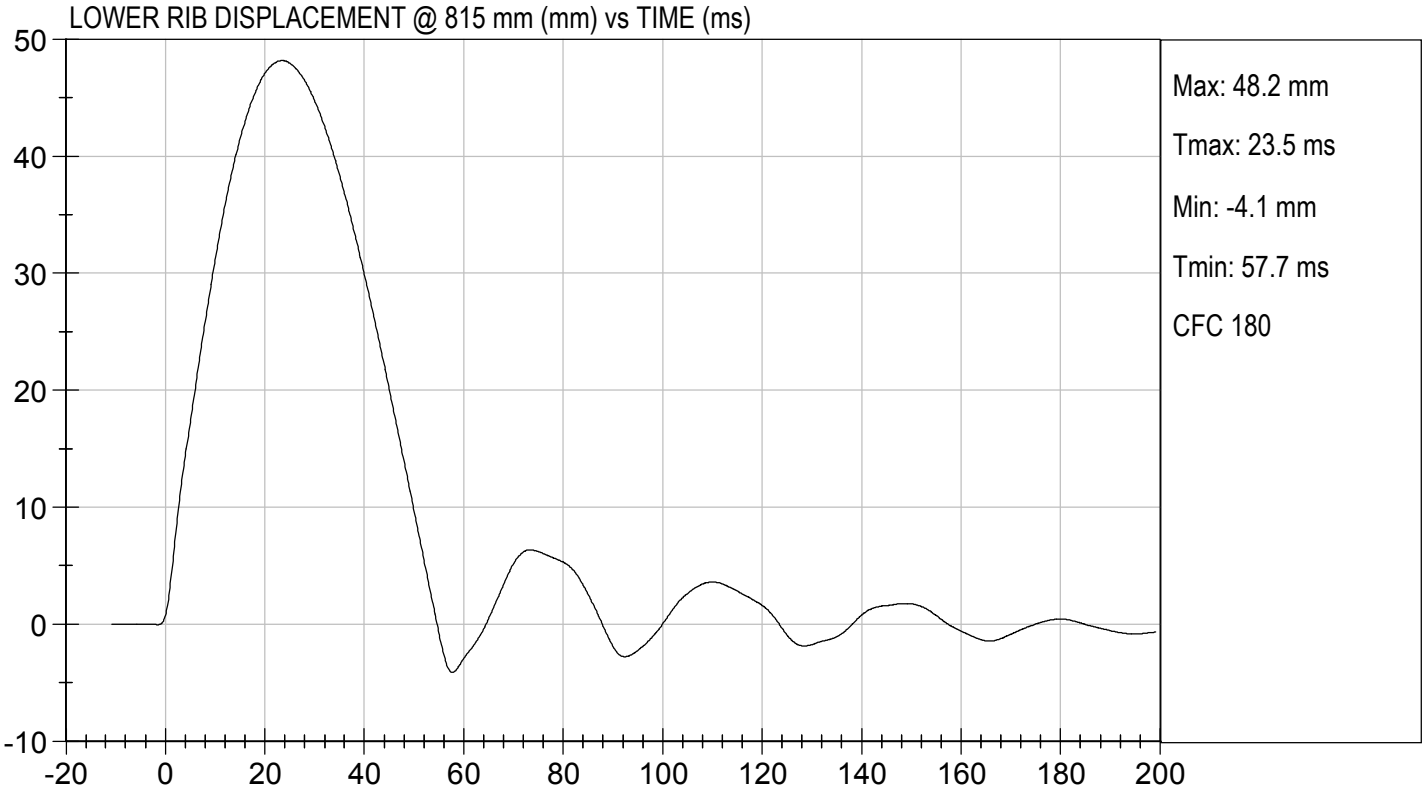
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.7 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 39 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 37.4 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 48.2 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

04/30/2021
Test Date

Approved By


LOWER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 37.4 mm
Tmax: 26.3 ms
Min: -3.0 mm
Tmin: 63.8 ms
CFC 180


LOWER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 48.2 mm
Tmax: 23.5 ms
Min: -4.1 mm
Tmin: 57.7 ms
CFC 180

**MGA RESEARCH CORPORATION**

**ABDOMEN TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211567

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 33 | Pass |
| Probe Speed | m/s | 3.90 to 4.10 | 4.06 | Pass |
| Maximum Impactor Force | N | 4000 to 4800 | 4178 | Pass |
| Time of Maximum Impactor Force | ms | 10.6 to 13.0 | 11.5 | Pass |
| Maximum Total Abdomen Force | N | 2200 to 2700 | 2248 | Pass |
| Time of Maximum Abdomen Force | ms | 10.0 to 12.3 | 11.2 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

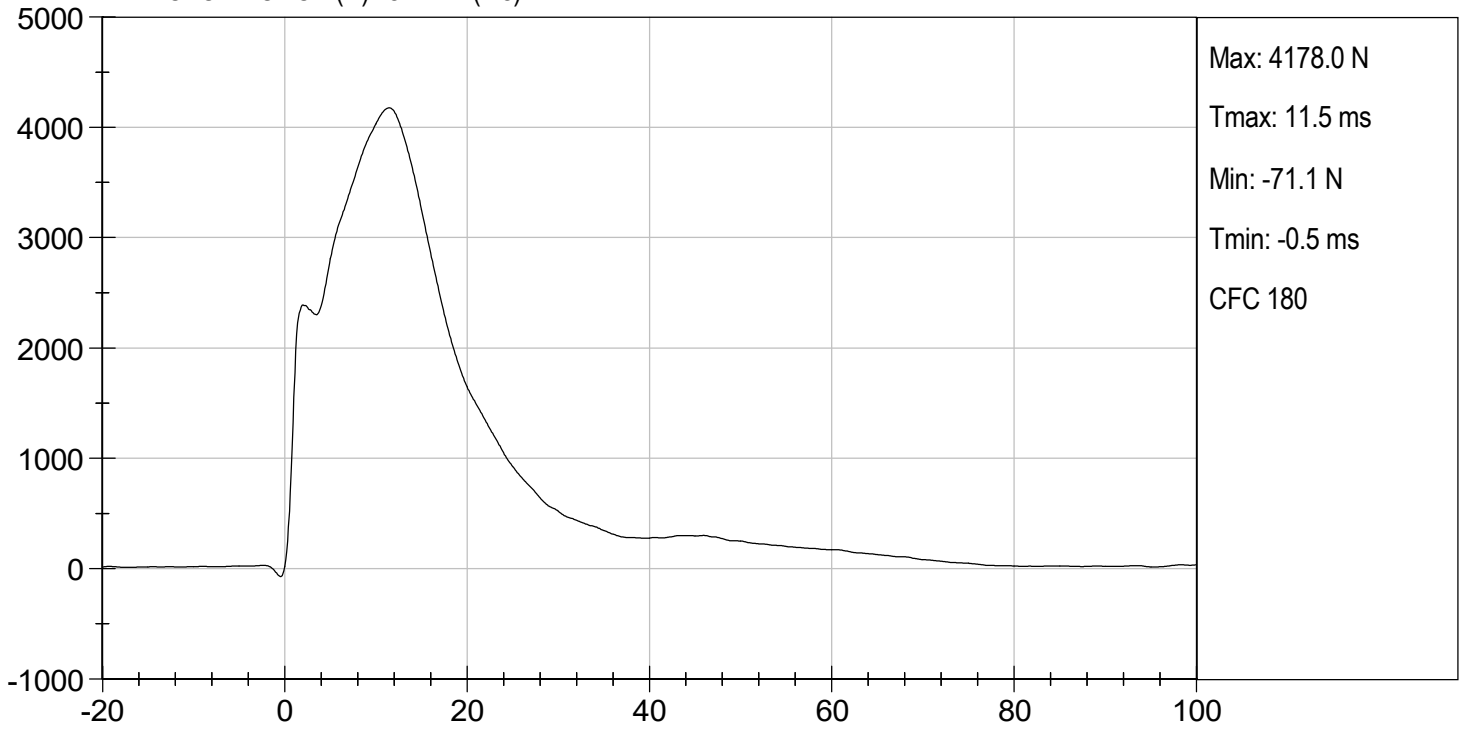
04/30/2021
Test Date

Approved By

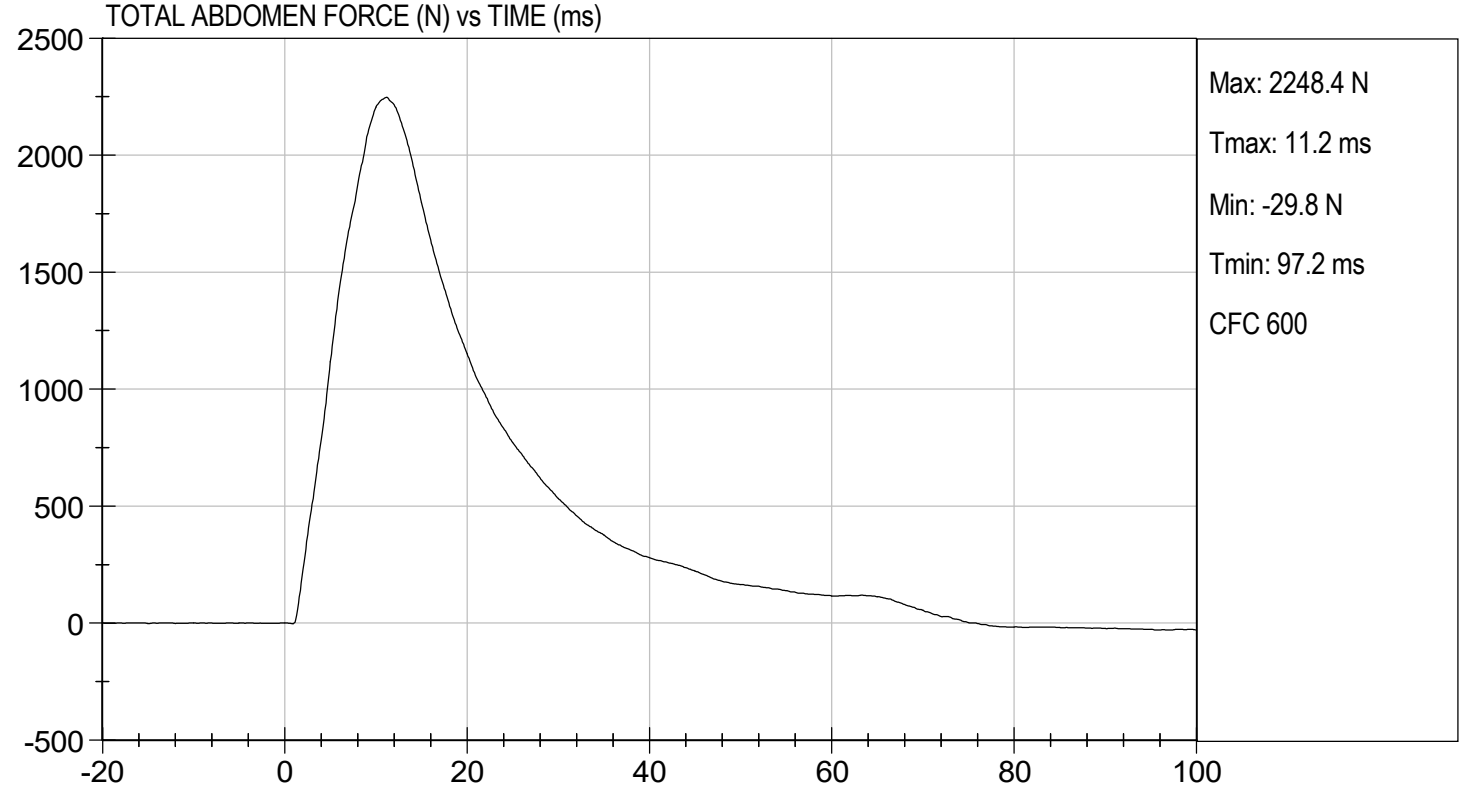
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 04/30/2021
TEST #: D211567

IMPACTOR FORCE (N) vs TIME (ms)



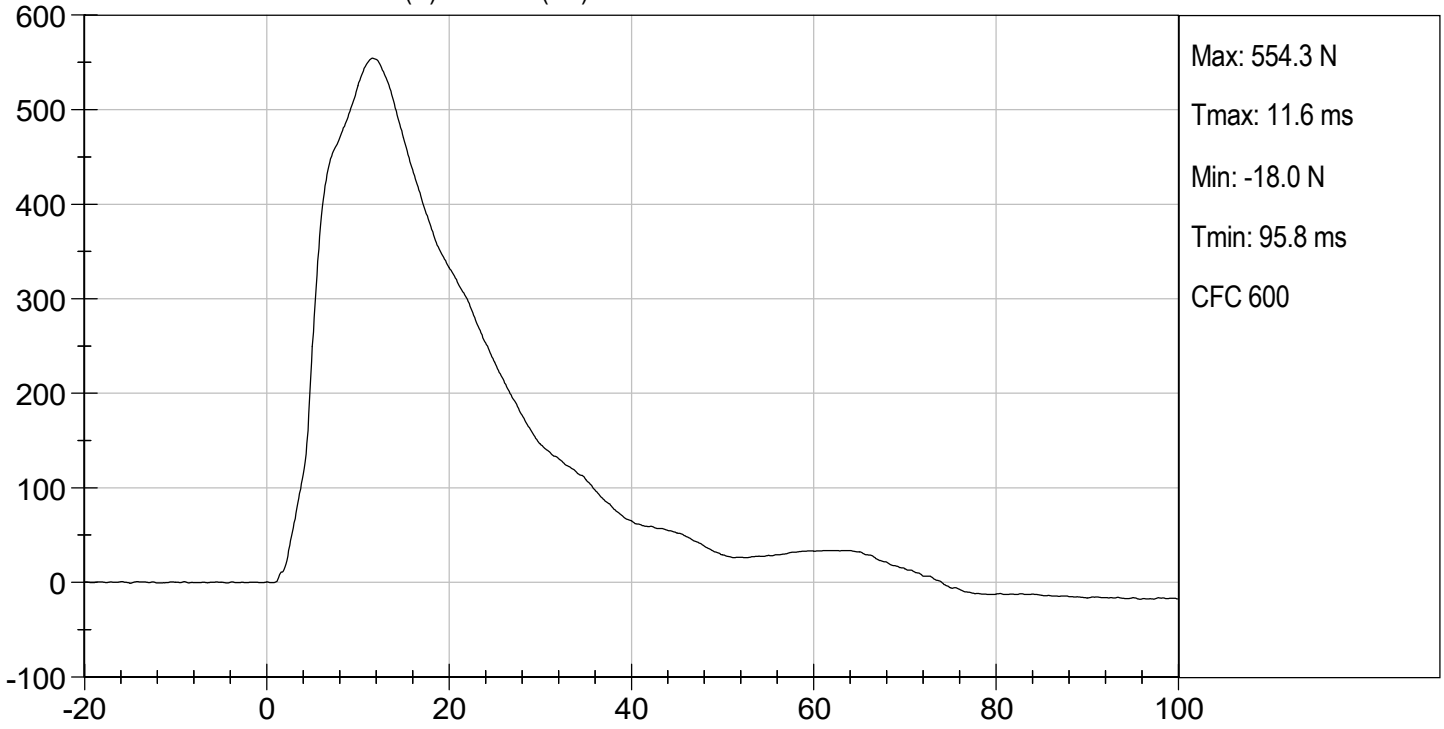

TOTAL ABDOMEN FORCE (N) vs TIME (ms)



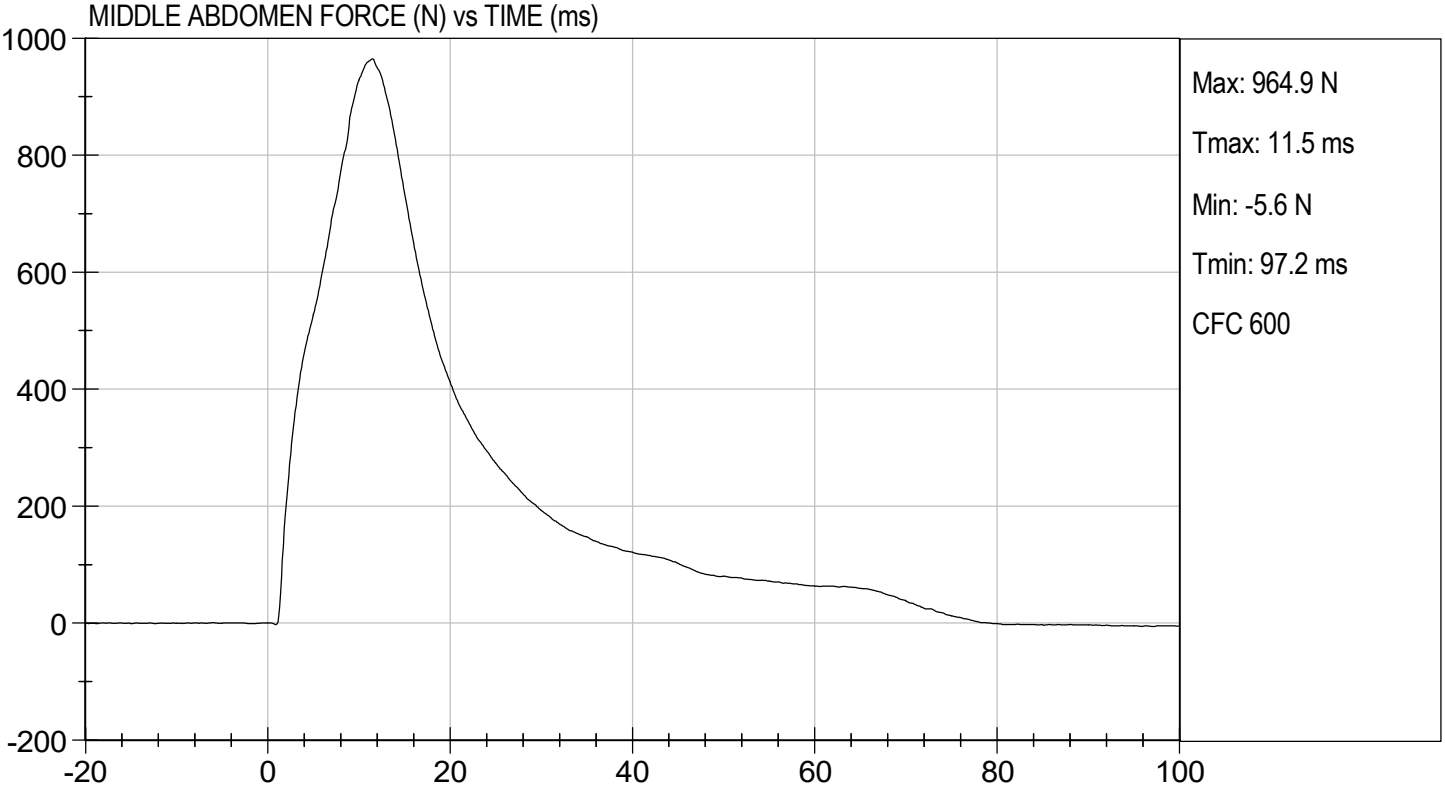
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 04/30/2021
TEST #: D211567

FRONT ABDOMEN FORCE (N) vs TIME (ms)



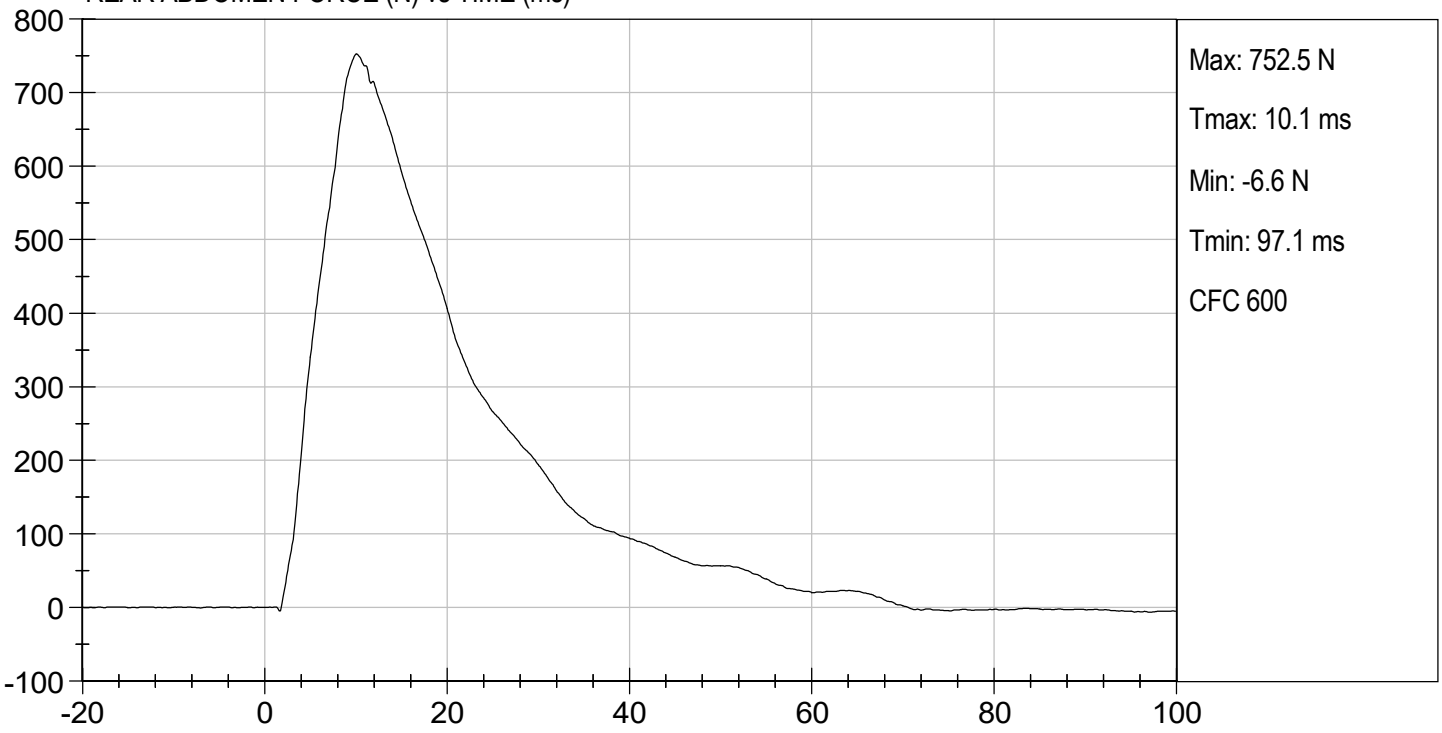

MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.33 ft/s, 4.06 m/s

TEST DATE: 04/30/2021
TEST #: D211567

REAR ABDOMEN FORCE (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**LUMBAR SPINE TEST**

**ES-2re DUMMY**

**ATD Serial No:** f032 **Test I.D:** D211568

| 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 | 44 | Pass |
| Pendulum Speed | | m/s | 5.95 to 6.15 | 6.05 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | -0.03 | Pass |
| | 3.7 ms | m/s | -0.425 to -0.24 | -0.389 | Pass |
| | 27 ms | m/s | -6.50 to -5.80 | -6.07 | Pass |
| | 30 ms | m/s | >= -6.50 | -5.96 | Pass |
| Maximum Flexion Angle | | deg | 45.0 to 55.0 | 46.2 | Pass |
| Time of Maximum Flexion Angle | | ms | 39.0 to 53.0 | 44.6 | Pass |
| Headform Rotation Decay to Initial Position | | ms | 37 to 57 | 38 | Pass |
| | | | Overall Results | | Pass |

Laboratory Technician

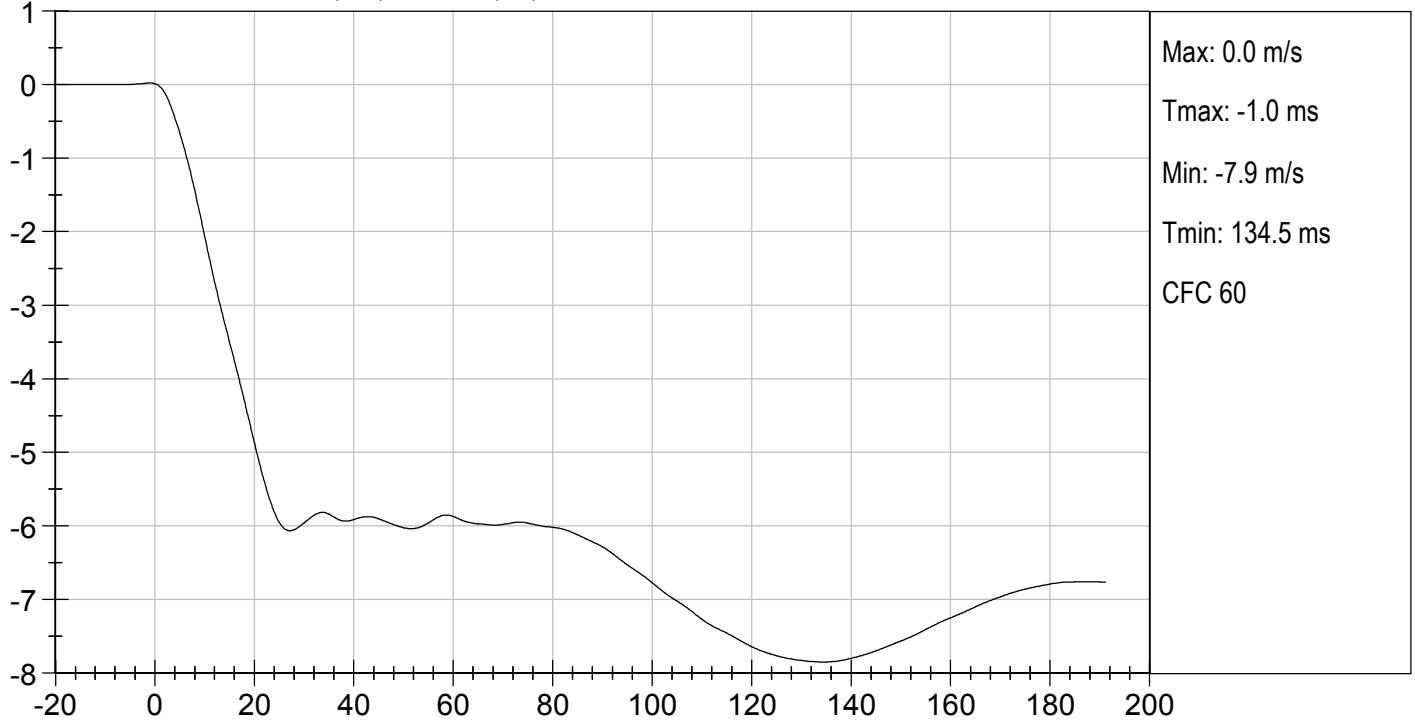
05/03/2021
Test Date

Approved By

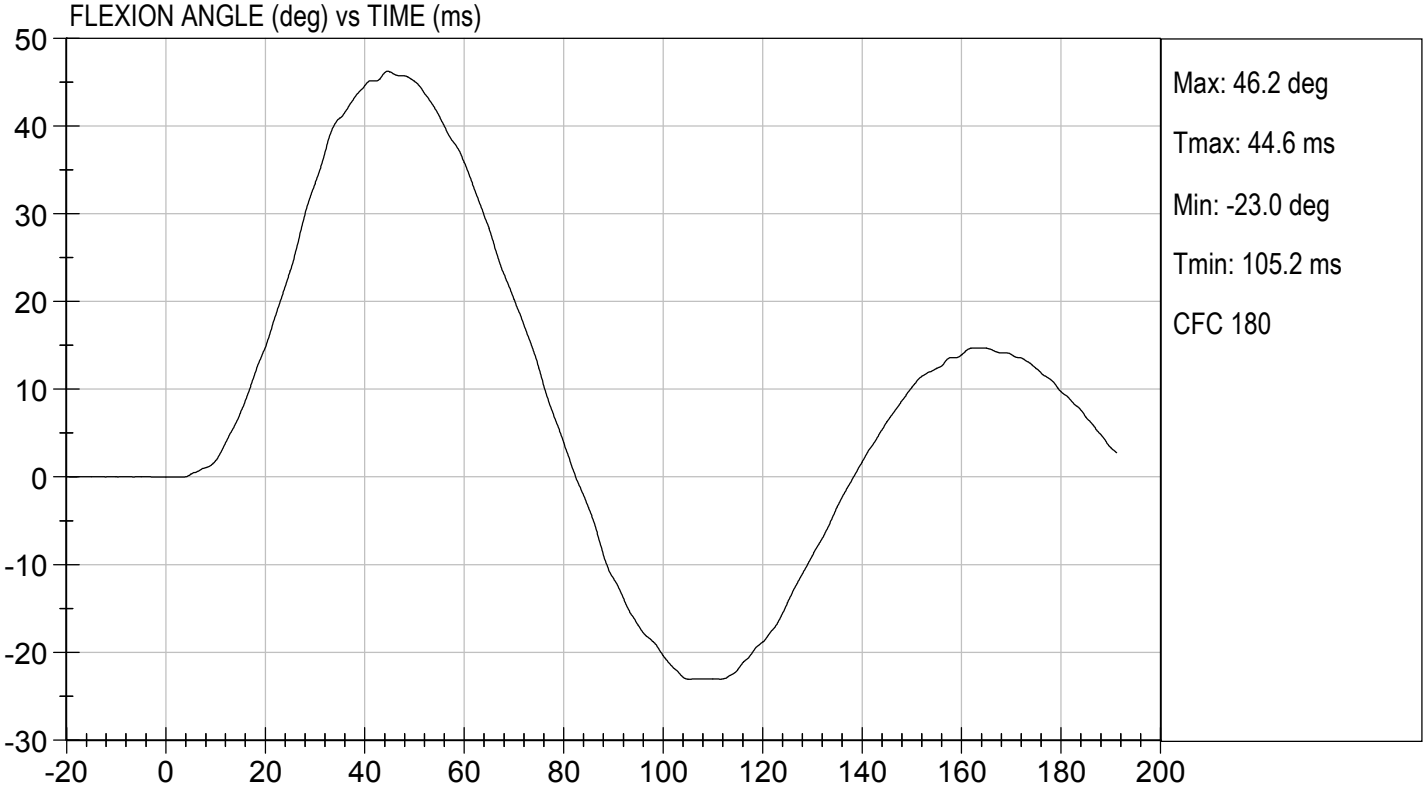
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 05/03/2021
TEST #: D211568

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



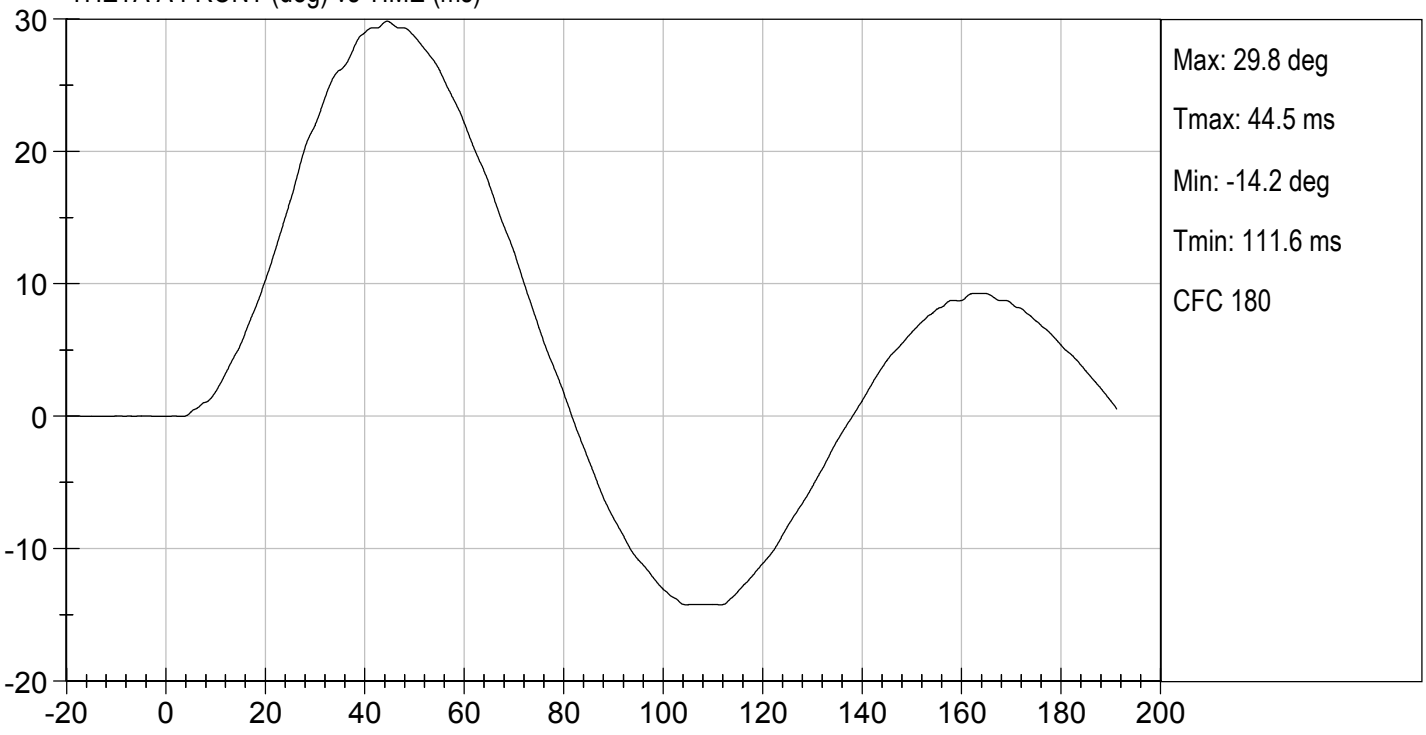

FLEXION ANGLE (deg) vs TIME (ms)



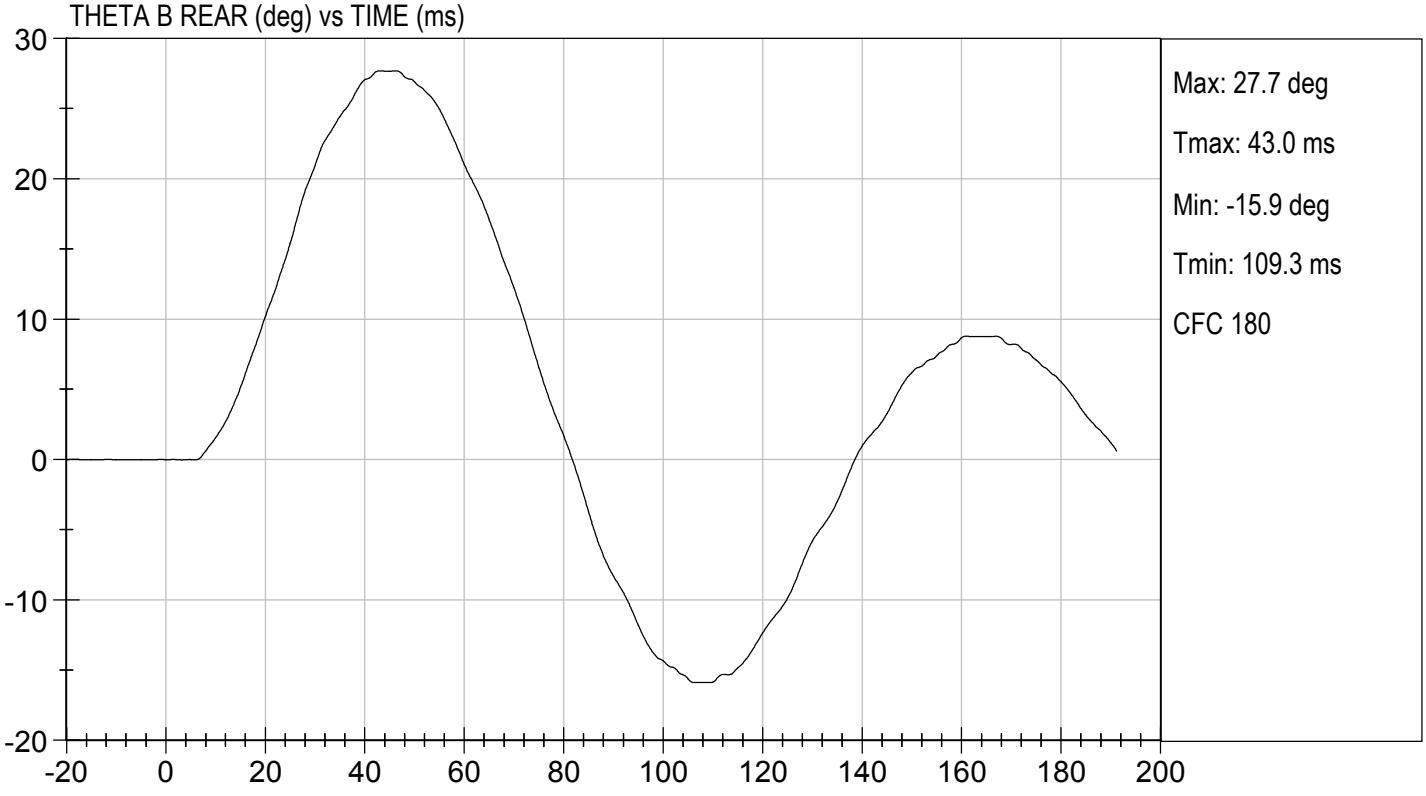
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 05/03/2021
TEST #: D211568

THETA A FRONT (deg) vs TIME (ms)

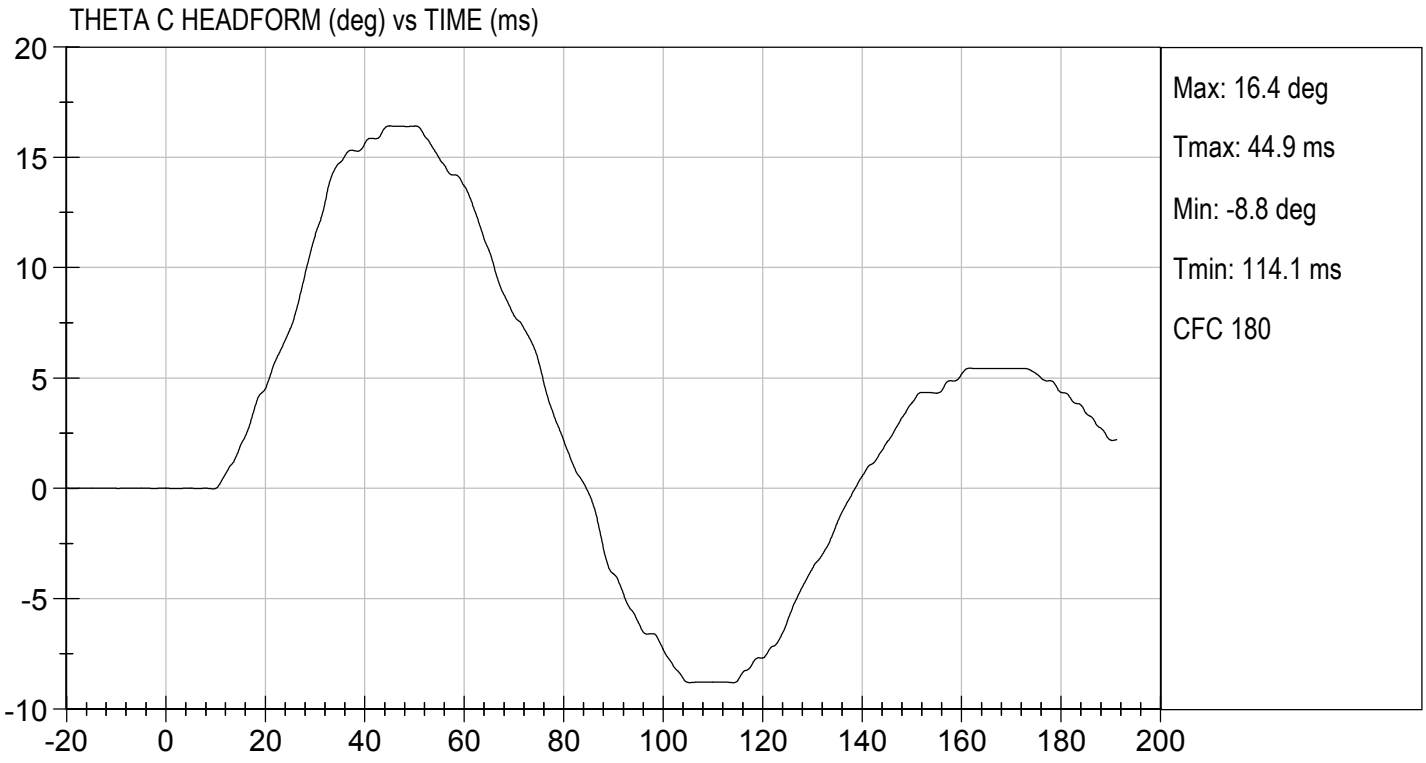



THETA B REAR (deg) vs TIME (ms)



TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 05/03/2021
TEST #: D211568



**MGA RESEARCH CORPORATION**

**PELVIS TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211569

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 33 | Pass |
| Probe Speed | m/s | 4.20 to 4.40 | 4.23 | Pass |
| Maximum Impactor Force | N | 4700 to 5400 | 5006 | Pass |
| Time of Maximum Impactor Force | ms | 11.8 to 16.1 | 13.2 | Pass |
| Maximum Pubic Force | N | 1230 to 1590 | 1379 | Pass |
| Time of Maximum Pubic Force | ms | 12.2 to 17.0 | 13.3 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

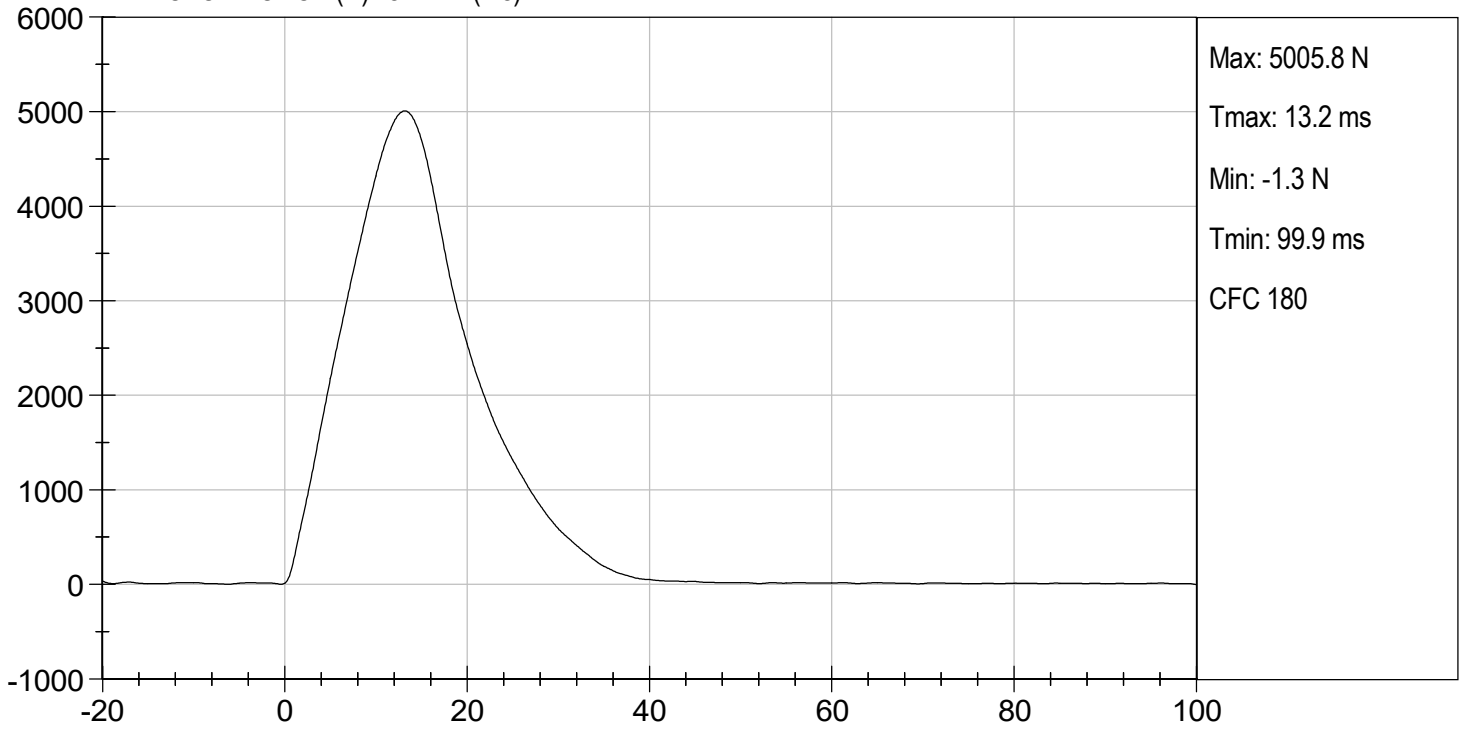
04/30/2021
Test Date

Approved By

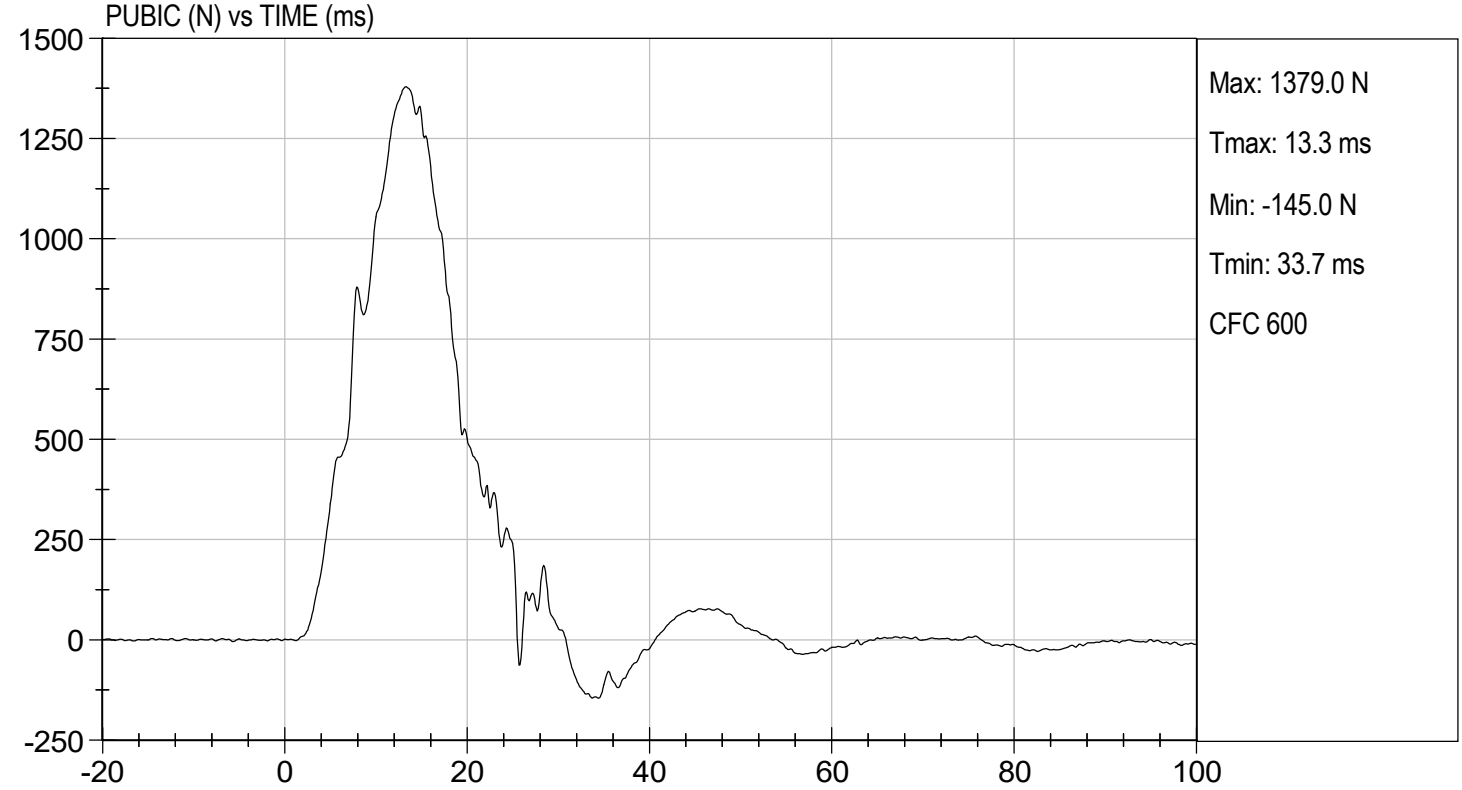
TEST DESC: PELVIS IMPACT
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 04/30/2021
TEST #: D211569

IMPACTOR FORCE (N) vs TIME (ms)




PUBIC (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**THORAX IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** F032 **Test I.D:** D211560

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Humidity | % | 10 to 70 | 33 | Pass |
| Probe Speed | m/s | 5.40 to 5.60 | 5.52 | Pass |
| Maximum Impactor Force (after 6 ms) | N | 5100 to 6200 | 6069 | Pass |
| Upper Rib Displacement | mm | 34.0 to 41.0 | 37.3 | Pass |
| Middle Rib Displacement | mm | 37.0 to 45.0 | 39.6 | Pass |
| Lower Rib Displacement | mm | 37.0 to 44.0 | 40.0 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

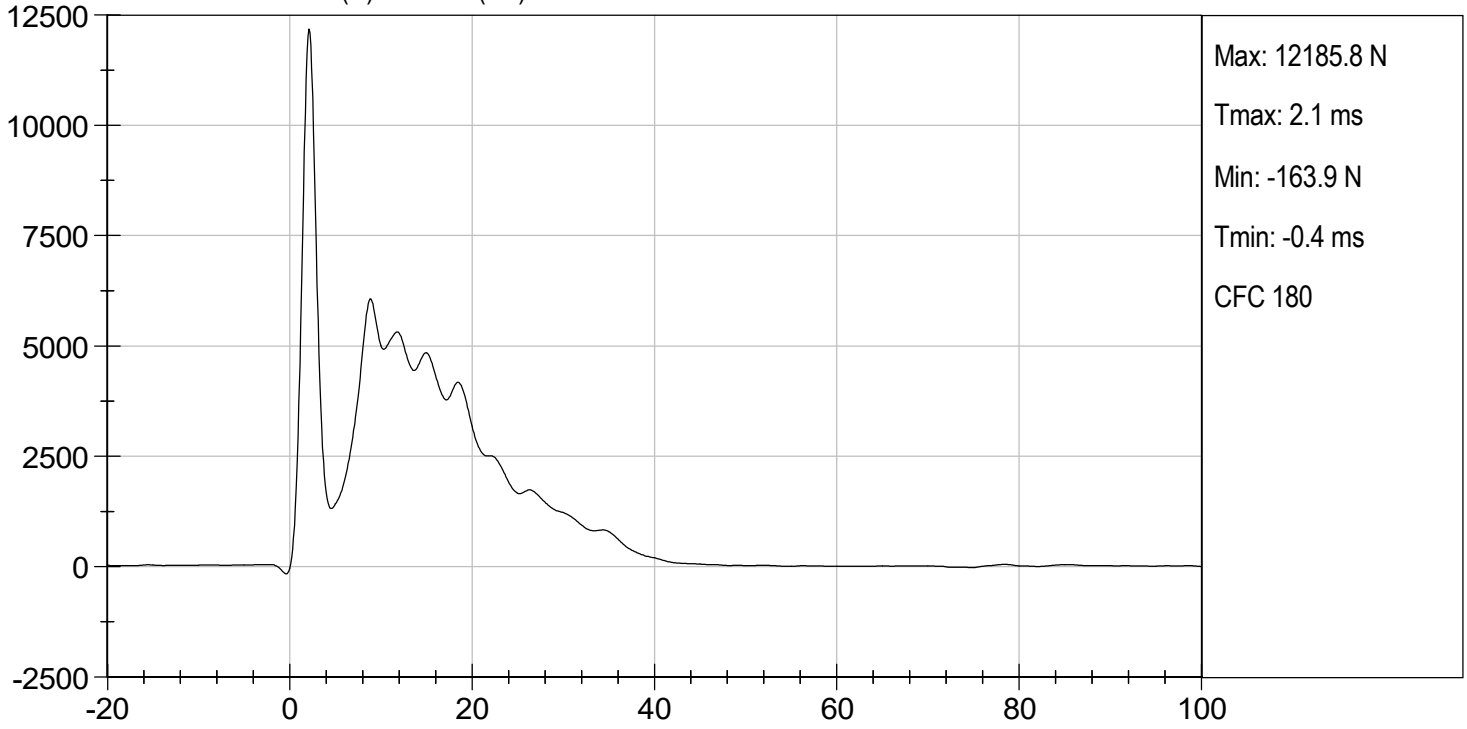
04/30/2021
Test Date

Approved By

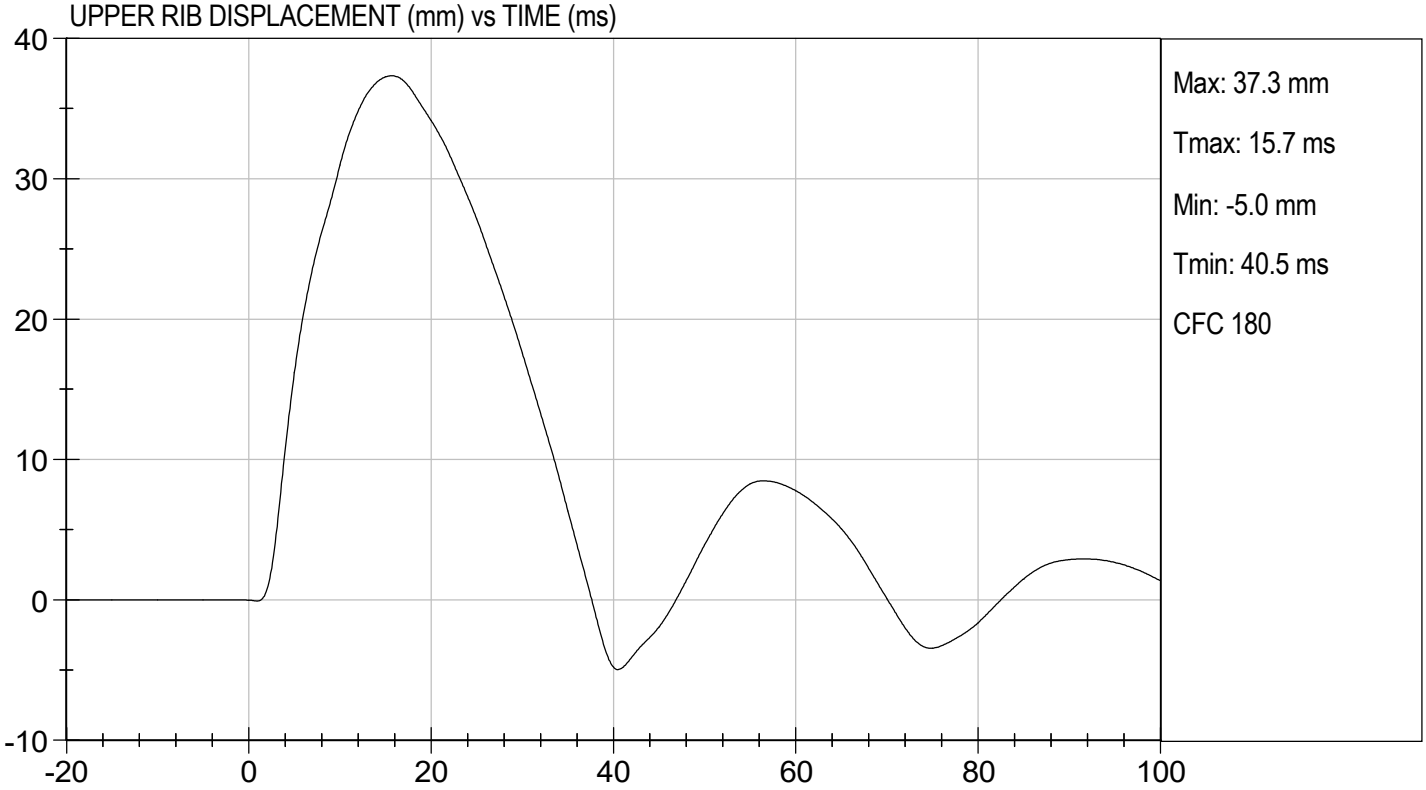
TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 04/30/2021
TEST #: D211560

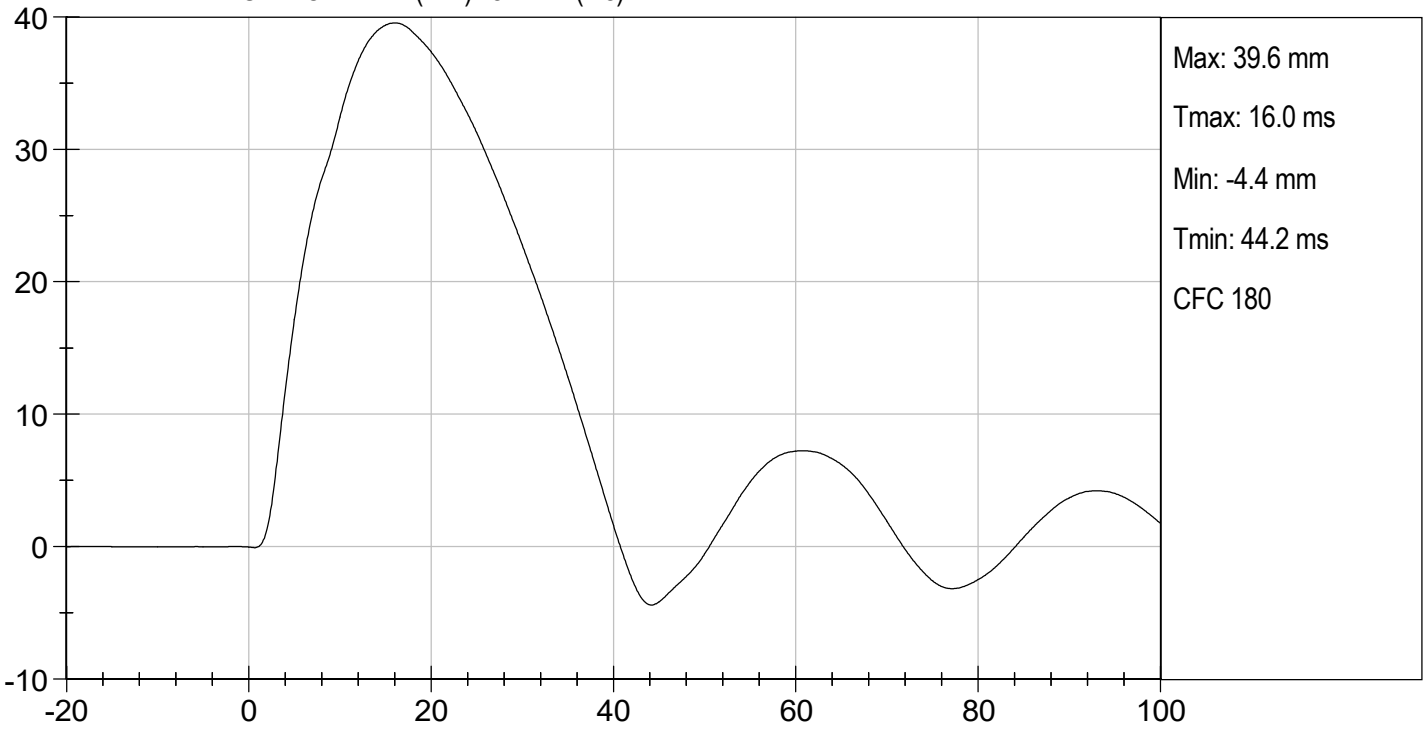
IMPACTOR FORCE (N) vs TIME (ms)



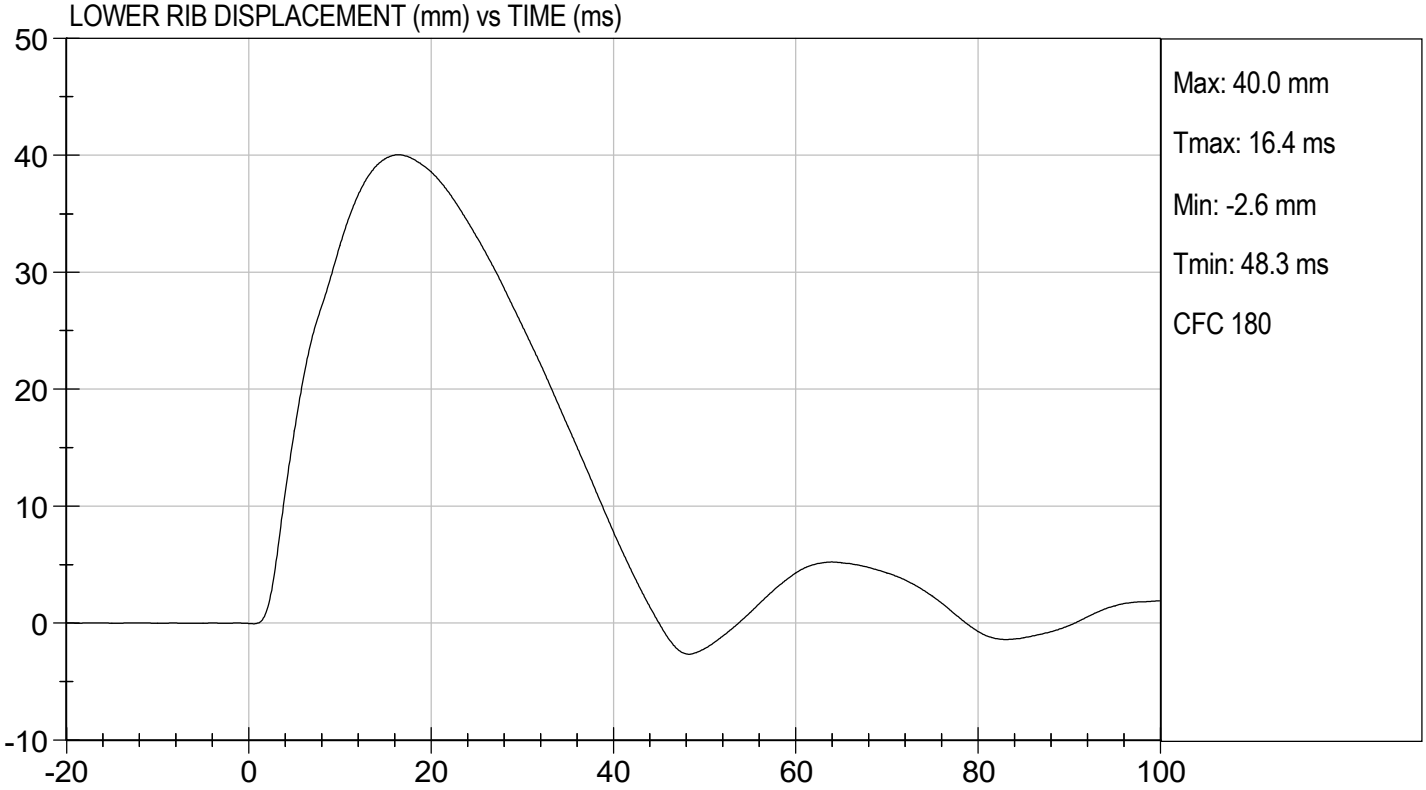

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)




LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



**CALIBRATION TEST RESULTS**

**PRE-TEST**

**SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD**

**SID-IIsD External Measurements**
**SN: 306**

| No. | Name | Spec. (mm) | Result | Pass/Fail |
|---|---|---|---|---|
| **A** | Sitting Height | 772 - 788 | 785 | Pass |
| **B** | Shoulder Pivot Height | 437 - 453 | 449 | Pass |
| **C** | H-point Height | 79 - 89 | 86 | Pass |
| **D** | H-point from Seatback | 141 - 151 | 147 | Pass |
| **E** | Shoulder Pivot from Backline | 97 - 107 | 99 | Pass |
| **F** | Thigh Clearance | 119 -135 | 120 | Pass |
| **G** | Head Breadth | 140 - 148 | 141 | Pass |
| **H** | Head Back from Backline | 40 - 46 | 45 | Pass |
| **I** | Head Depth | 178 - 188 | 182 | Pass |
| **J** | Head Circumference | 541 - 551 | 550 | Pass |
| **K** | Buttock to Knee Length | 514 - 540 | 538 | Pass |
| **L** | Popliteal Height | 343 - 369 | 349 | Pass |
| **M** | Knee Pivot to Floor Height | 392 - 409 | 394 | Pass |
| **N** | Buttock Popliteal Length | 416 - 442 | 435 | Pass |
| **O** | Chest Depth w/o Jacket | 195 - 211 | 198 | Pass |
| **P** | Foot Length | 216 - 232 | 222 | Pass |
| **Q** | Hip Breadth (w/ pelvic plugs) | 313 - 323 | 317 | Pass |
| **R** | Arm Length | 249 - 259 | 250 | Pass |
| **S** | Knee Joint to Seatback | 477 - 493 | 483 | Pass |
| **V** | Shoulder Width | 341 - 357 | 351 | Pass |
| **W** | Foot Width | 78 - 94 | 82 | Pass |
| **Y** | Chest Circumference w/ jacket | 851 - 881 | 863 | Pass |
| **Z** | Waist Circumference | 761 - 791 | 782 | Pass |

**MGA RESEARCH CORPORATION**

**HEAD DROP TEST**

**SID-IIs BUILD LEVEL D DUMMY**

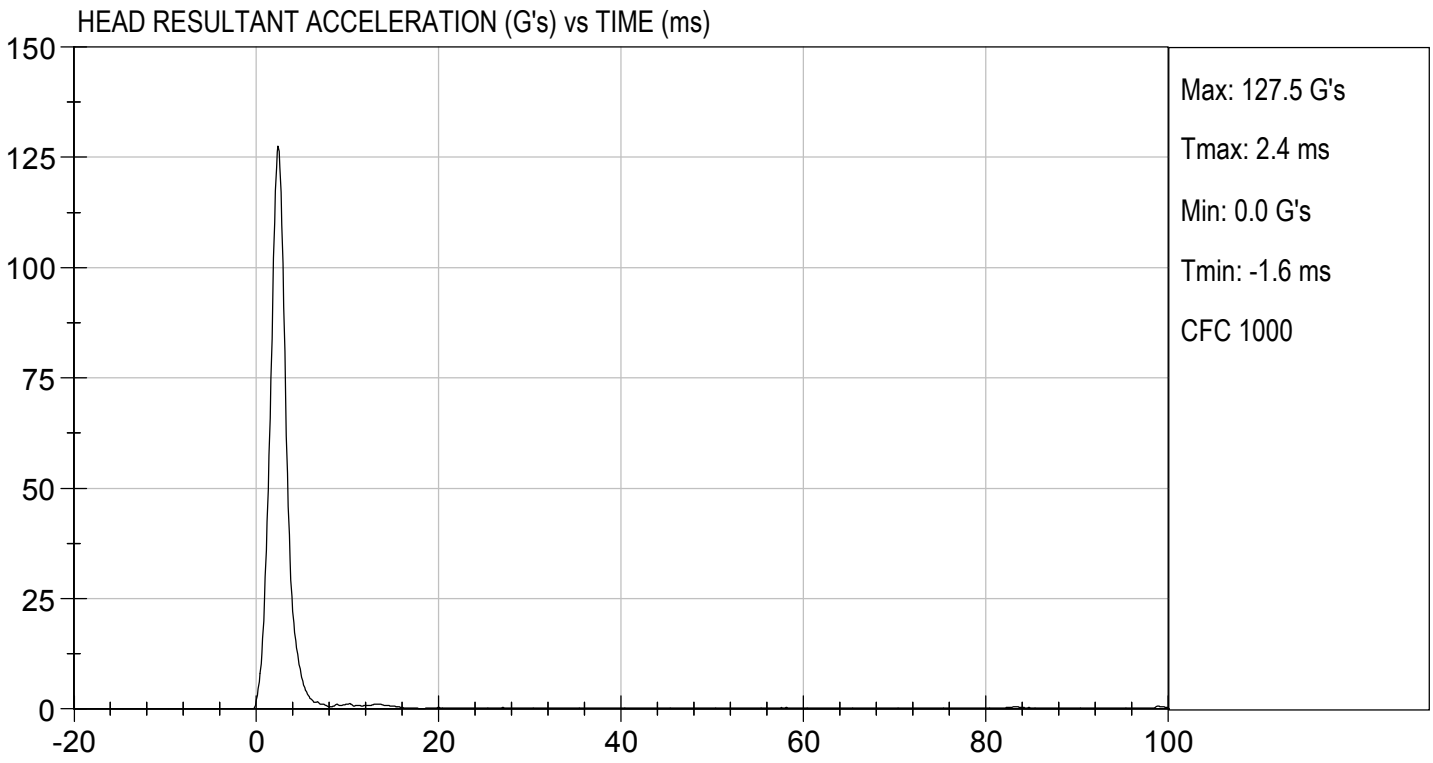
**ATD Serial No:** 306 **Test ID:** D211351

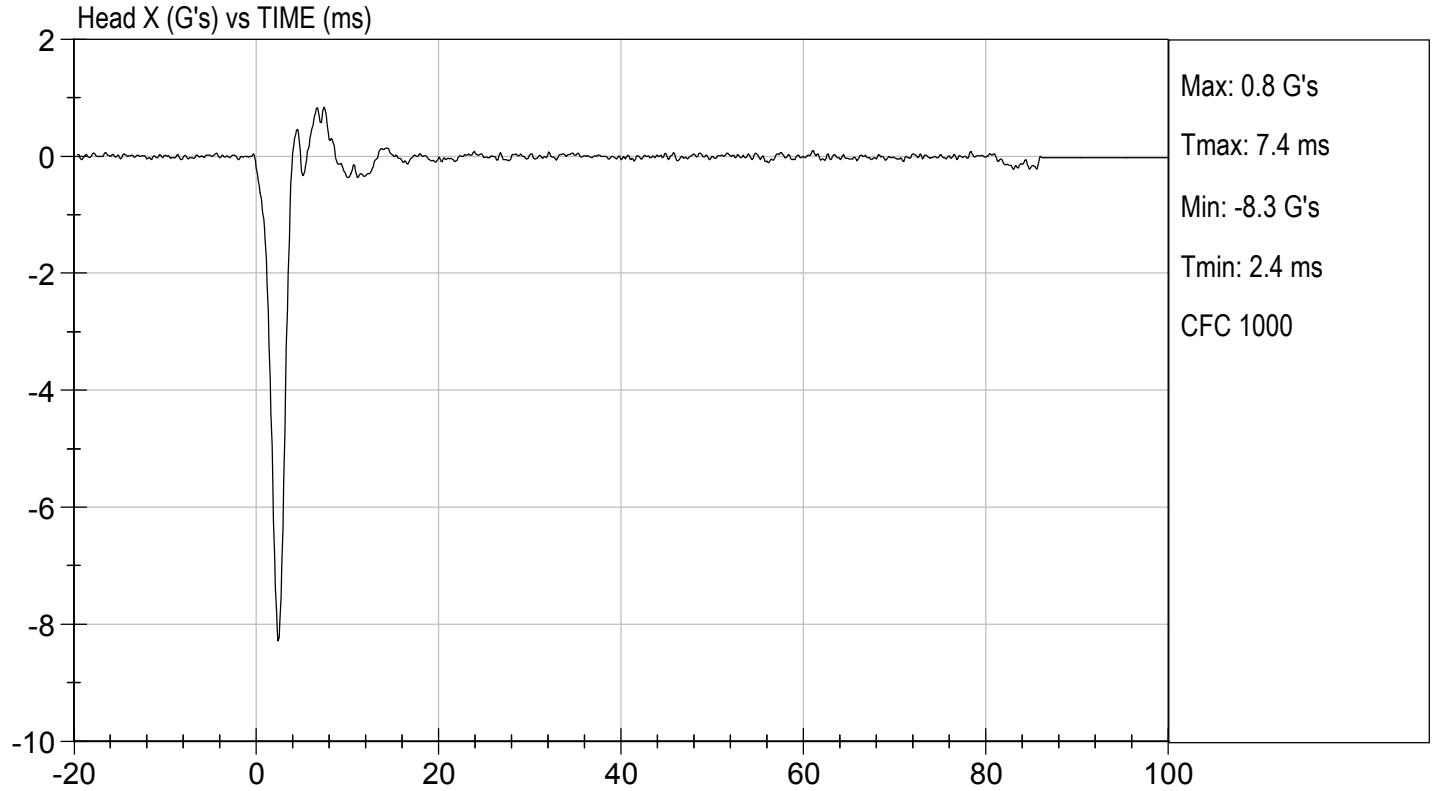
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.4 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 21 | Pass |
| Peak Resultant Acceleration | G's | 115 to 137 | 127 | Pass |
| Peak Longitudinal Acceleration | G's | +/- 15 | -8.3 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | <15% | Yes | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

04/21/2021
Test Date

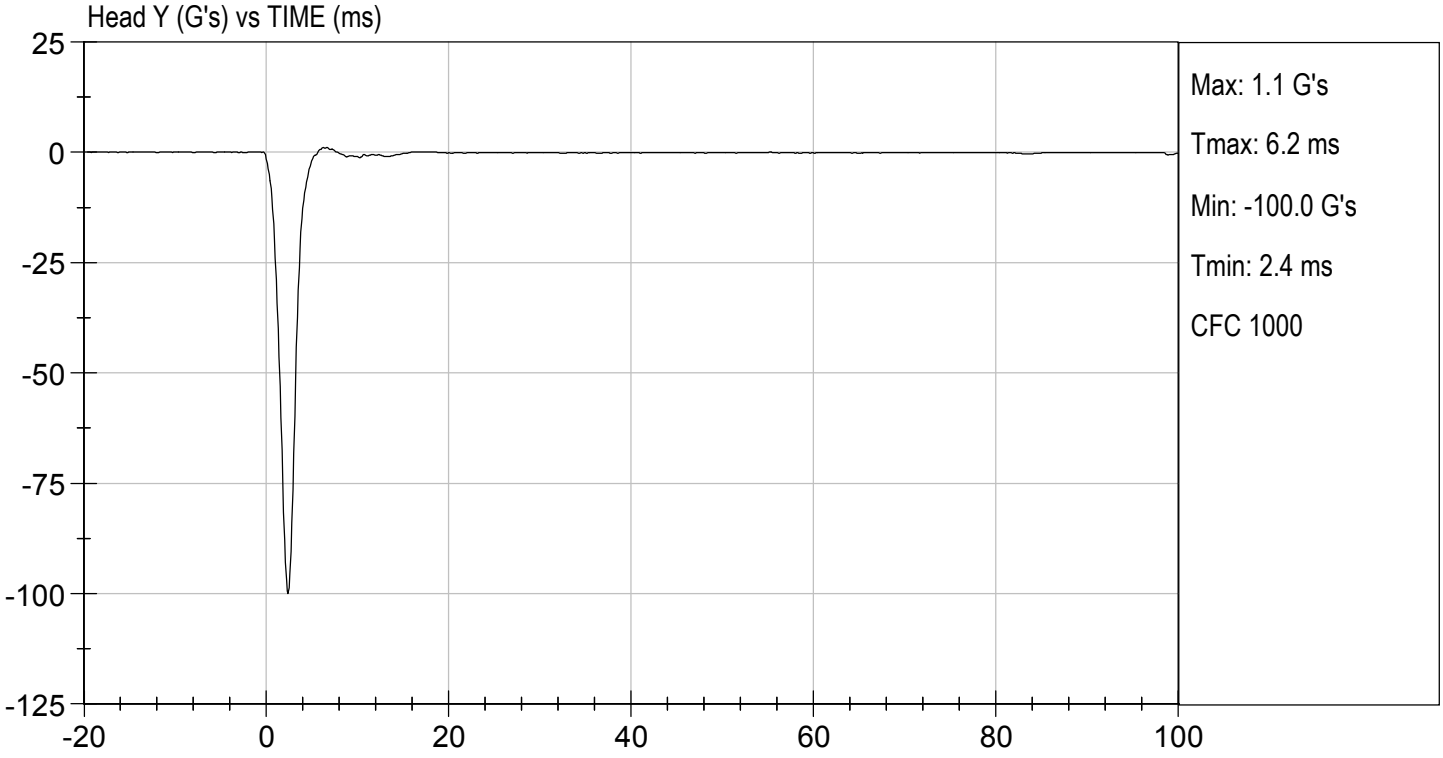
Approved By

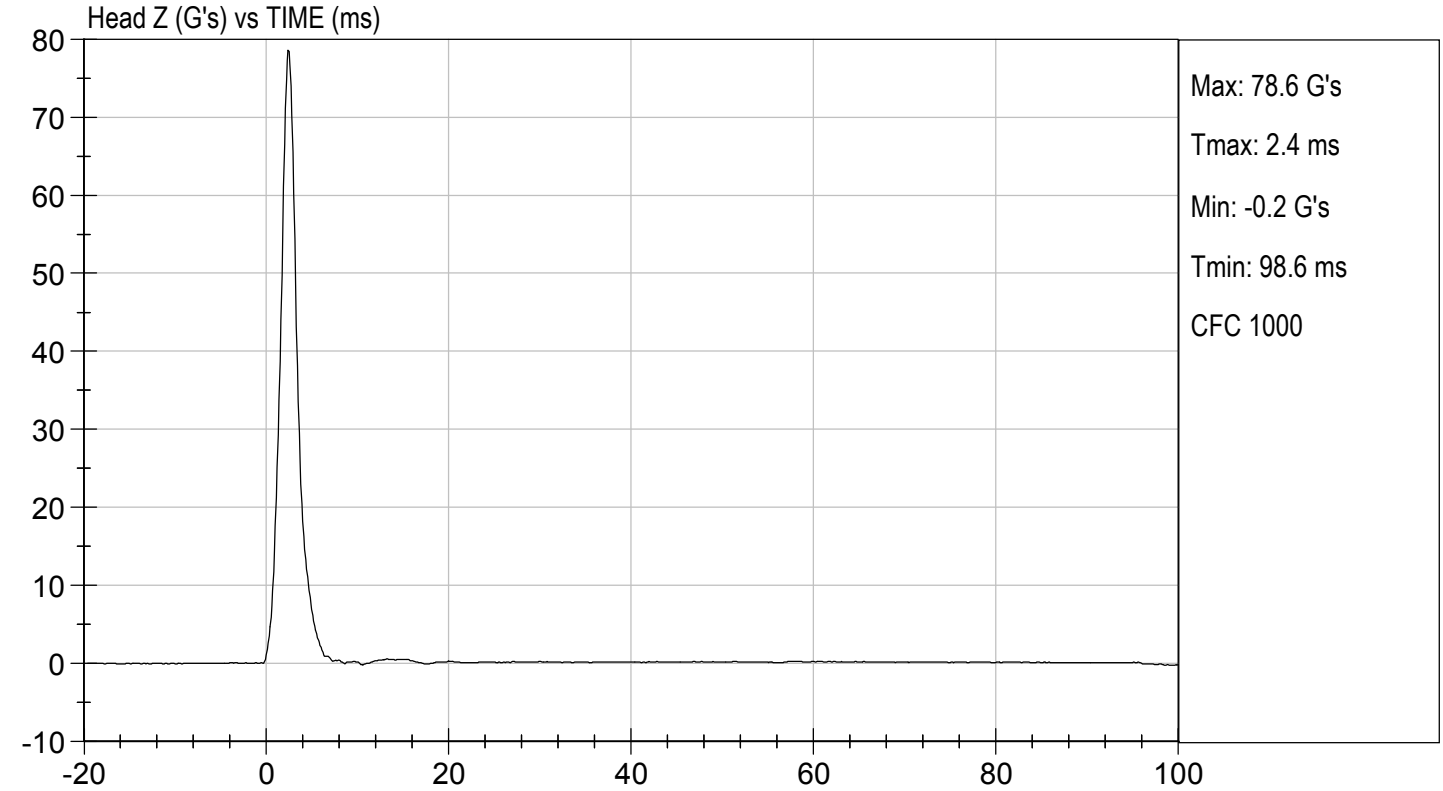

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)
150
125
100
75
50
25
0
-20
0
20
40
60
80
100
Max: 127.5 G's
Tmax: 2.4 ms
Min: 0.0 G's
Tmin: -1.6 ms
CFC 1000


Head X (G's) vs TIME (ms)
2
0
-2
-4
-6
-8
-10
-20
0
20
40
60
80
100
Max: 0.8 G's
Tmax: 7.4 ms
Min: -8.3 G's
Tmin: 2.4 ms
CFC 1000

TEST DESC: HEAD DROP

TEST DATE: 04/21/2021
TEST #: D211351



**MGA RESEARCH CORPORATION**

**LATERAL NECK PENDULUM TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211352

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Temperature | | deg C | 20.6 to 22.2 | 21 | Pass |
| Humidity | | % | 10 to 70 | 21 | Pass |
| Impact Velocity | | m/s | 5.51 to 5.63 | 5.52 | Pass |
| Pendulum Velocity | 10 ms | m/s | 2.20 to 2.80 | 2.70 | Pass |
| | 15 ms | m/s | 3.30 to 4.10 | 3.89 | Pass |
| | 20 ms | m/s | 4.40 to 5.40 | 5.26 | Pass |
| | 25 ms | m/s | 5.40 to 6.10 | 5.61 | Pass |
| | 25-100 ms | m/s | 5.50 to 6.20 | 5.66 | Pass |
| Maximum D-Plane Rotation | | deg | 71 to 81 | 74 | Pass |
| Time of Maximum D-Plane Rotation | | ms | 50 to 70 | 61 | Pass |
| Maximum Occipital Condyle Moment | | Nm | -44 to -36 | -38 | Pass |
| Time of Moment Decay to 0 Nm | | ms | 102 to 126 | 119 | Pass |
| | | | Overall Test Results | | Pass |

Laboratory Technician

04/21/2021

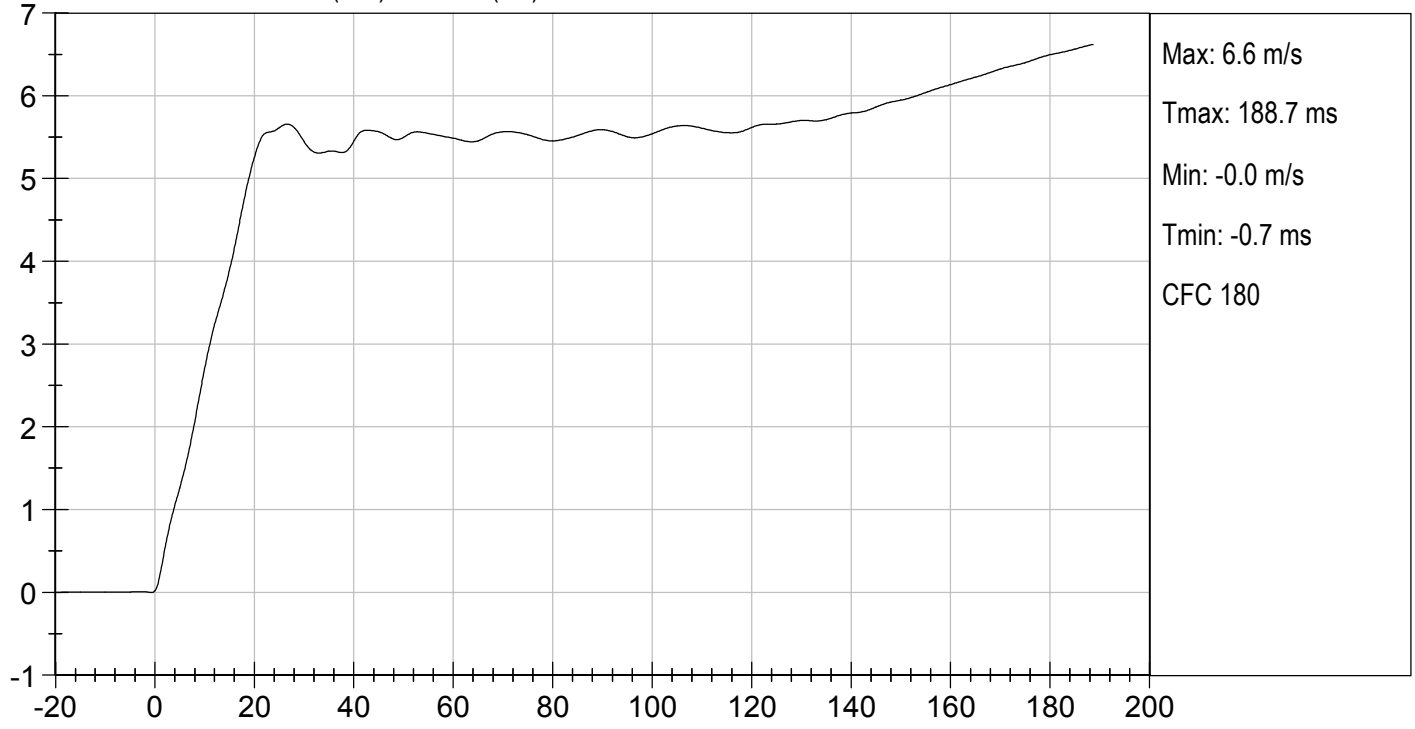
Test Date

Approved By

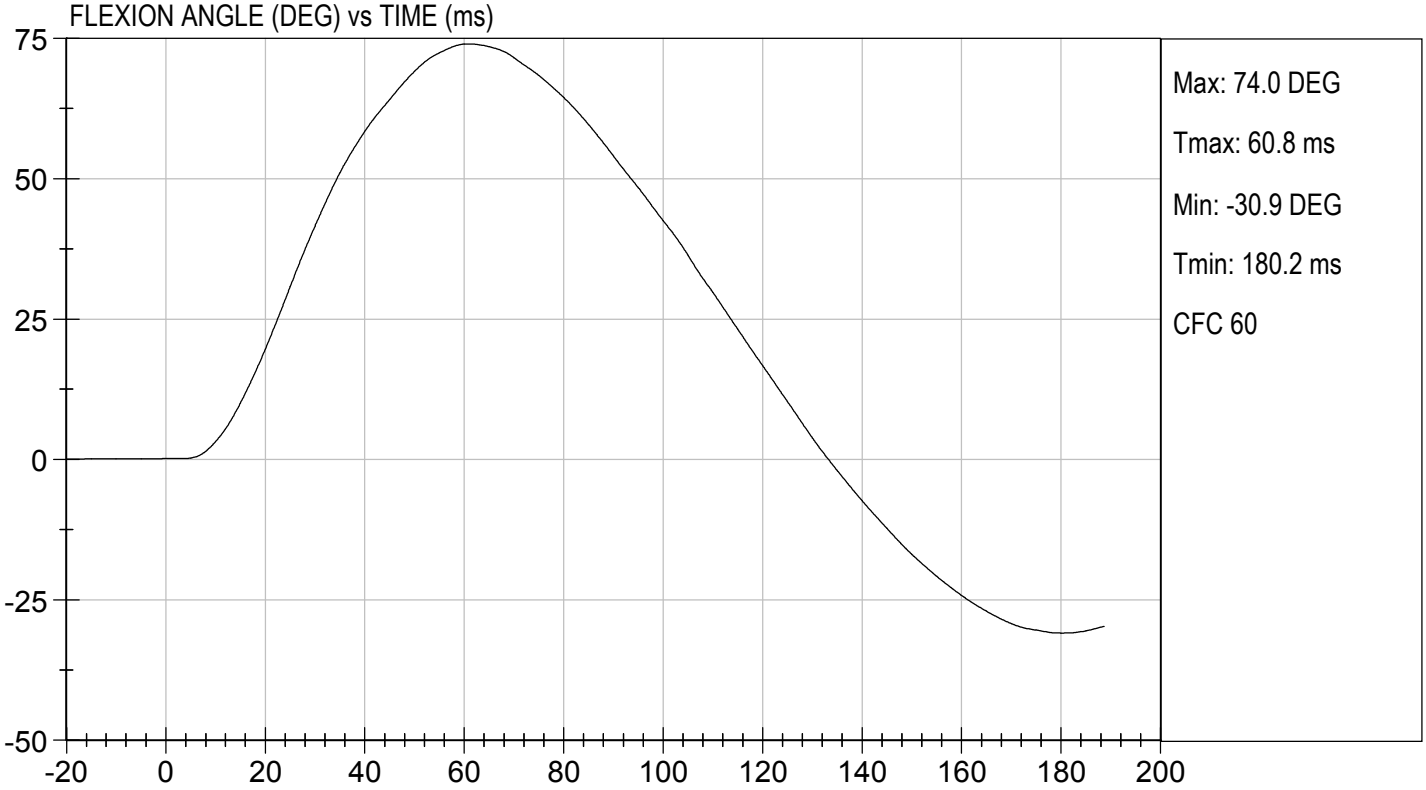
TEST DESC: NECK BENDING
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 04/21/2021
TEST #: D211352

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

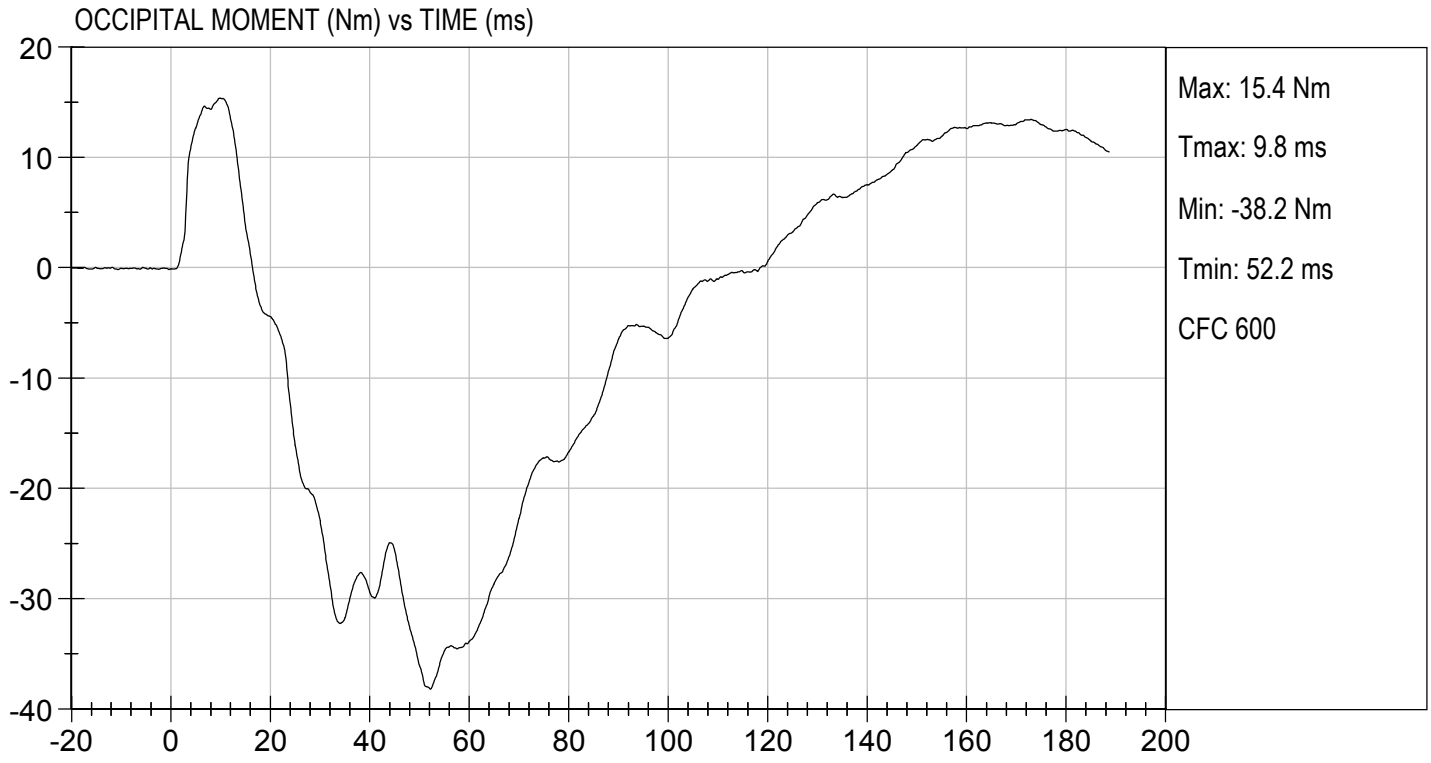



FLEXION ANGLE (DEG) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 04/21/2021
TEST #: D211352



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test ID:** D211353

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 21.4 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.30 | Pass |
| Maximum Probe Acceleration | G's | 13 to 18 | 15 | Pass |
| Shoulder Displacement | mm | 28 to 37 | 31 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 17 to 22 | 19 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

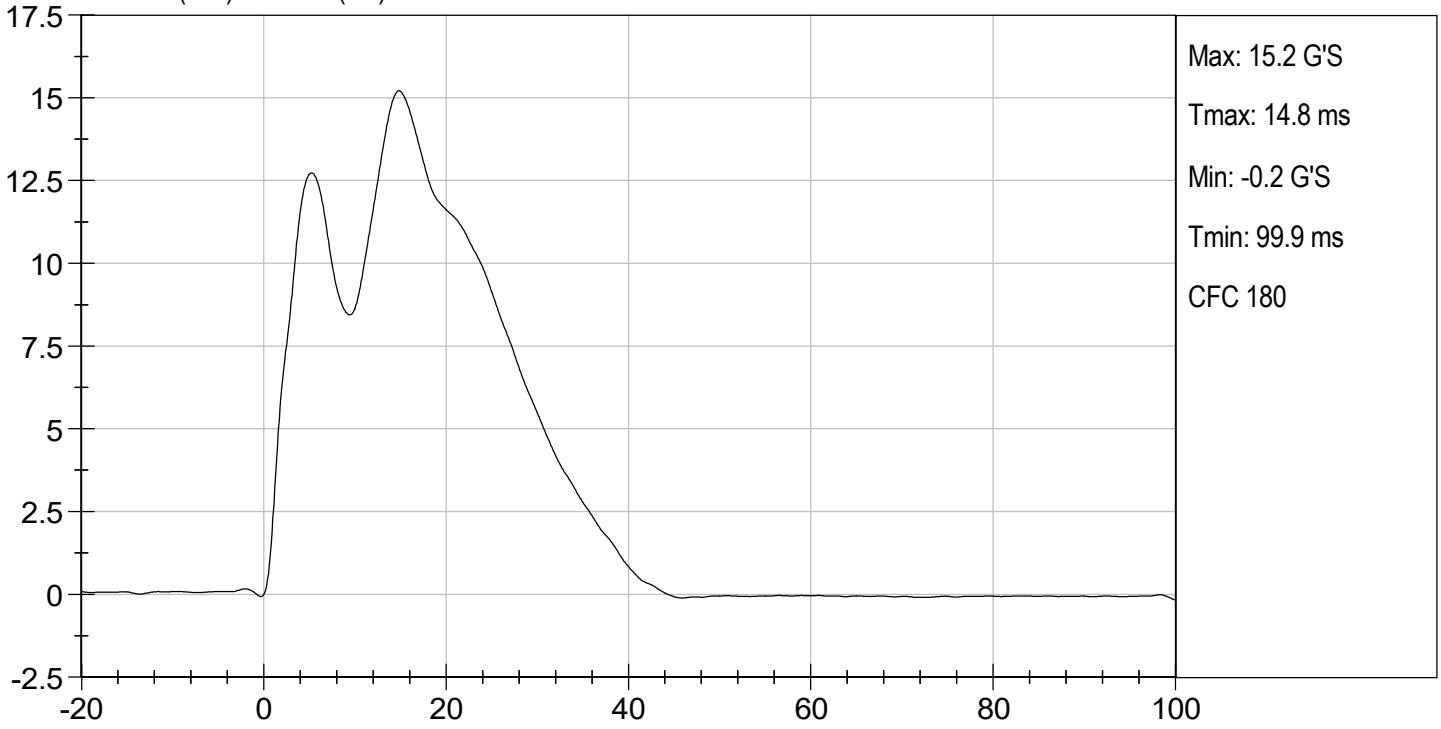
04/20/2021
Test Date

Approved By

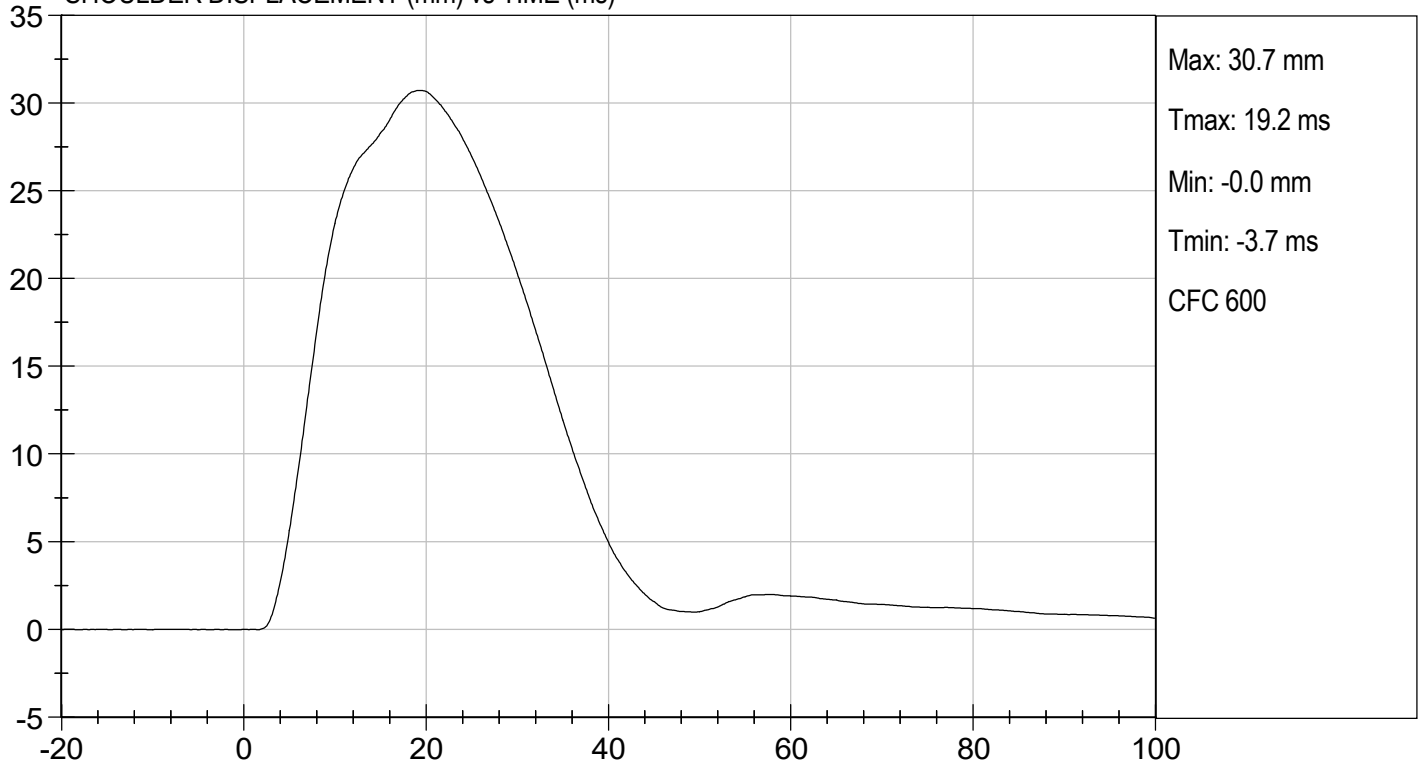
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 04/20/2021
TEST #: D211353

PROBE (G'S) vs TIME (ms)



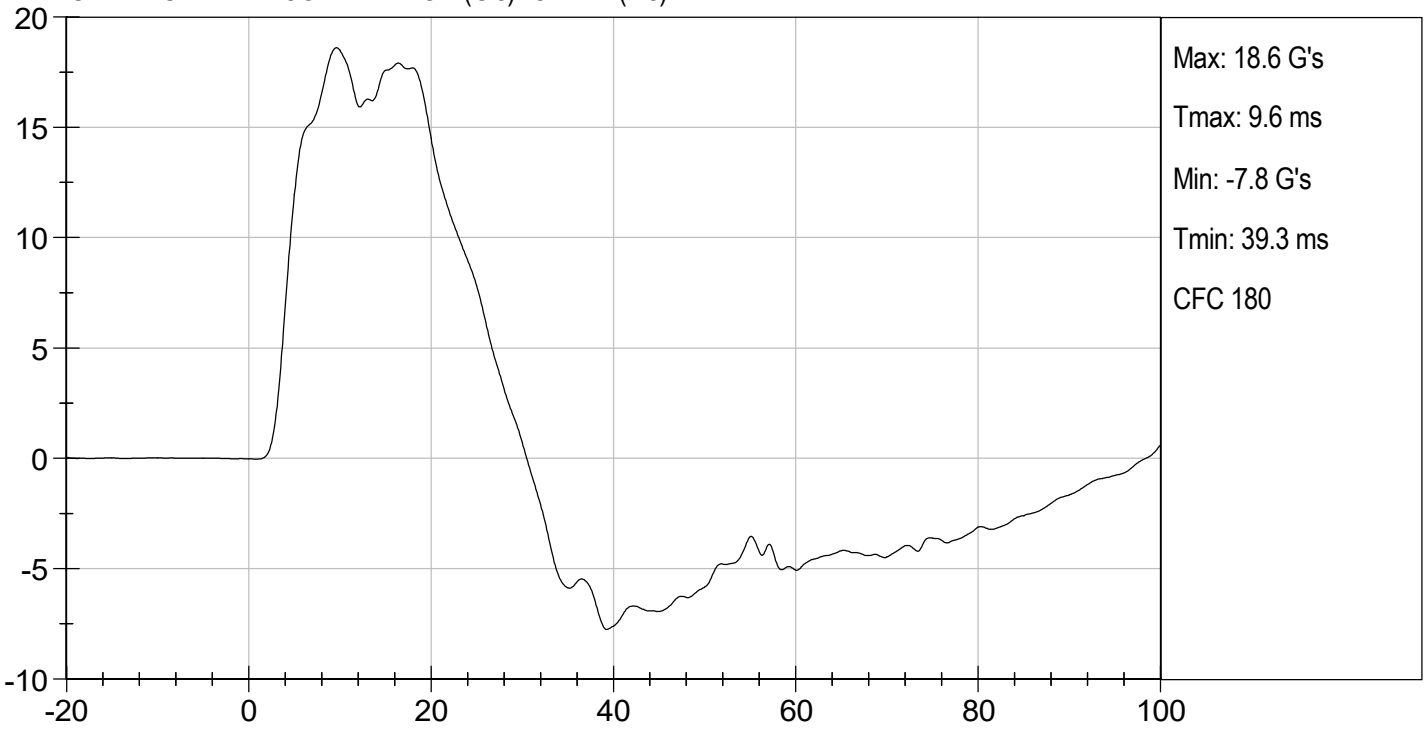

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: SHOULDER IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 04/20/2021
TEST #: D211353

UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**THORAX (WITH ARM) IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211354

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Humidity | % | 10 to 70 | 21.4 | Pass |
| Impact Velocity | m/s | 6.60 to 6.80 | 6.60 | Pass |
| Maximum Probe Acceleration | G's | 30 to 36 | 34 | Pass |
| Shoulder Displacement | mm | 31 to 40 | 37 | Pass |
| Upper Rib Displacement | mm | 25 to 32 | 29 | Pass |
| Middle Rib Displacement | mm | 30 to 36 | 31 | Pass |
| Lower Rib Displacement | mm | 32 to 38 | 33 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 34 to 43 | 39 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 29 to 37 | 34 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

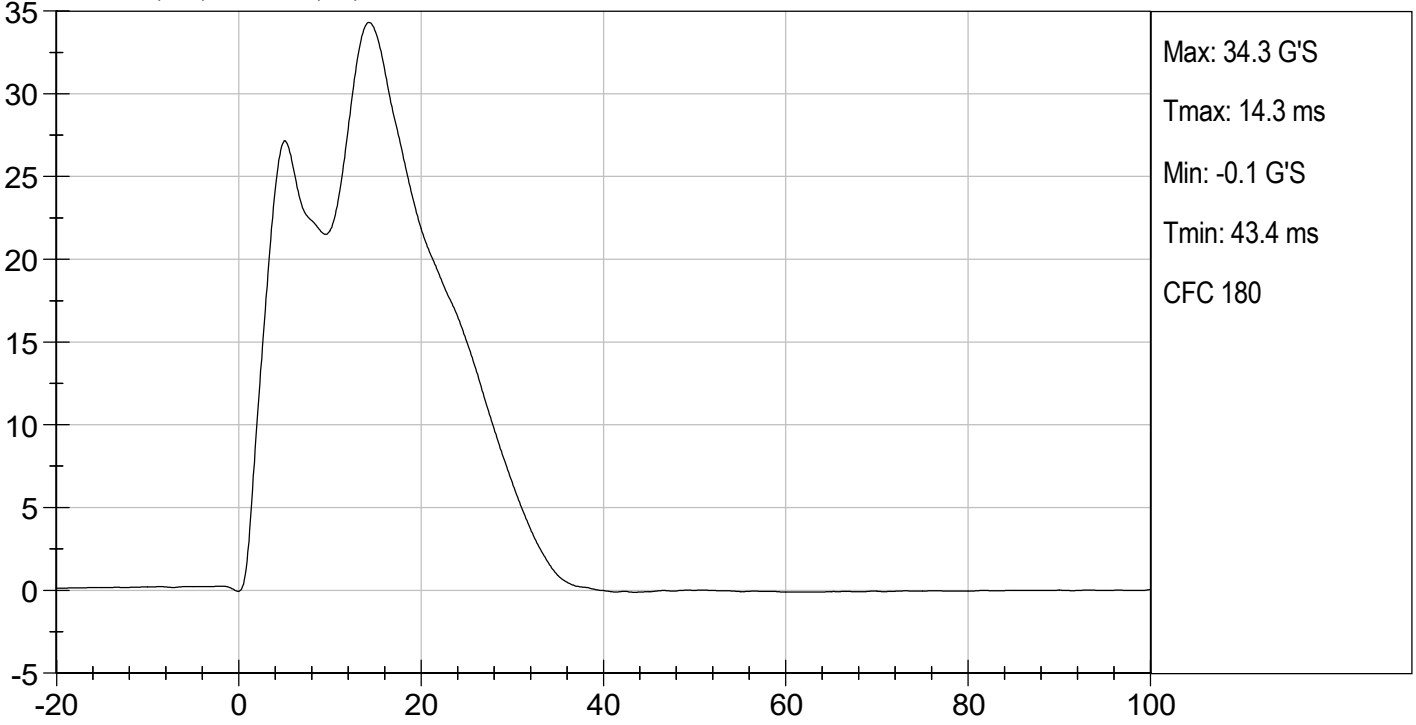
04/20/2021
Test Date

Approved By

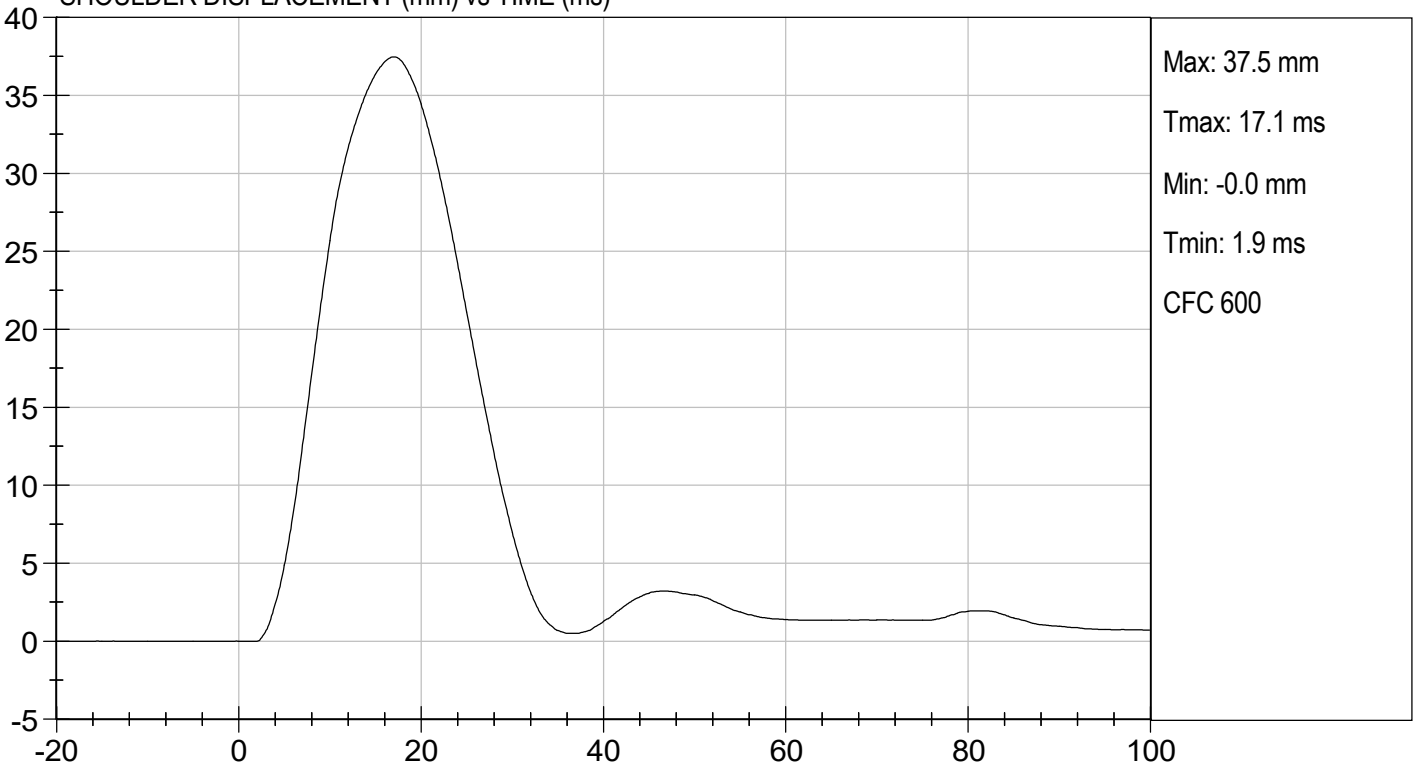
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 04/20/2021
TEST #: D211354

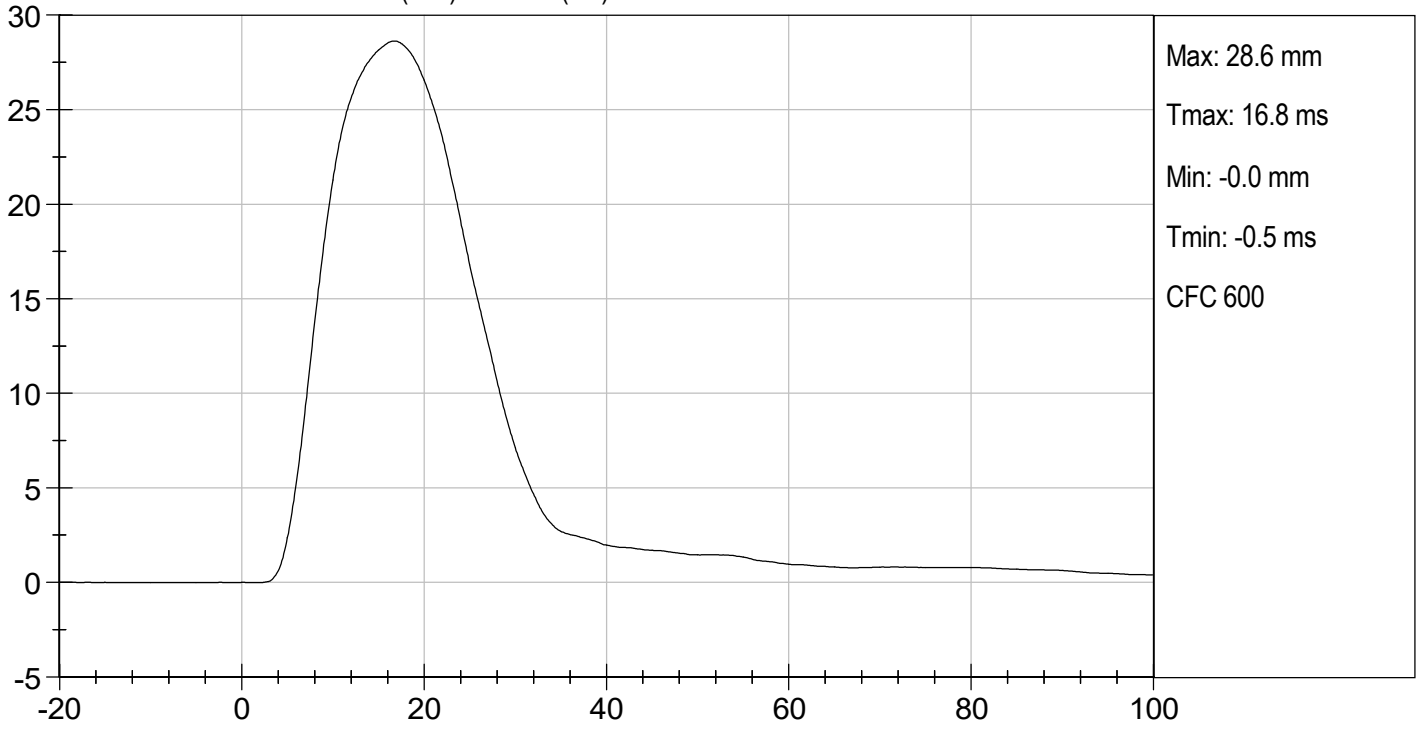
PROBE (G'S) vs TIME (ms)



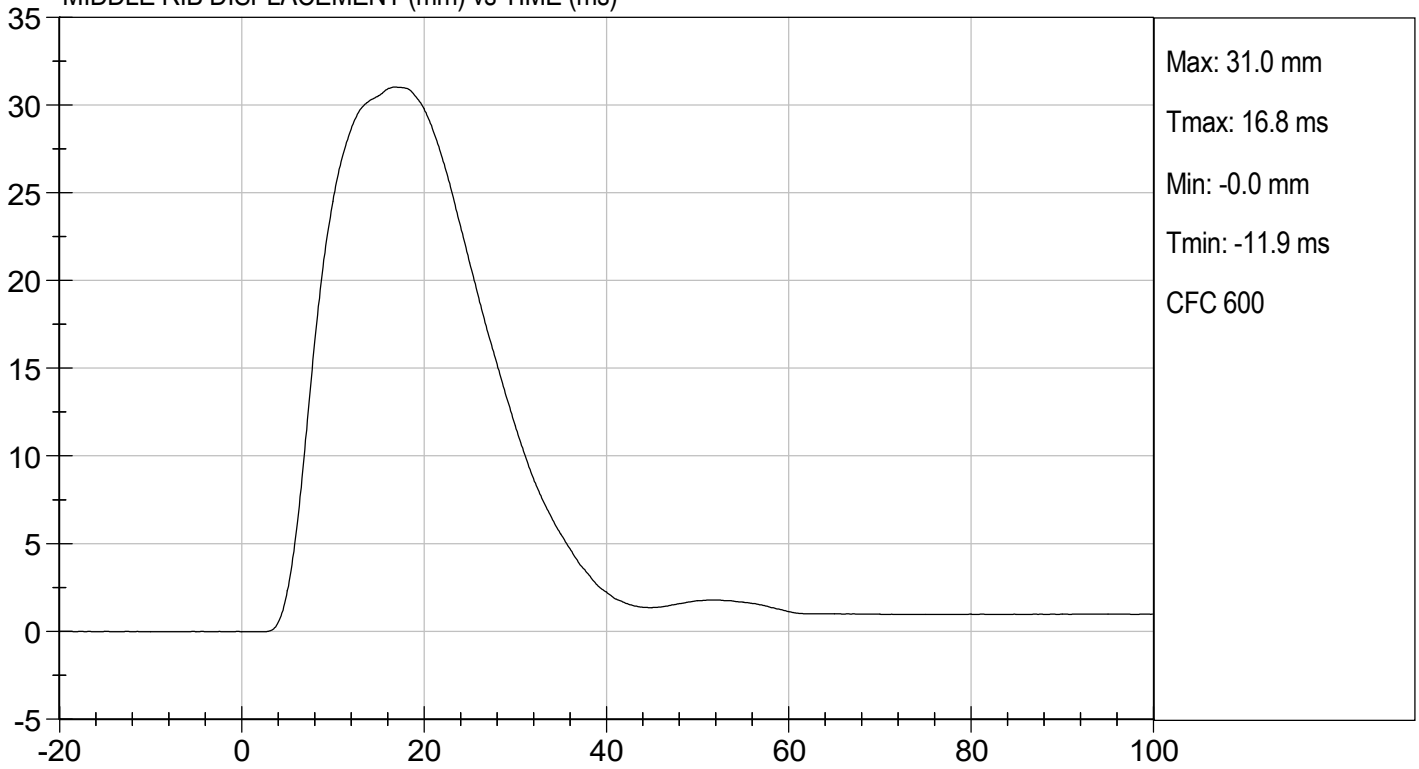

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



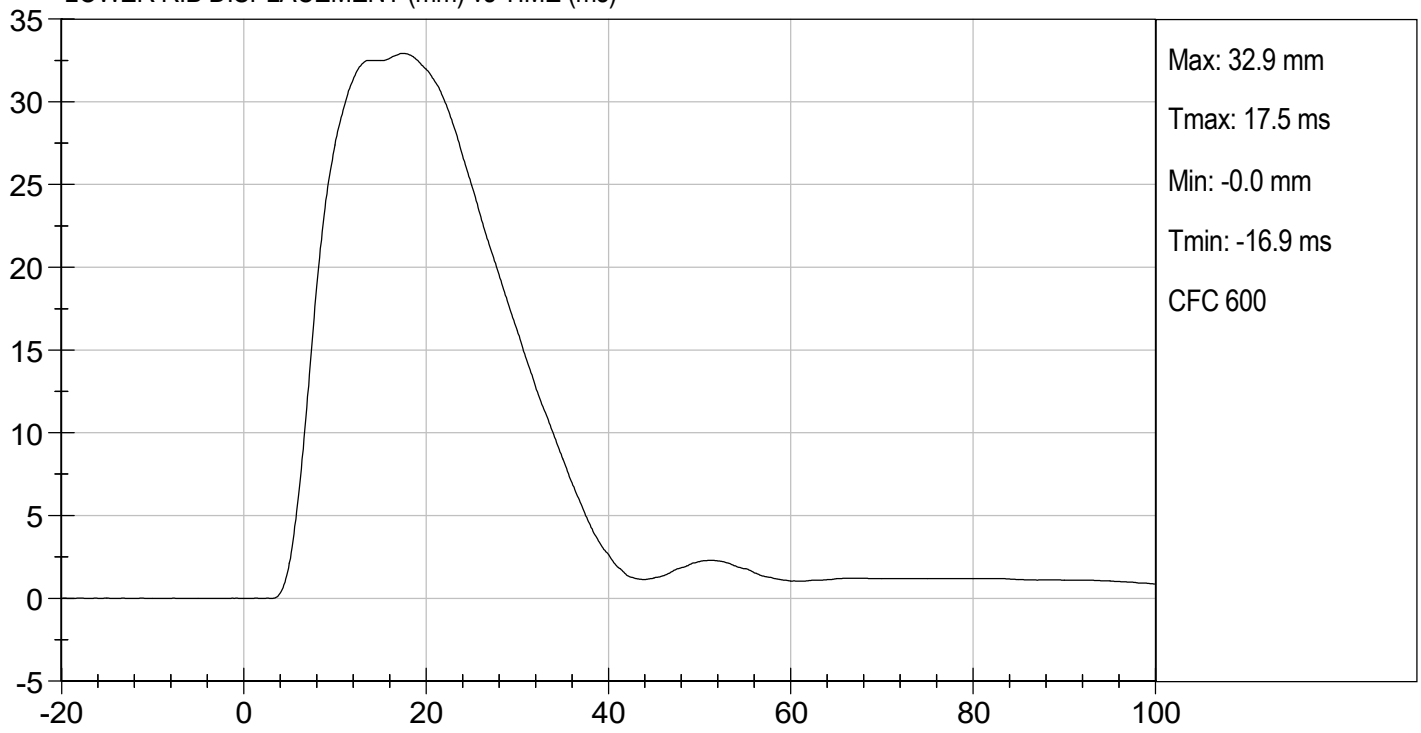

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



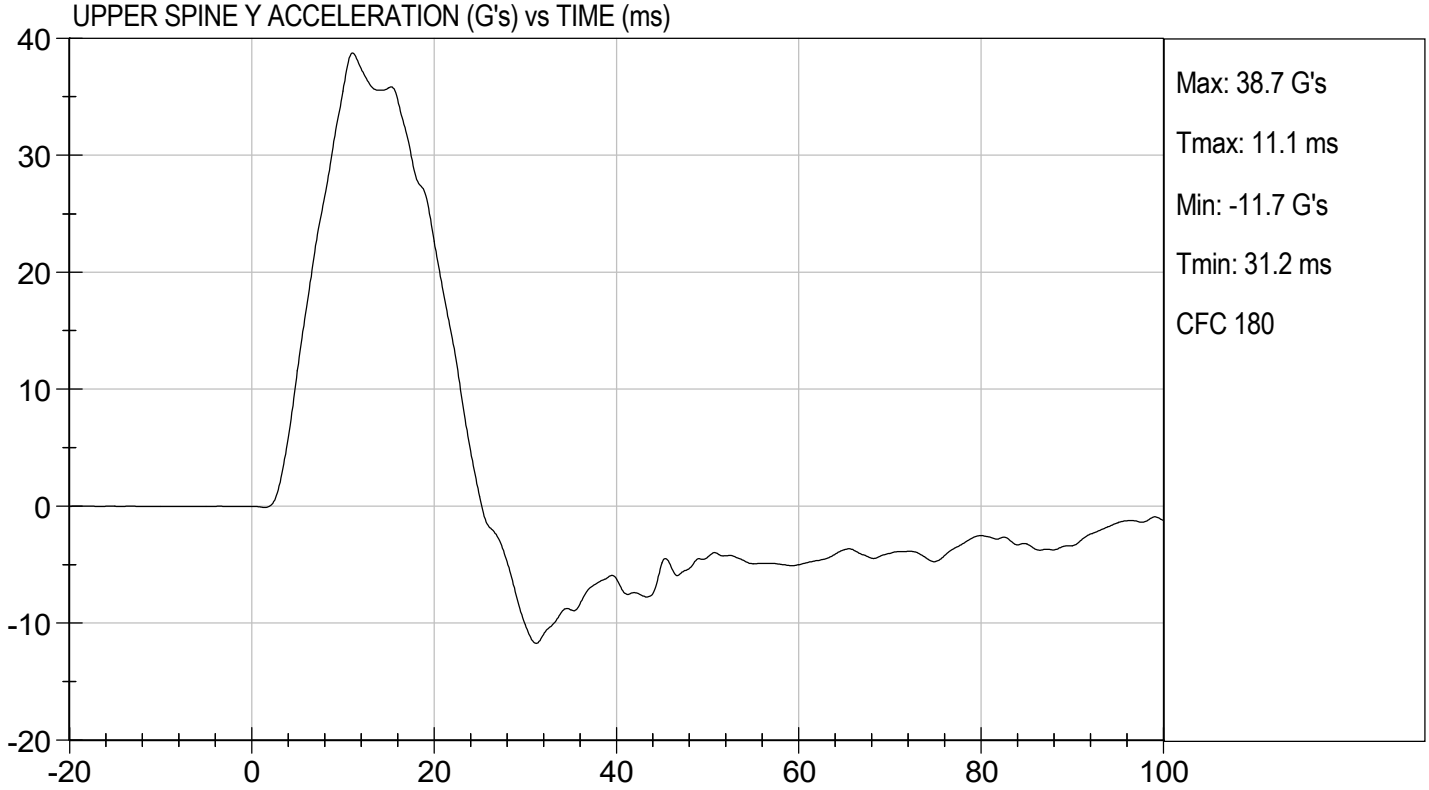
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 04/20/2021
TEST #: D211354

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

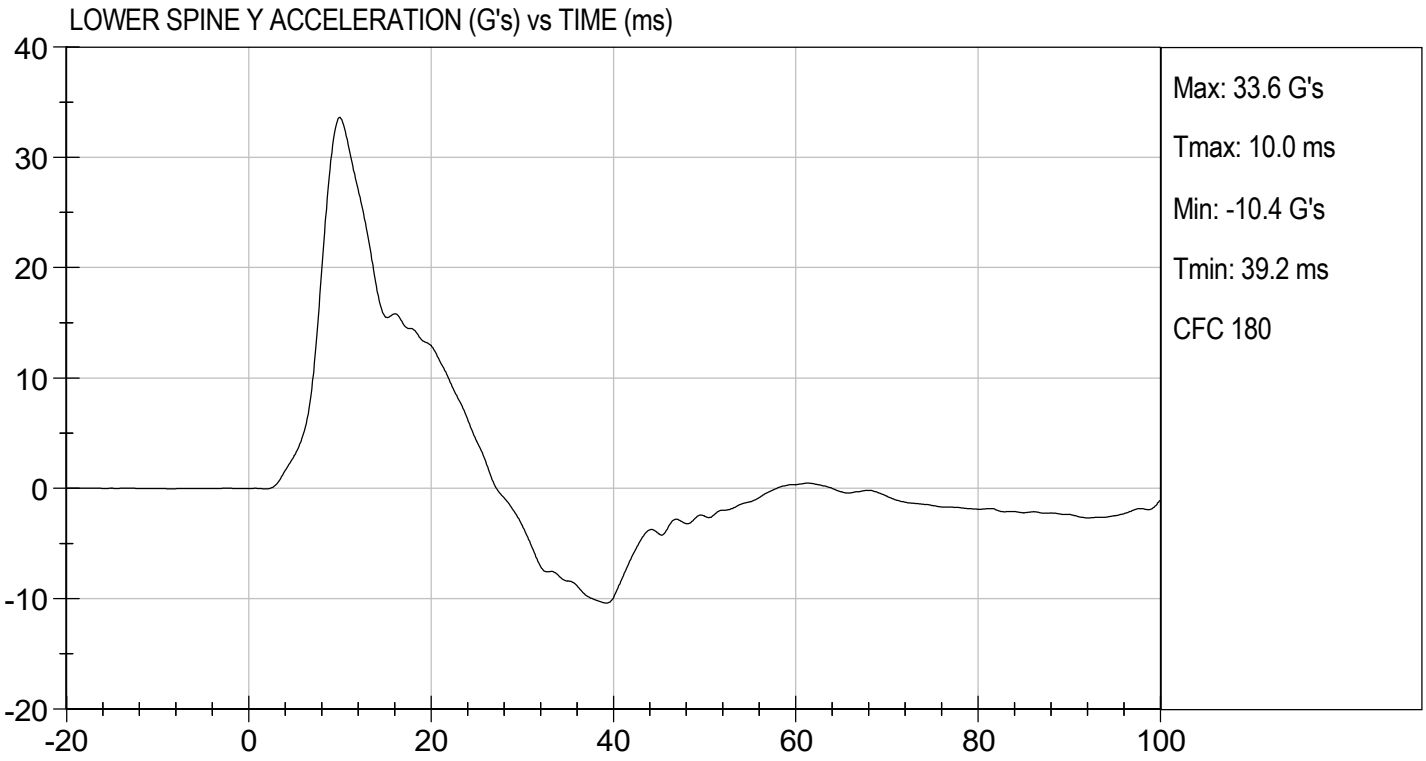



UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 04/20/2021
TEST #: D211354



**MGA RESEARCH CORPORATION**

**THORAX (WITHOUT ARM) IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211355

| 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 | 4.23 | Pass |
| Maximum Probe Acceleration | G's | 14 to 18 | 14 | Pass |
| Upper Rib Displacement | mm | 32 to 40 | 40 | Pass |
| Middle Rib Displacement | mm | 39 to 45 | 42 | Pass |
| Lower Rib Displacement | mm | 35 to 43 | 37 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 13 to 17 | 15 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 7 to 11 | 9 | Pass |
| | | Overall Test Results | | Pass |

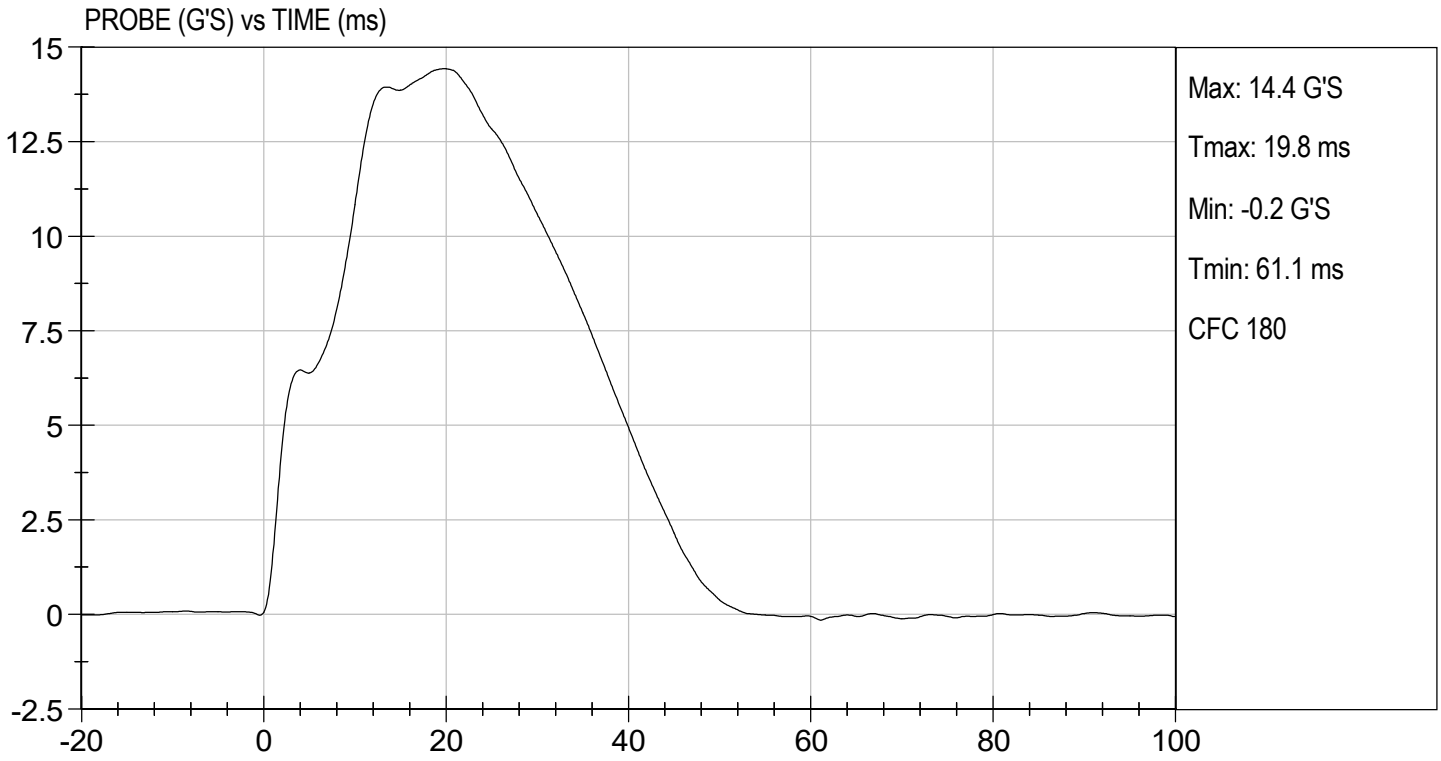
Laboratory Technician

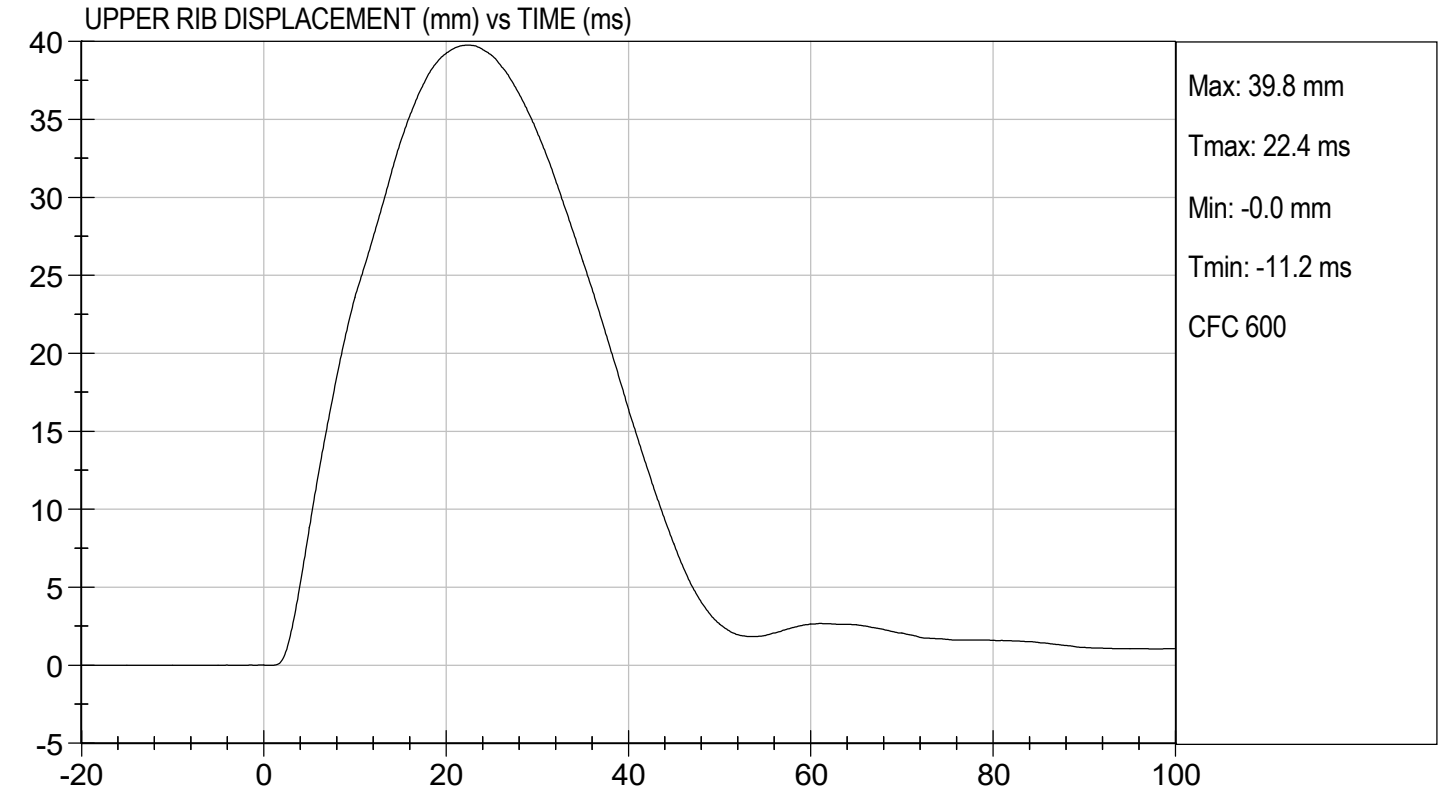
04/21/2021
Test Date

Approved By

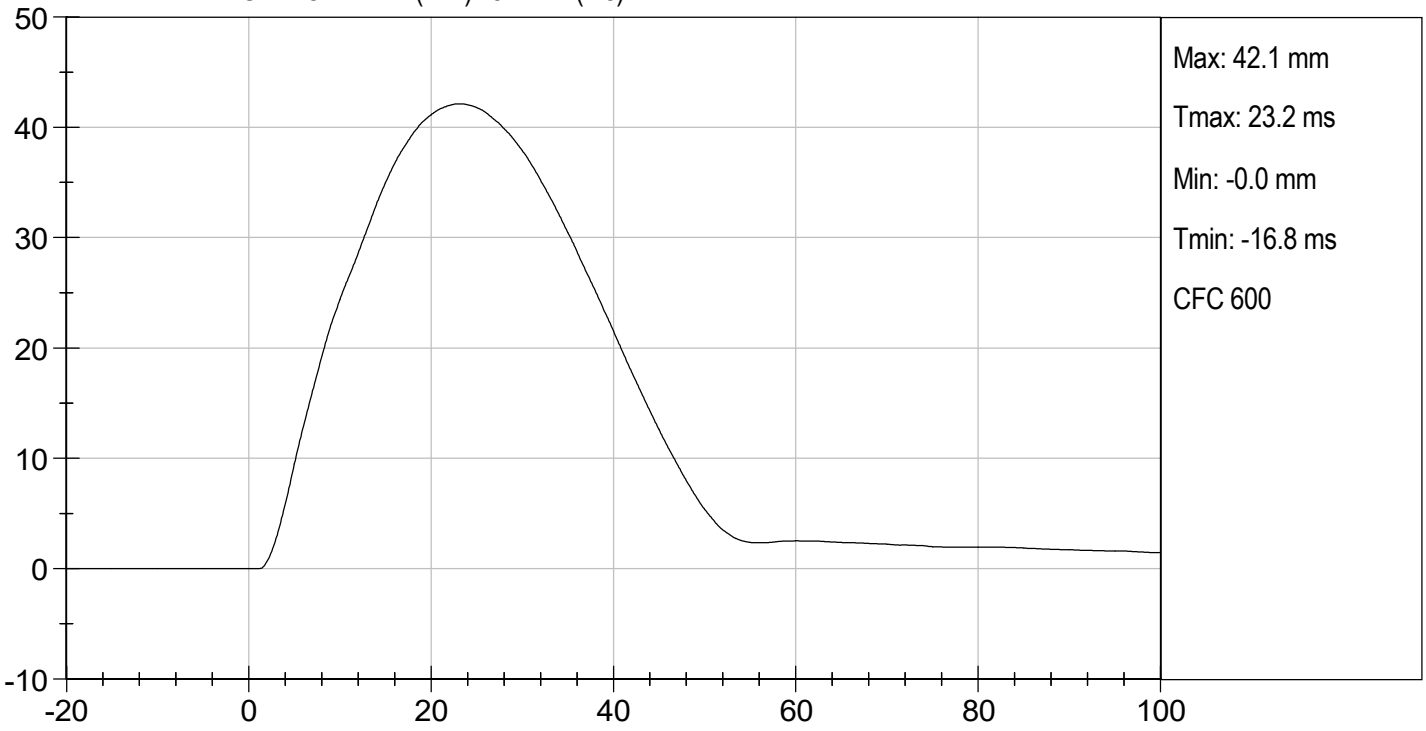
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 04/21/2021
TEST #: D211355

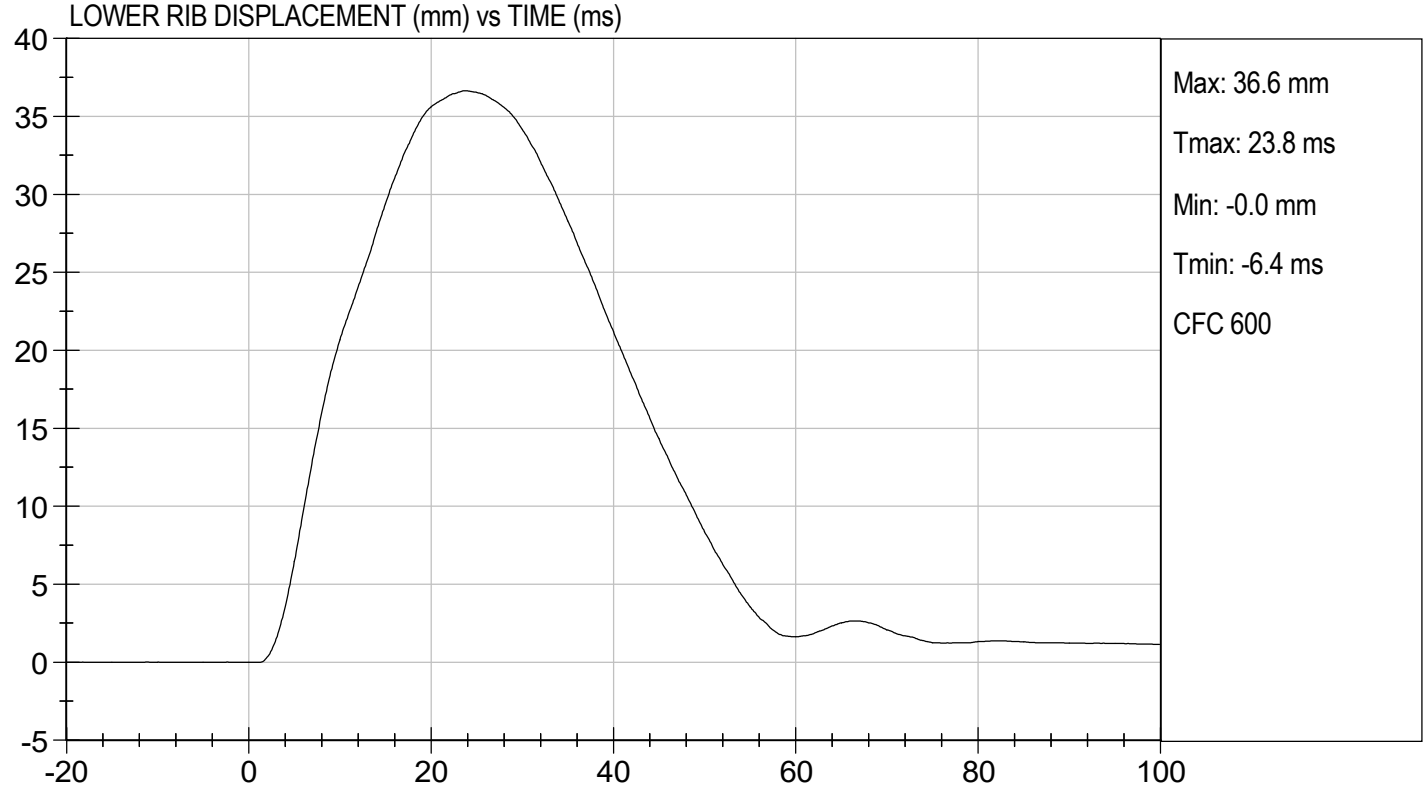


MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)

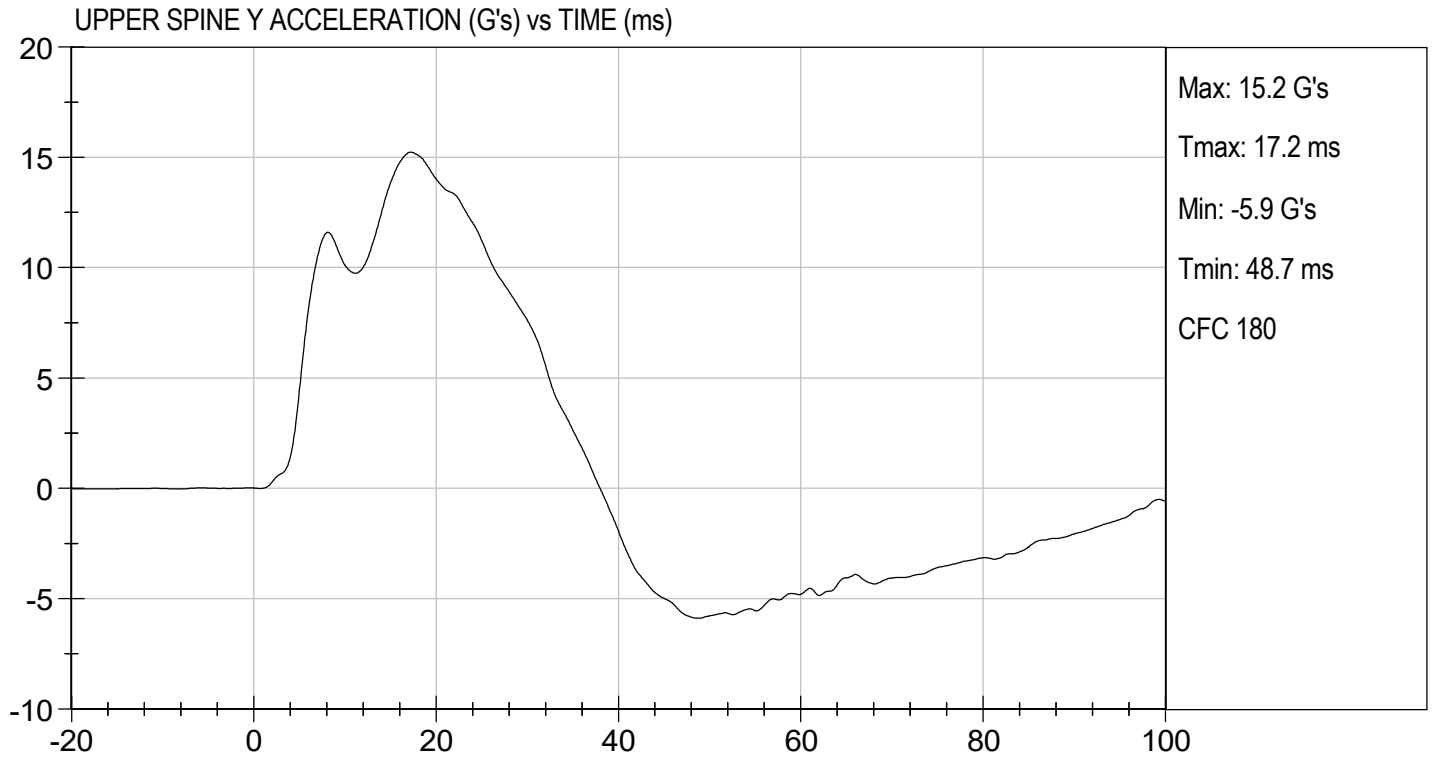


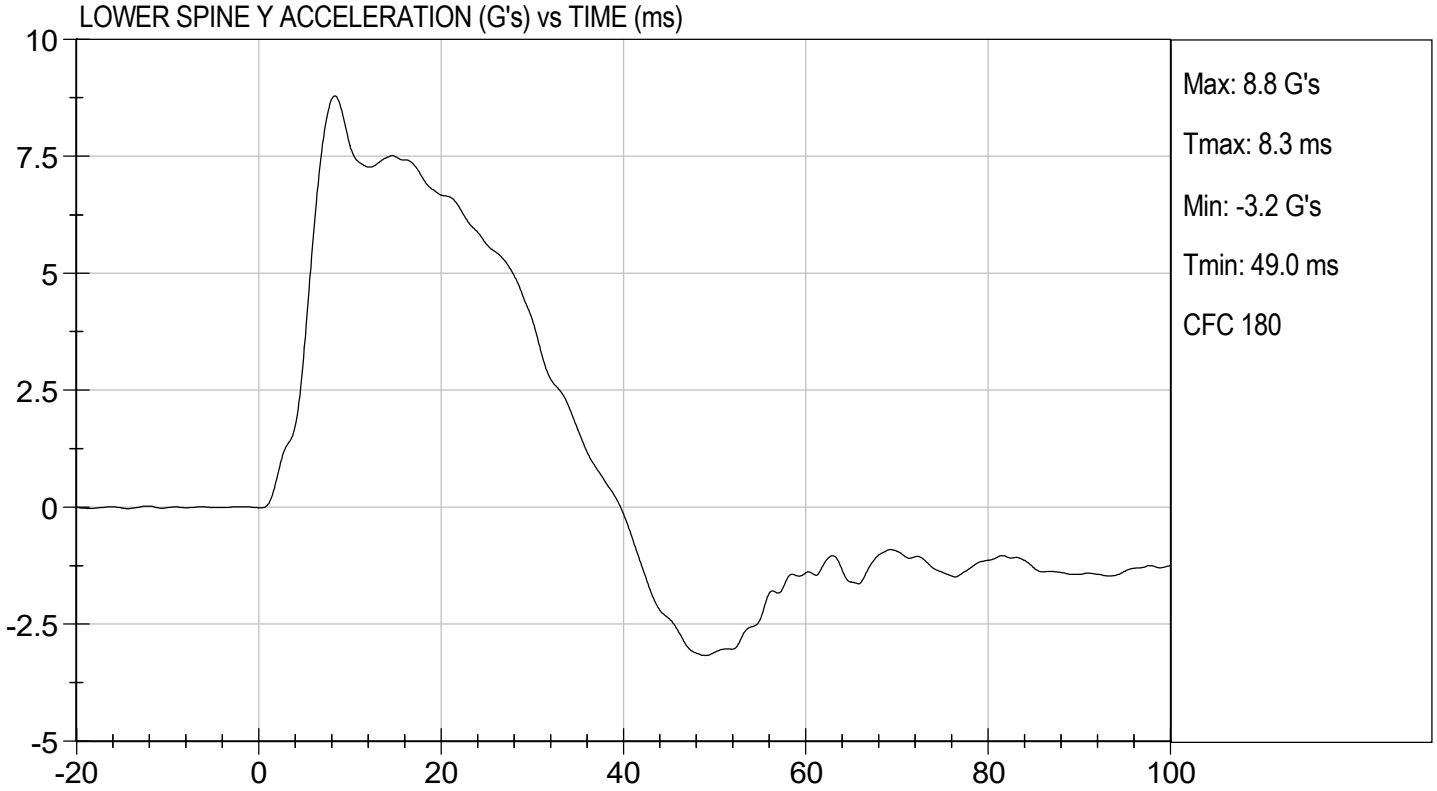

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 04/21/2021
TEST #: D211355



**MGA RESEARCH CORPORATION**

**ABDOMINAL IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211356

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Humidity | % | 10 to 70 | 21.4 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.23 | Pass |
| Maximum Probe Acceleration | G's | 12 to 16 | 14 | Pass |
| Upper Abdomen Rib Displacement | mm | 36 to 47 | 43 | Pass |
| Lower Abdomen Rib Displacement | mm | 33 to 44 | 38 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 9 to 14 | 11 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

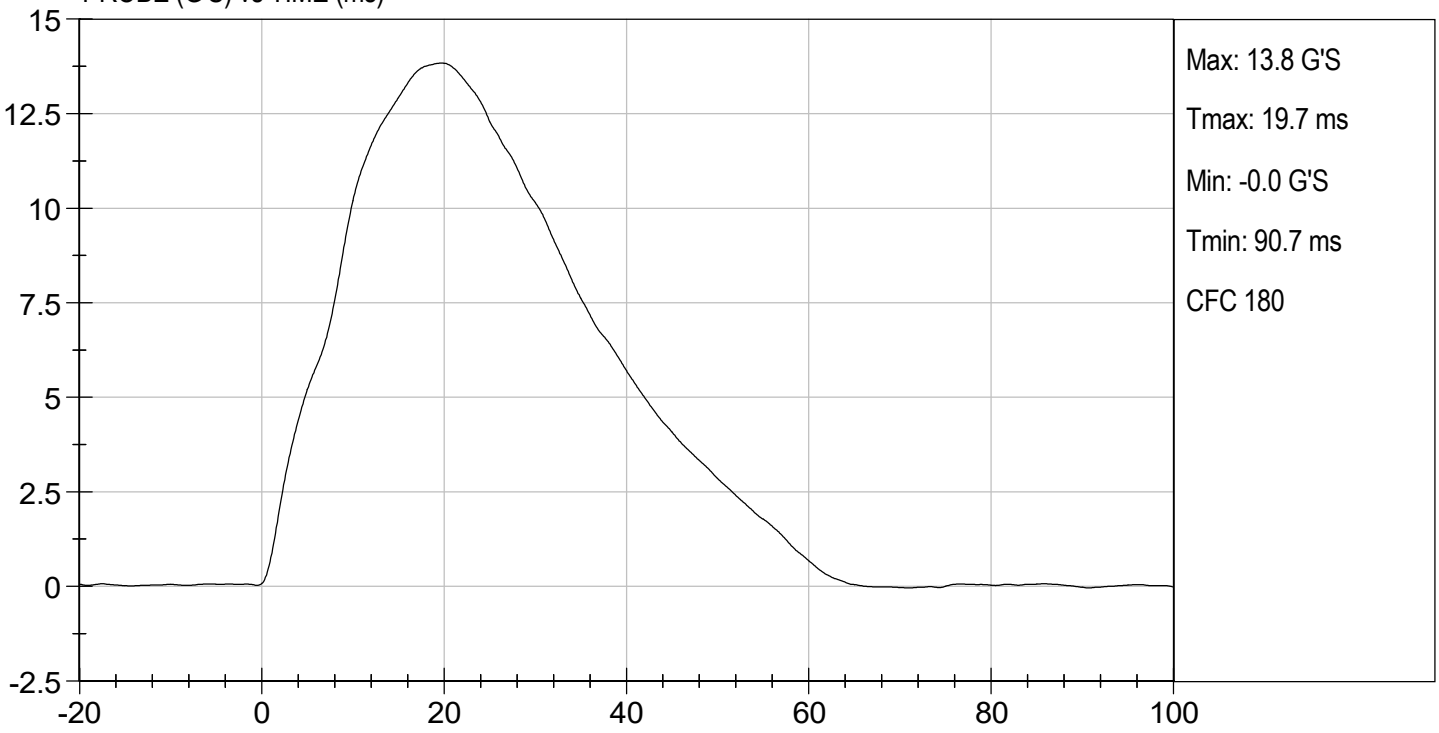
04/20/2021
Test Date

Approved By

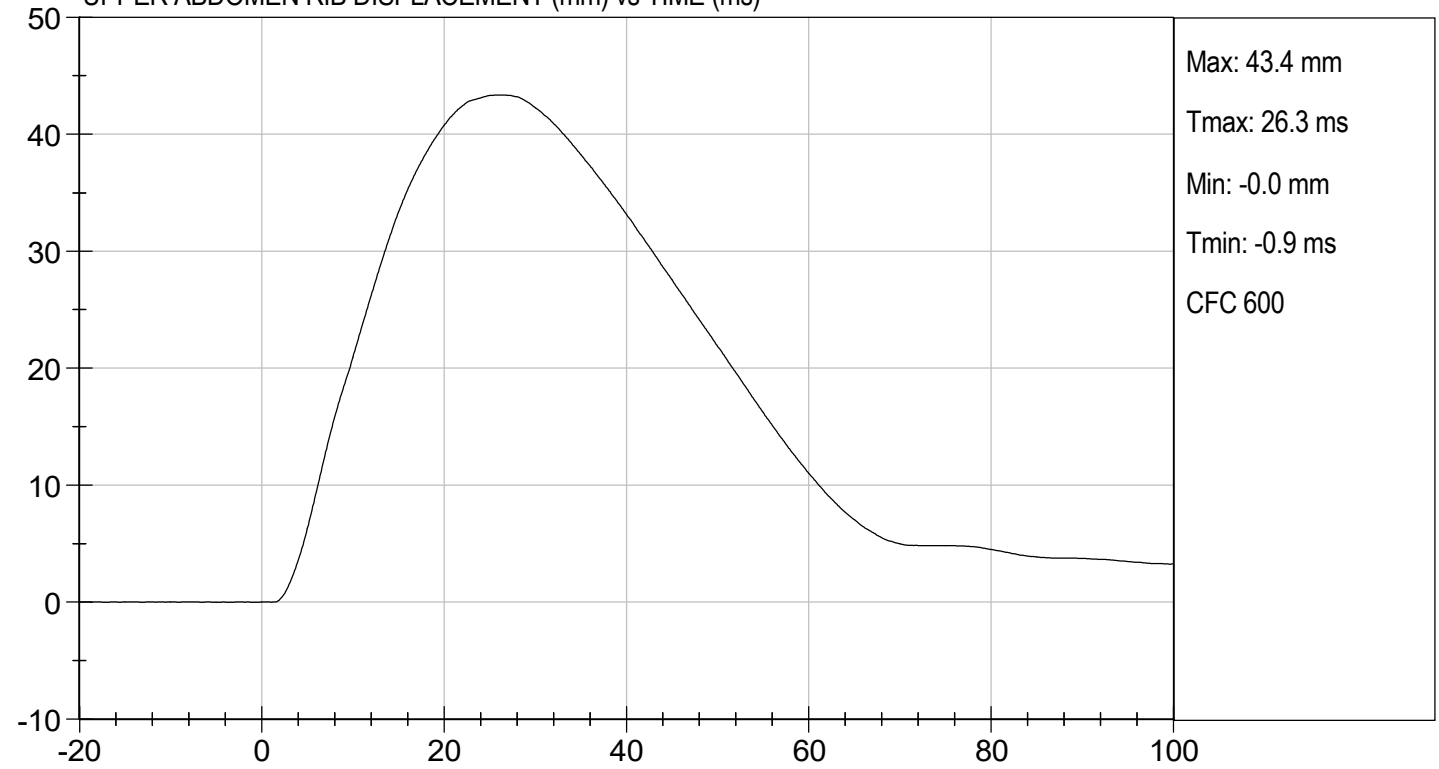
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.88 ft/s, 4.23 m/s

TEST DATE: 04/20/2021
TEST #: D211356

PROBE (G'S) vs TIME (ms)



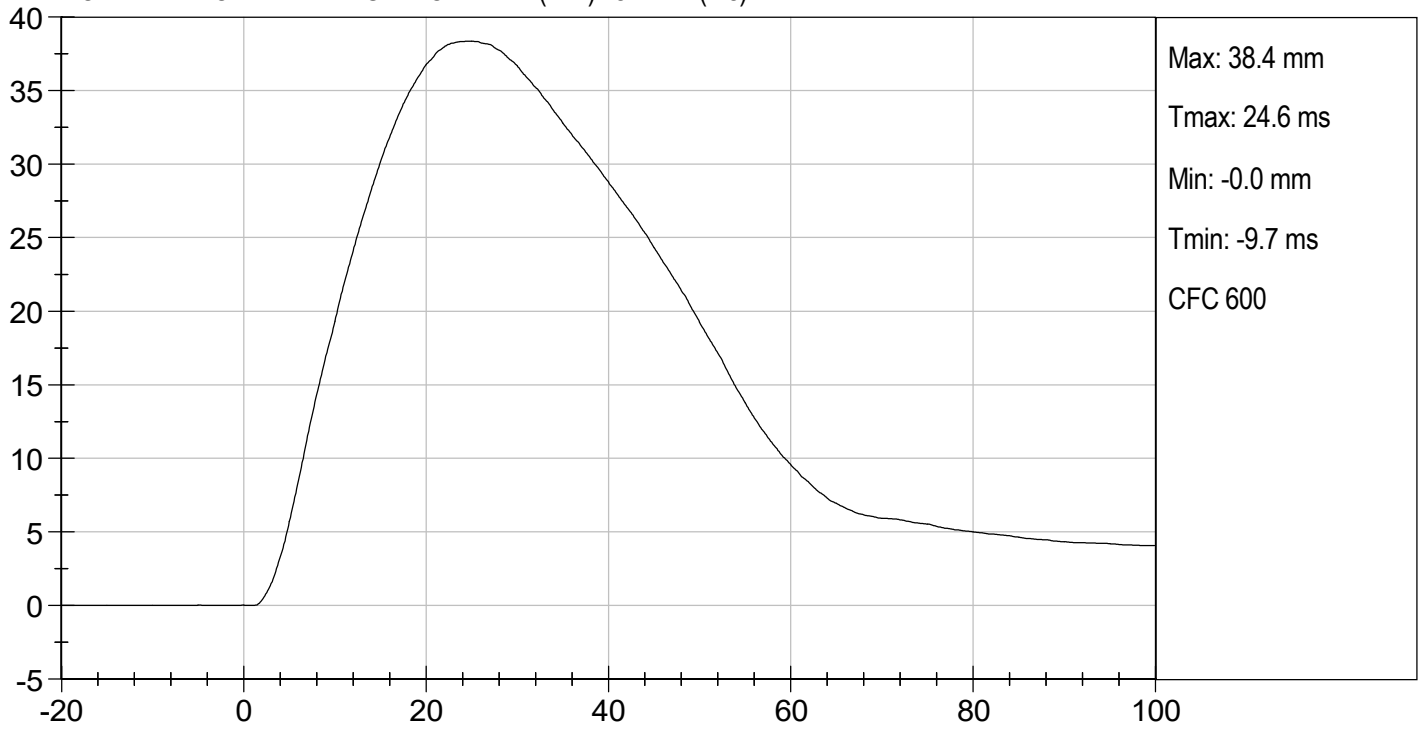

UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



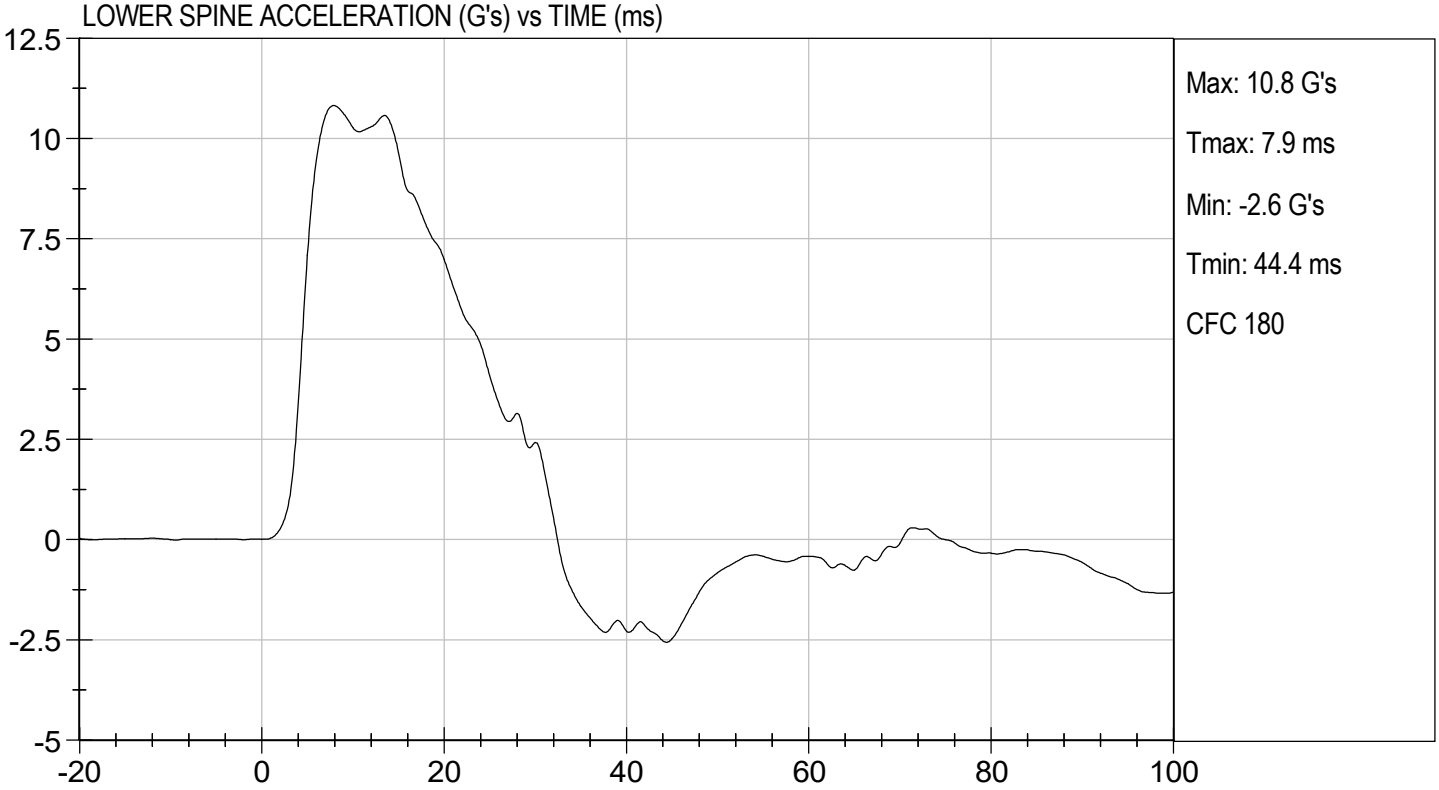
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.88 ft/s, 4.23 m/s

TEST DATE: 04/20/2021
TEST #: D211356

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)




LOWER SPINE ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**PELVIS IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211357

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Humidity | % | 10 to 70 | 21.4 | Pass |
| Impact Velocity | m/s | 6.60 to 6.80 | 6.61 | Pass |
| Maximum Probe Acceleration | G's | 38 to 47 | 44 | Pass |
| Pelvis Y Acceleration After 6 ms | G's | 34 to 42 | 41 | Pass |
| Peak Acetabulum Force | N | 3600 to 4300 | 3,762 | Pass |
| | | Overall Test Results | | Pass |

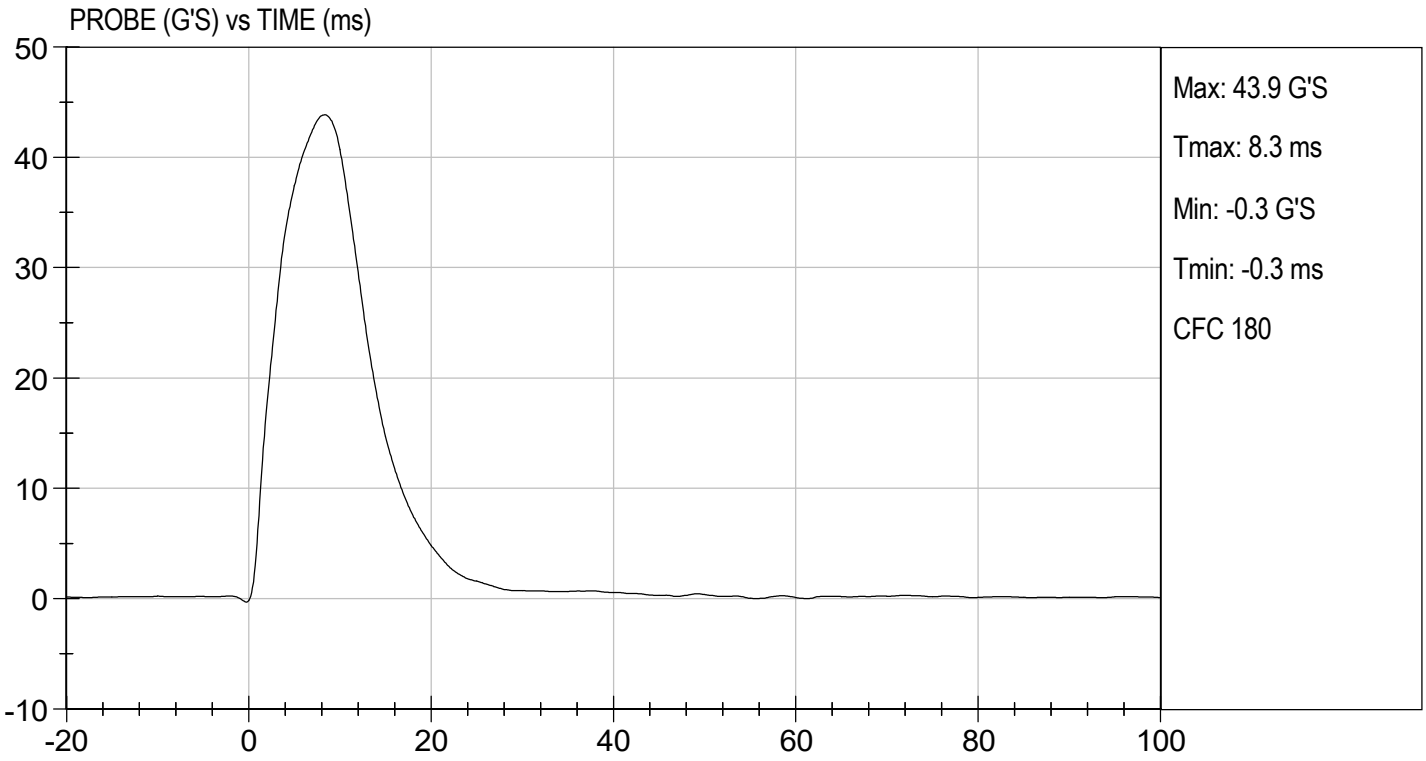
Laboratory Technician

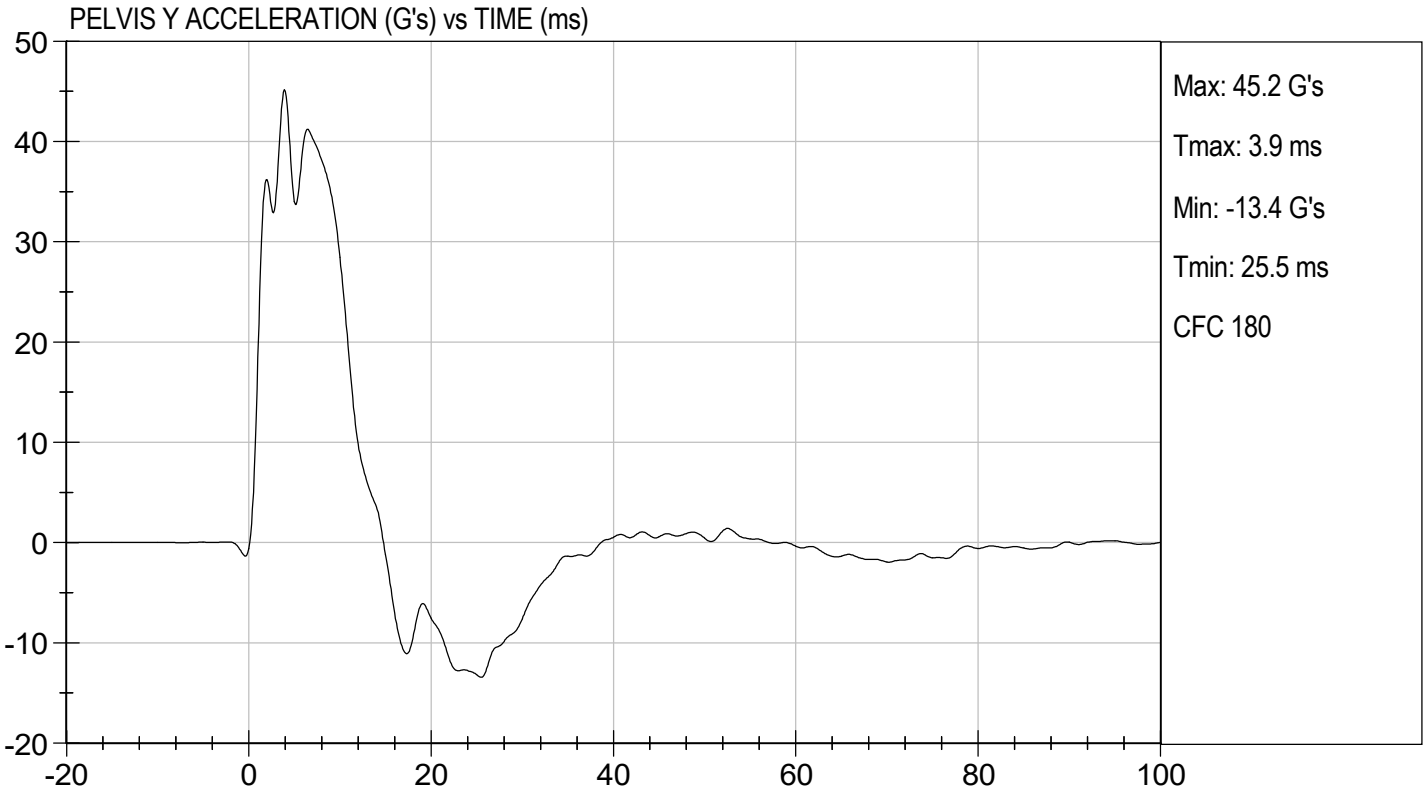
04/20/2021
Test Date

Approved By

TEST DESC: PELVIS IMPACT
VELOCITY: 21.67 ft/s, 6.61 m/s

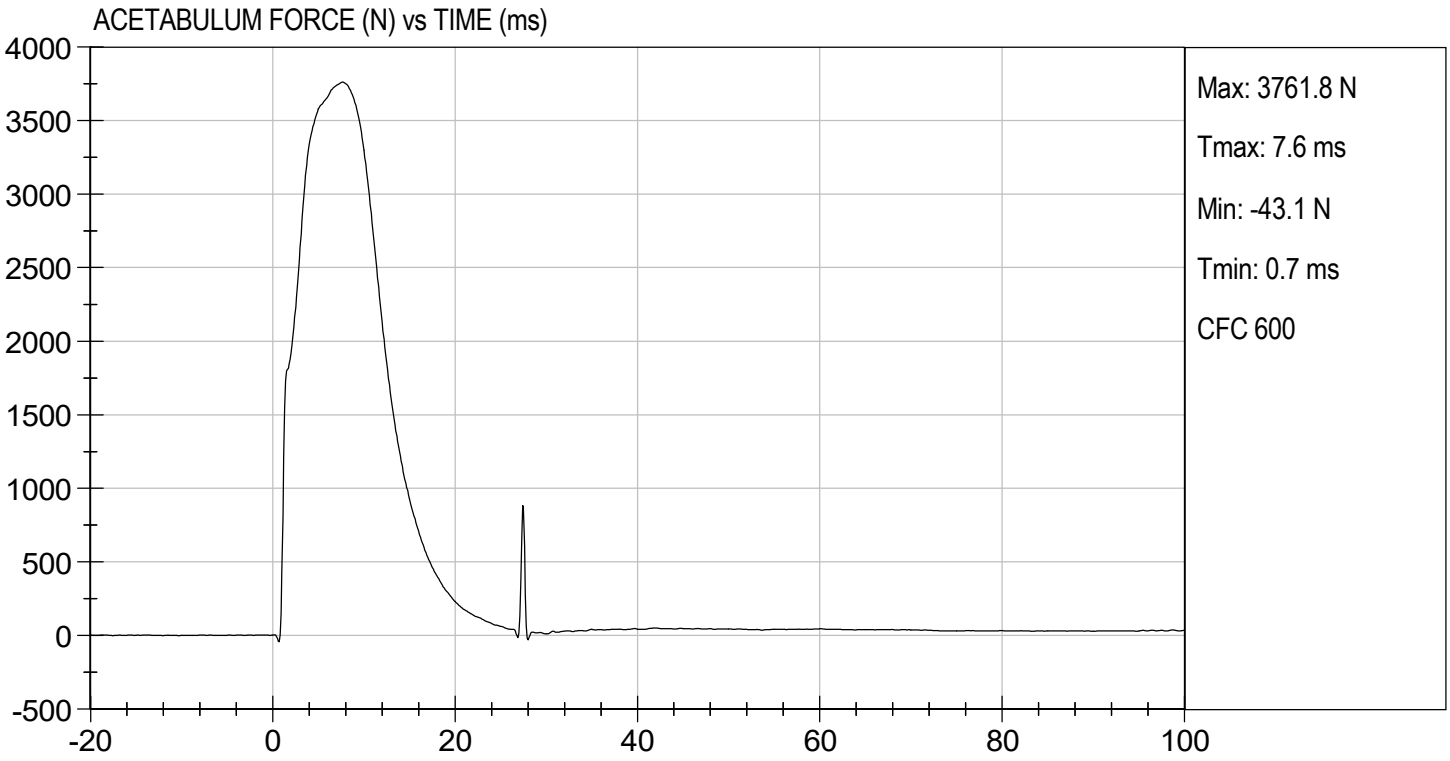
TEST DATE: 04/20/2021
TEST #: D211357A



TEST DESC: PELVIS IMPACT
VELOCITY: 21.67 ft/s, 6.61 m/s

TEST DATE: 04/20/2021
TEST #: D211357A



**MGA RESEARCH CORPORATION**

**ILIAC IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211358

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21 | Pass |
| Humidity | % | 10 to 70 | 26.8 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.20 | Pass |
| Maximum Probe Acceleration | G's | 36 to 45 | 41 | Pass |
| Pelvis Y Acceleration | G's | 28 to 39 | 34 | Pass |
| Peak Pelvis Iliac Force | N | 4100 to 5100 | 4,643 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

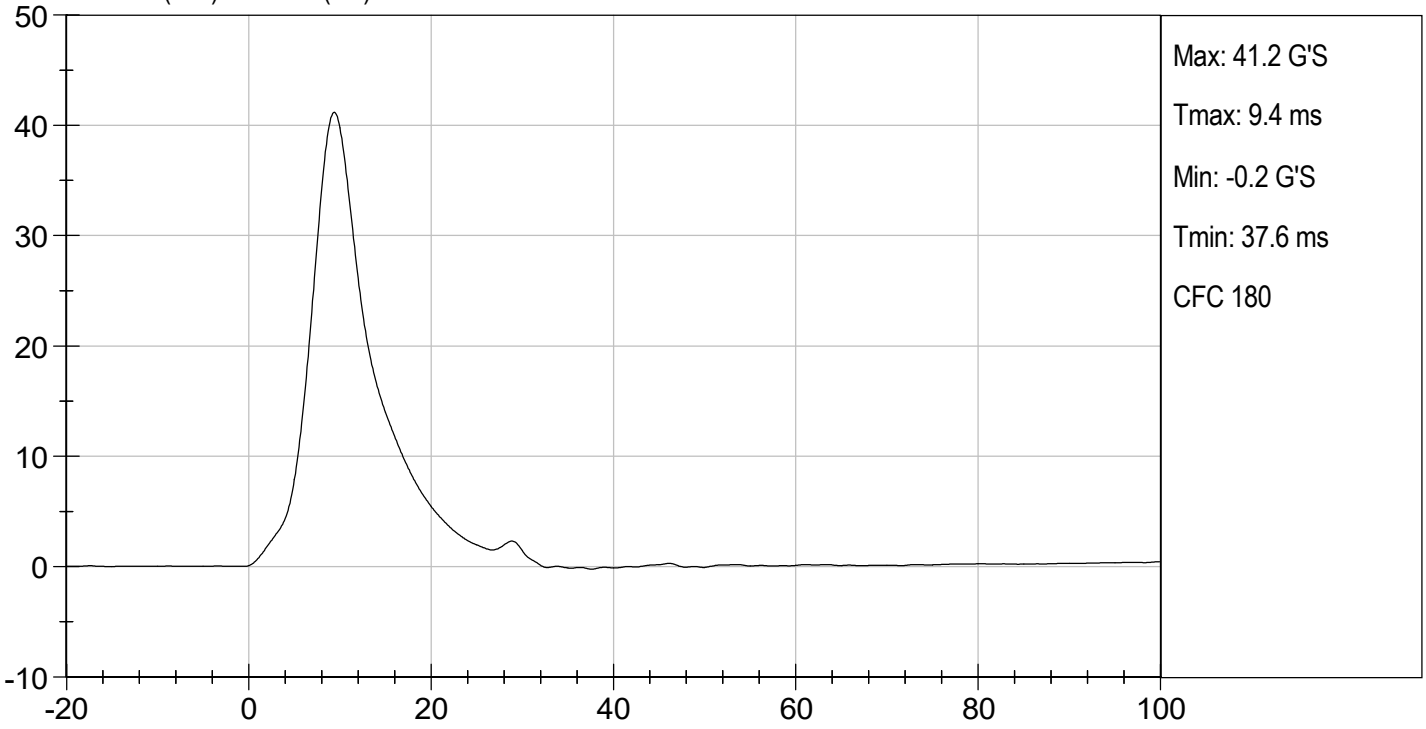
04/19/2021
Test Date

Approved By

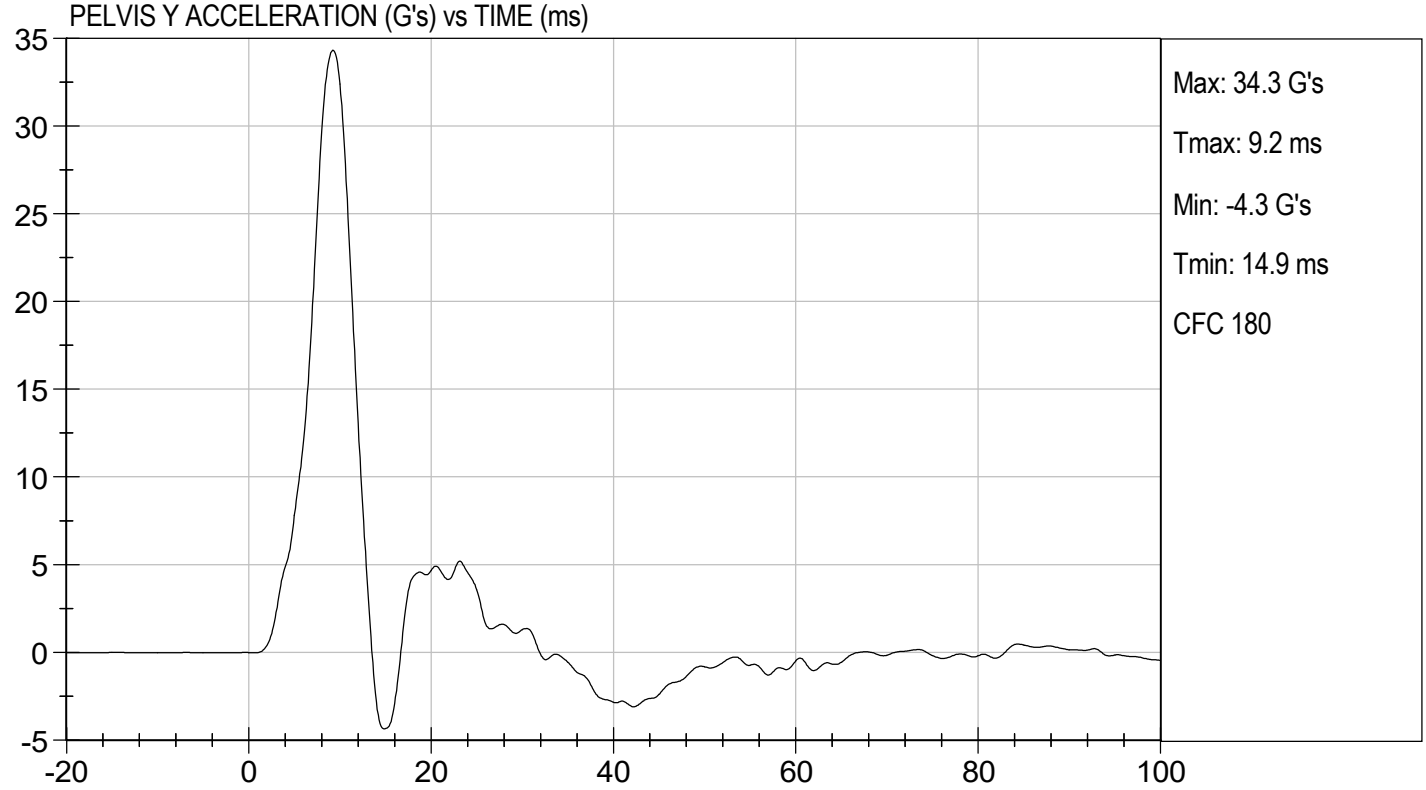
TEST DESC: ILIAC
VELOCITY: 13.77 ft/s, 4.20 m/s

TEST DATE: 04/19/2021
TEST #: D211358

PROBE (G'S) vs TIME (ms)

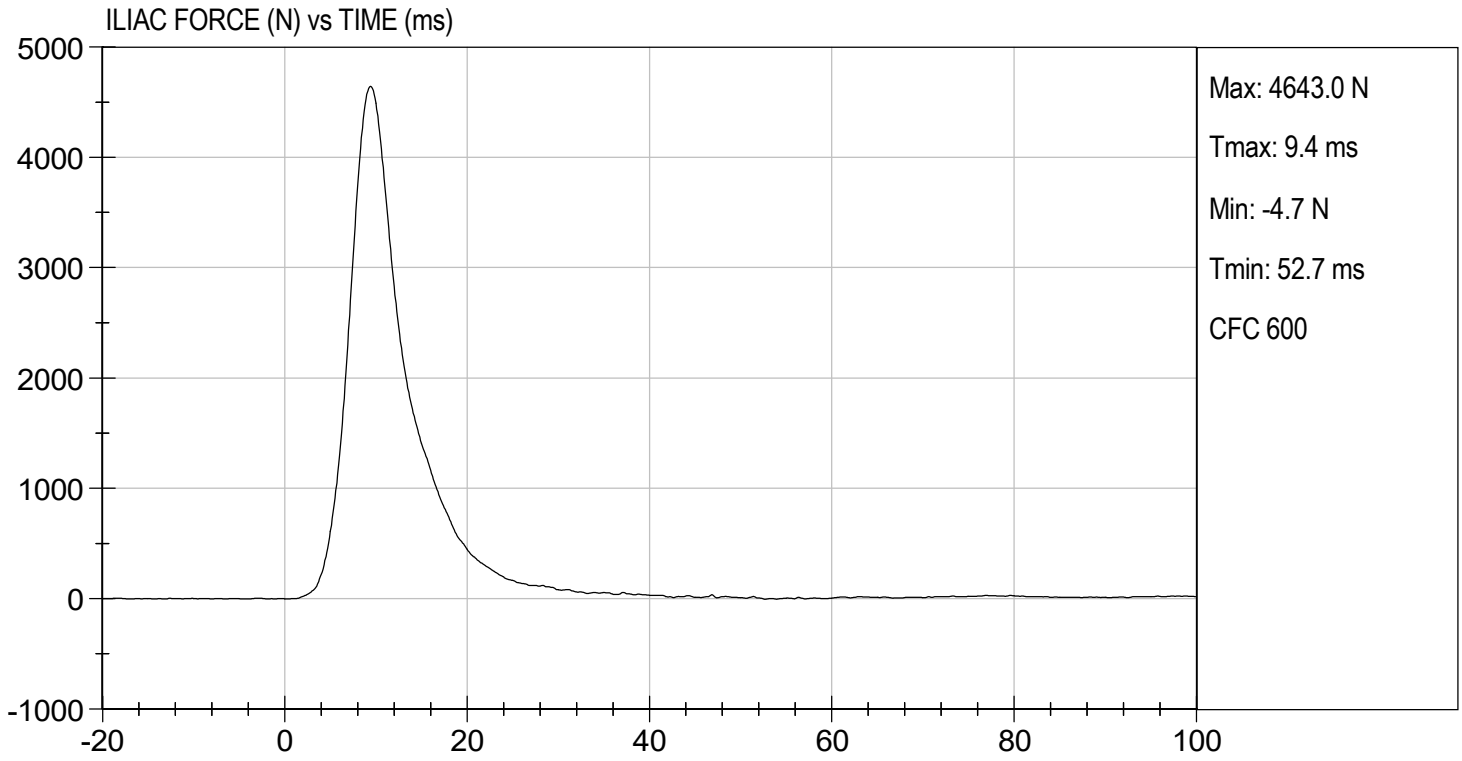



PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 04/19/2021
TEST #: D211358



**CALIBRATION TEST RESULTS**

**POST-TEST**

**SID-IIS 5TH PERCENTILE FEMALE - PASSENGER ATD**

**SID-IIsD External Measurements**
**SN: 306**

| No. | Name | Spec. (mm) | Result | Pass/Fail |
|---|---|---|---|---|
| **A** | Sitting Height | 772 - 788 | 785 | Pass |
| **B** | Shoulder Pivot Height | 437 - 453 | 449 | Pass |
| **C** | H-point Height | 79 - 89 | 86 | Pass |
| **D** | H-point from Seatback | 141 - 151 | 147 | Pass |
| **E** | Shoulder Pivot from Backline | 97 - 107 | 99 | Pass |
| **F** | Thigh Clearance | 119 -135 | 120 | Pass |
| **G** | Head Breadth | 140 - 148 | 141 | Pass |
| **H** | Head Back from Backline | 40 - 46 | 45 | Pass |
| **I** | Head Depth | 178 - 188 | 182 | Pass |
| **J** | Head Circumference | 541 - 551 | 550 | Pass |
| **K** | Buttock to Knee Length | 514 - 540 | 538 | Pass |
| **L** | Popliteal Height | 343 - 369 | 349 | Pass |
| **M** | Knee Pivot to Floor Height | 392 - 409 | 394 | Pass |
| **N** | Buttock Popliteal Length | 416 - 442 | 435 | Pass |
| **O** | Chest Depth w/o Jacket | 195 - 211 | 198 | Pass |
| **P** | Foot Length | 216 - 232 | 222 | Pass |
| **Q** | Hip Breadth (w/ pelvic plugs) | 313 - 323 | 317 | Pass |
| **R** | Arm Length | 249 - 259 | 250 | Pass |
| **S** | Knee Joint to Seatback | 477 - 493 | 483 | Pass |
| **V** | Shoulder Width | 341 - 357 | 351 | Pass |
| **W** | Foot Width | 78 - 94 | 82 | Pass |
| **Y** | Chest Circumference w/ jacket | 851 - 881 | 863 | Pass |
| **Z** | Waist Circumference | 761 - 791 | 782 | Pass |

**MGA RESEARCH CORPORATION**

**HEAD DROP TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test ID:** D211551

| 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 | 39 | Pass |
| Peak Resultant Acceleration | G's | 115 to 137 | 134 | Pass |
| Peak Longitudinal Acceleration | G's | +/- 15 | -9.3 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | <15% | Yes | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

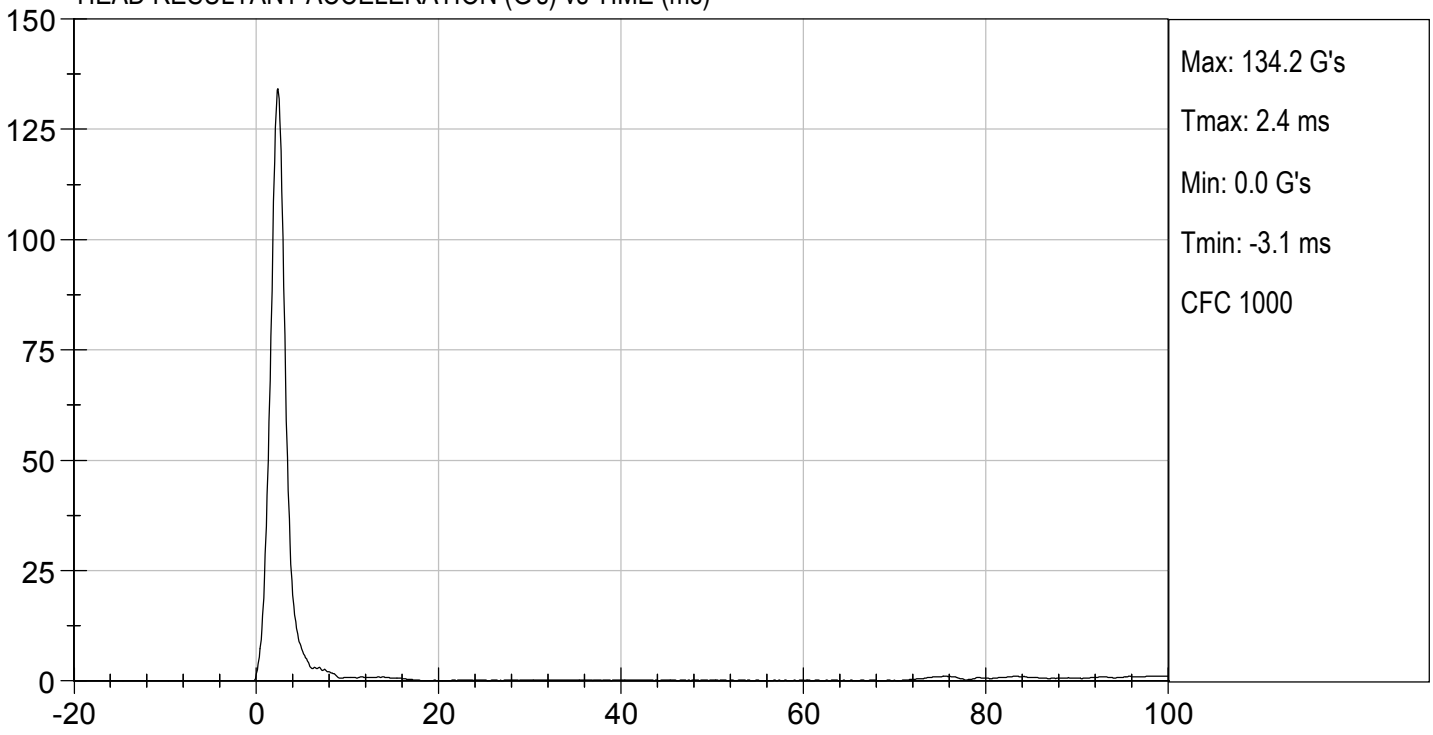
04/30/2021
Test Date

Approved By

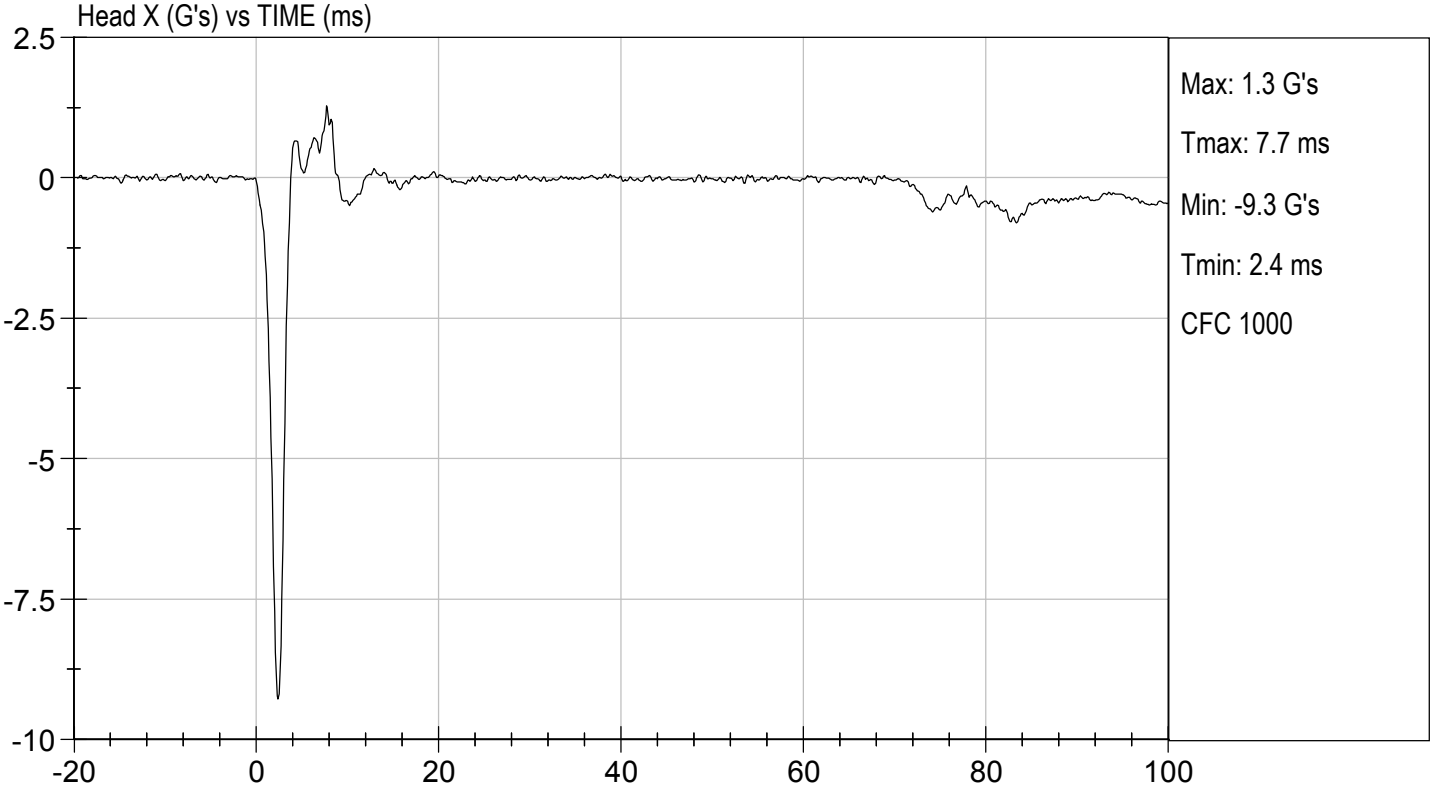
TEST DESC: HEAD DROP

TEST DATE: 04/30/2021
TEST #: D211551

HEAD RESULTANT ACCELERATION (G's) vs TIME (ms)

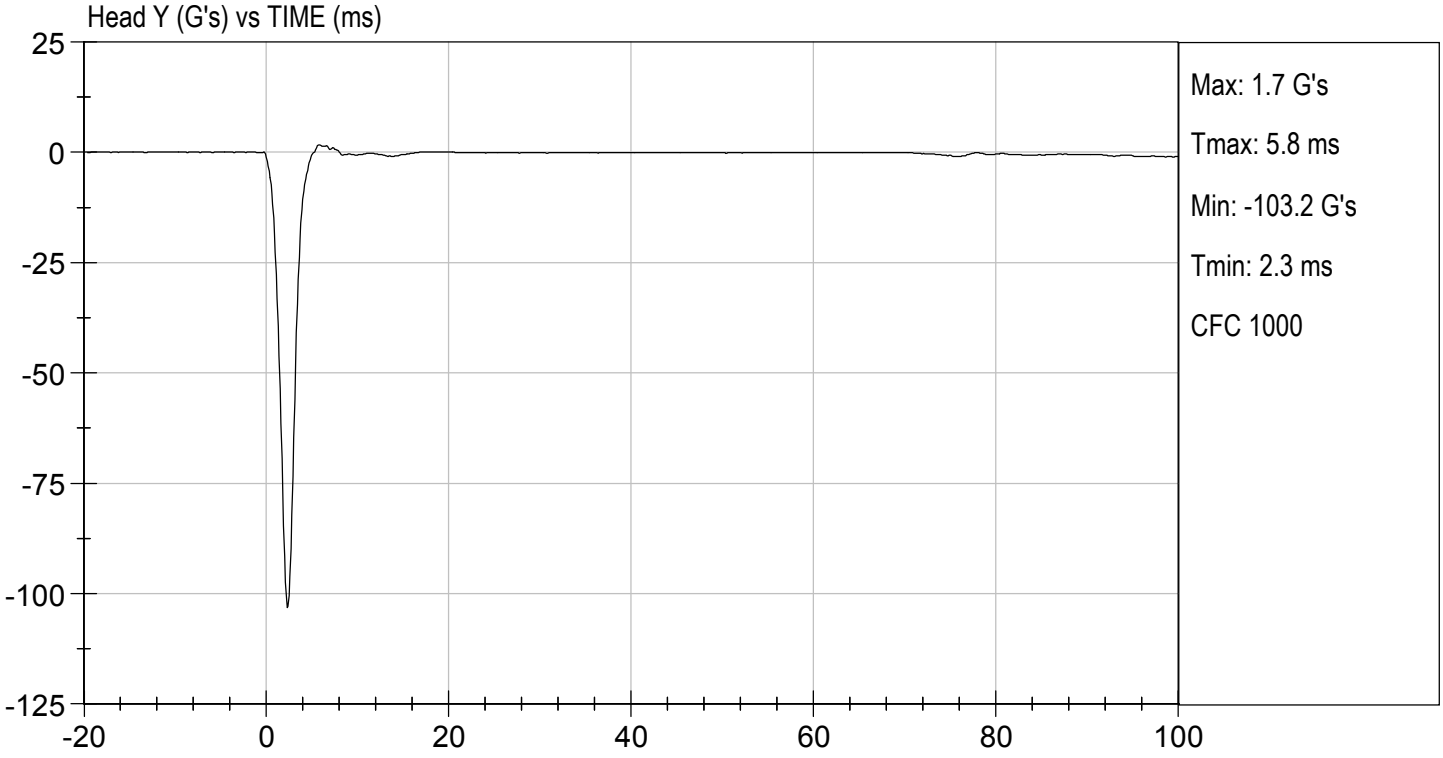


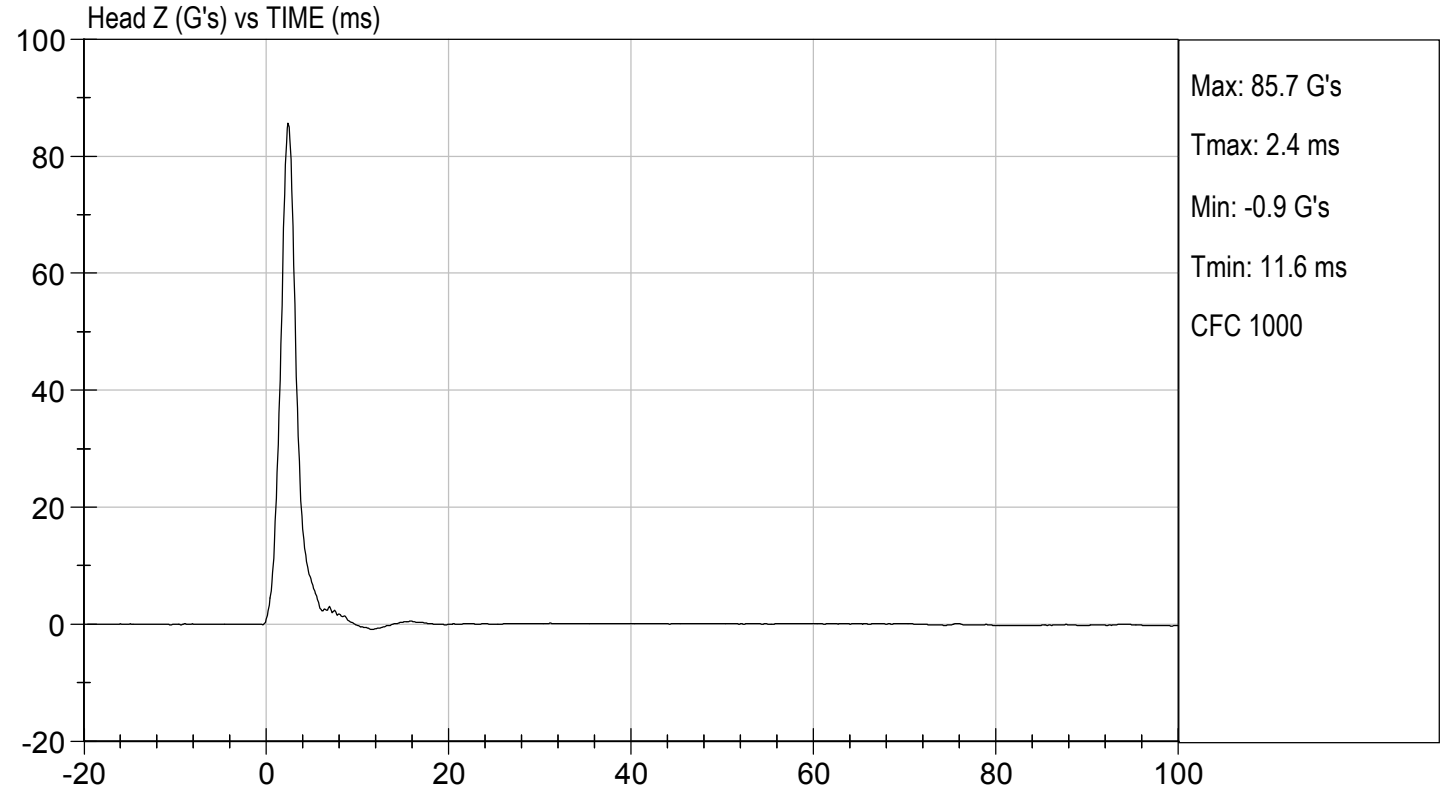

Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 04/30/2021
TEST #: D211551



**MGA RESEARCH CORPORATION**

**LATERAL NECK PENDULUM TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211552

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Temperature | | deg C | 20.6 to 22.2 | 21.7 | Pass |
| Humidity | | % | 10 to 70 | 39 | Pass |
| Impact Velocity | | m/s | 5.51 to 5.63 | 5.63 | Pass |
| Pendulum Velocity | 10 ms | m/s | 2.20 to 2.80 | 2.77 | Pass |
| | 15 ms | m/s | 3.30 to 4.10 | 3.94 | Pass |
| | 20 ms | m/s | 4.40 to 5.40 | 5.27 | Pass |
| | 25 ms | m/s | 5.40 to 6.10 | 5.61 | Pass |
| | 25-100 ms | m/s | 5.50 to 6.20 | 5.62 | Pass |
| Maximum D-Plane Rotation | | deg | 71 to 81 | 71 | Pass |
| Time of Maximum D-Plane Rotation | | ms | 50 to 70 | 62 | Pass |
| Maximum Occipital Condyle Moment | | Nm | -44 to -36 | -38 | Pass |
| Time of Moment Decay to 0 Nm | | ms | 102 to 126 | 112 | Pass |
| | | | Overall Test Results | | Pass |

Laboratory Technician

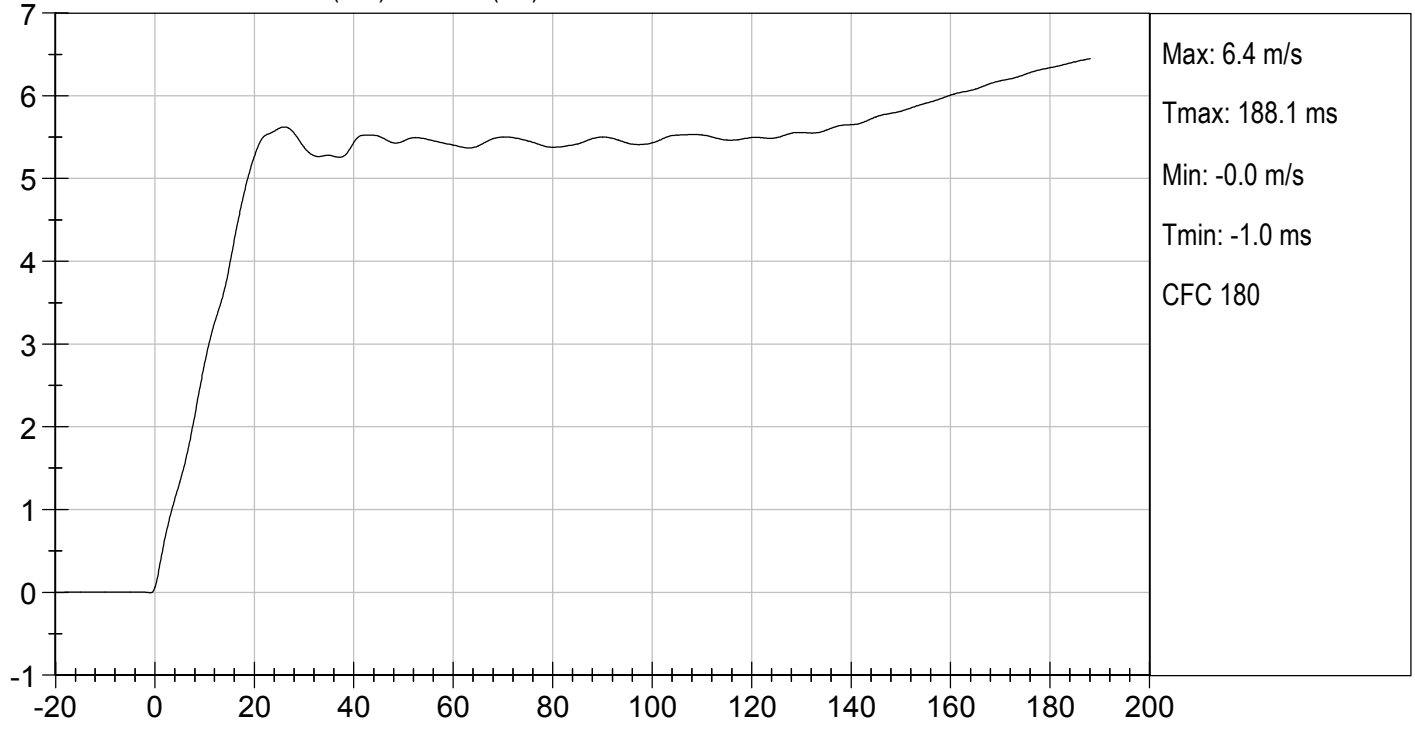
04/30/2021
Test Date

Approved By

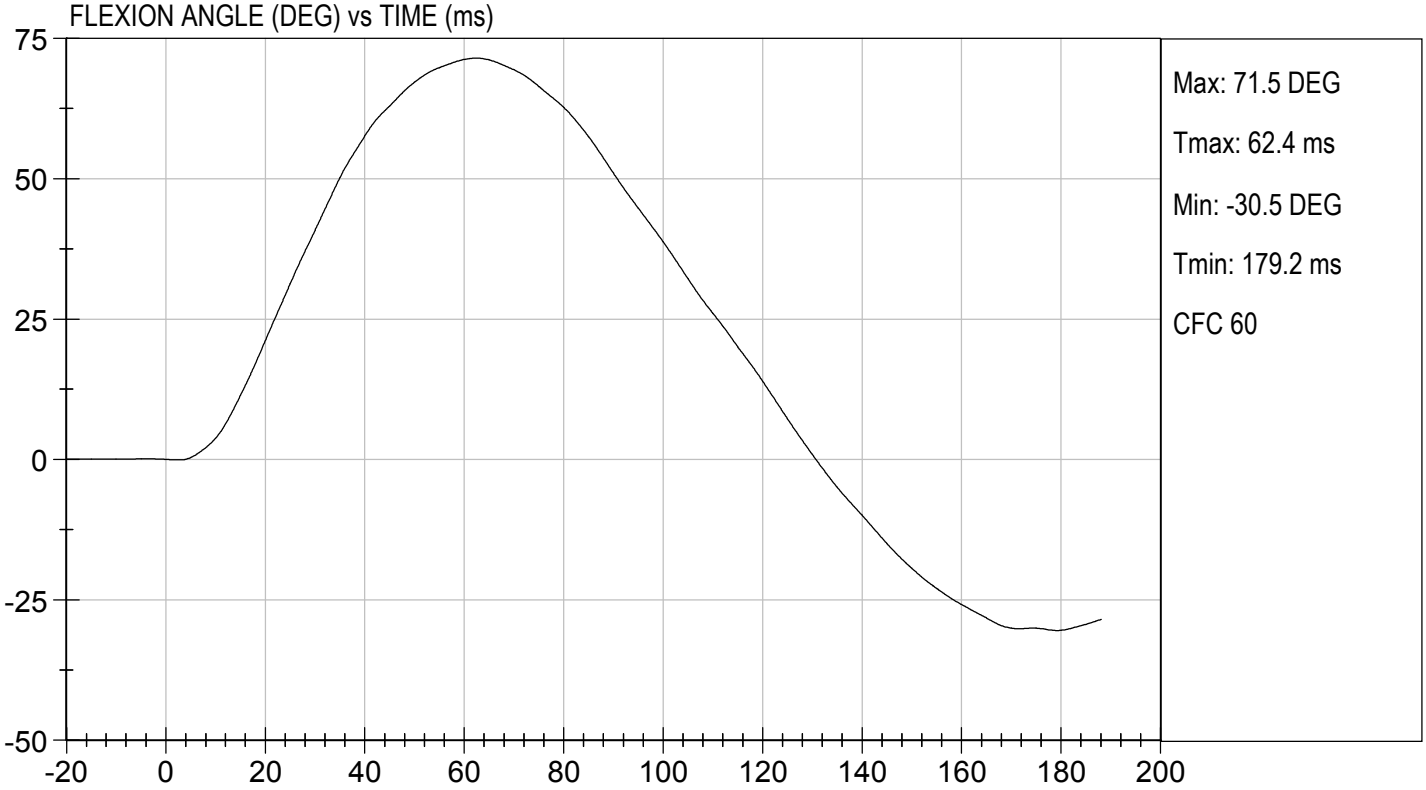
TEST DESC: NECK BENDING
VELOCITY: 18.46 ft/s, 5.63 m/s

TEST DATE: 04/30/2021
TEST #: D211552

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

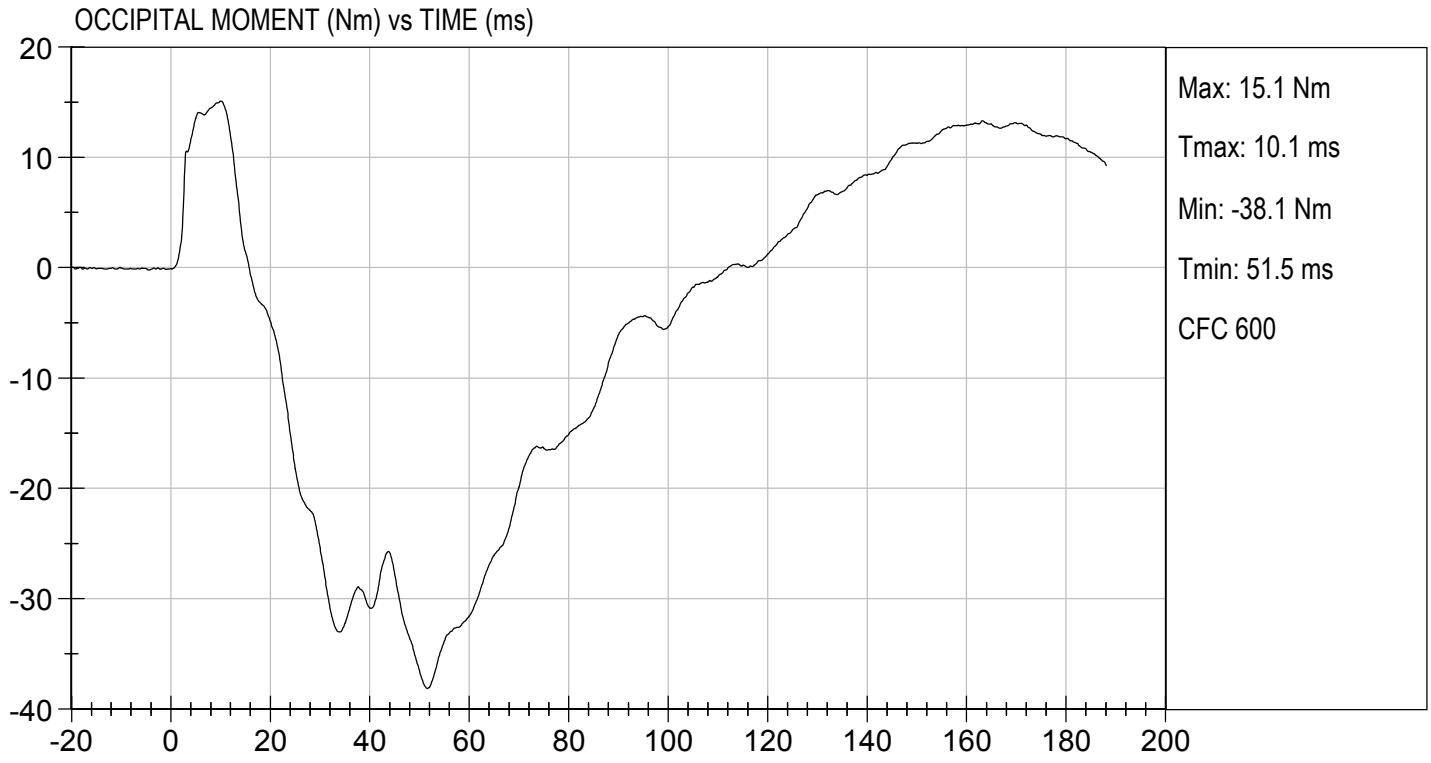



FLEXION ANGLE (DEG) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 18.46 ft/s, 5.63 m/s

TEST DATE: 04/30/2021
TEST #: D211552



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test ID:** D211553

| 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 | 44 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.34 | Pass |
| Maximum Probe Acceleration | G's | 13 to 18 | 15 | Pass |
| Shoulder Displacement | mm | 28 to 37 | 30 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 17 to 22 | 18 | Pass |
| | | Overall Test Results | | Pass |

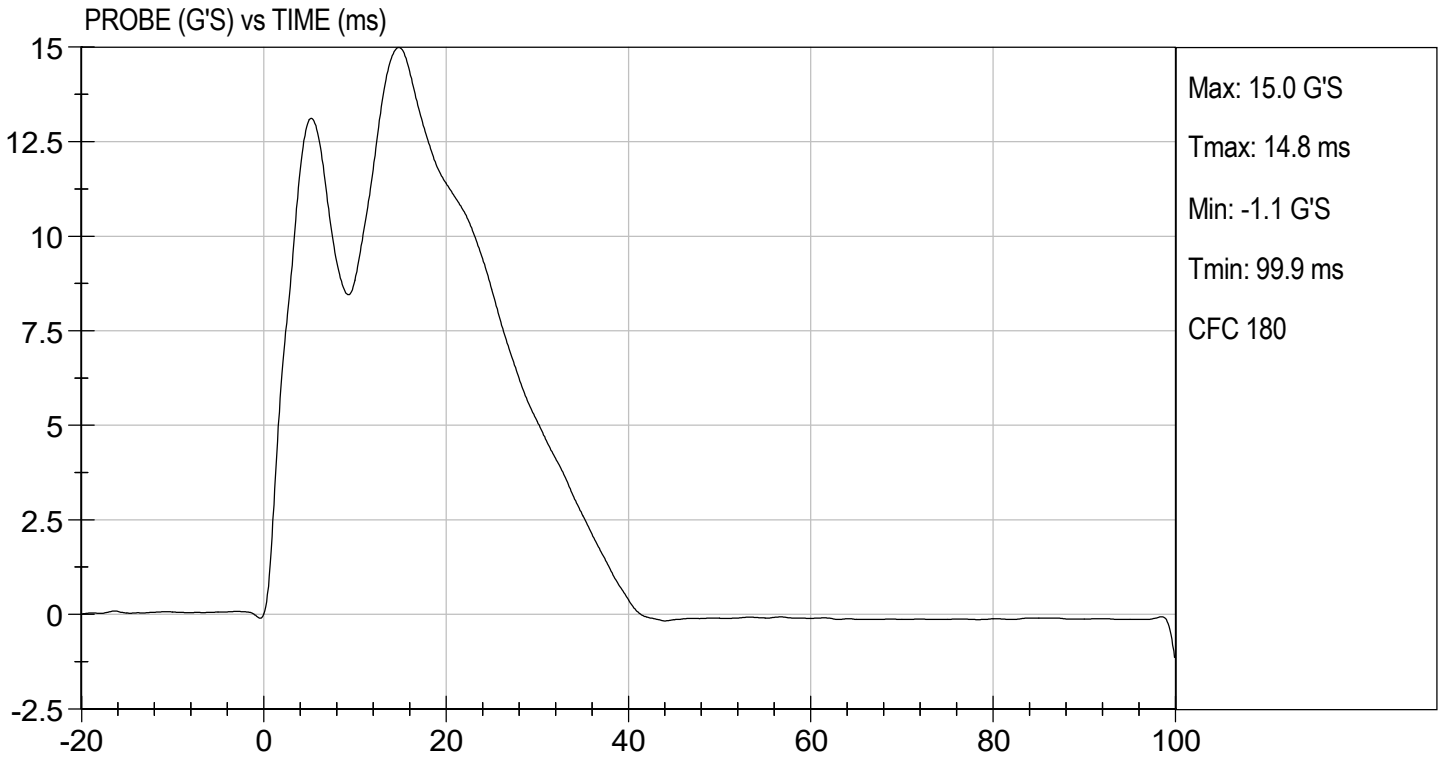
Laboratory Technician

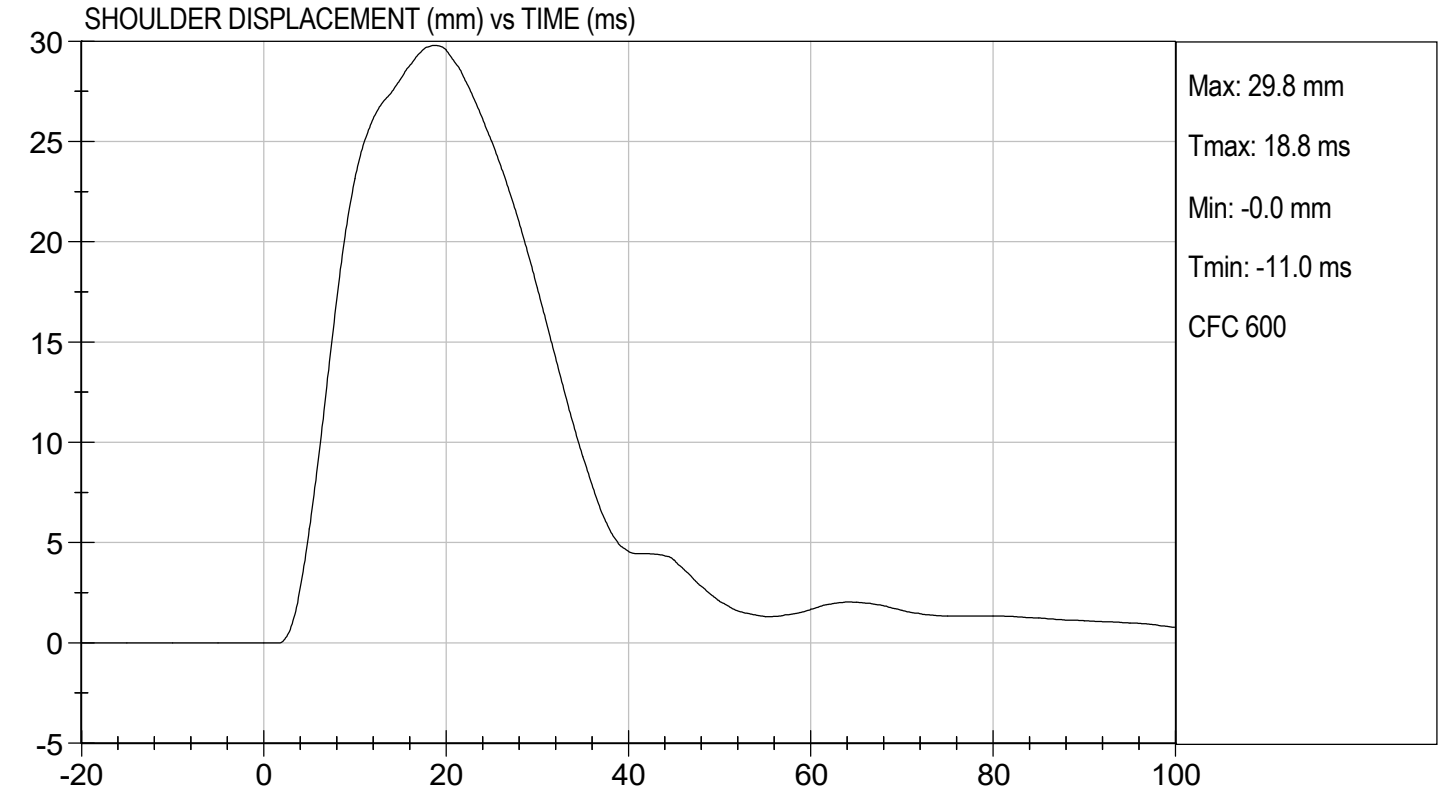
05/03/2021
Test Date

Approved By

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

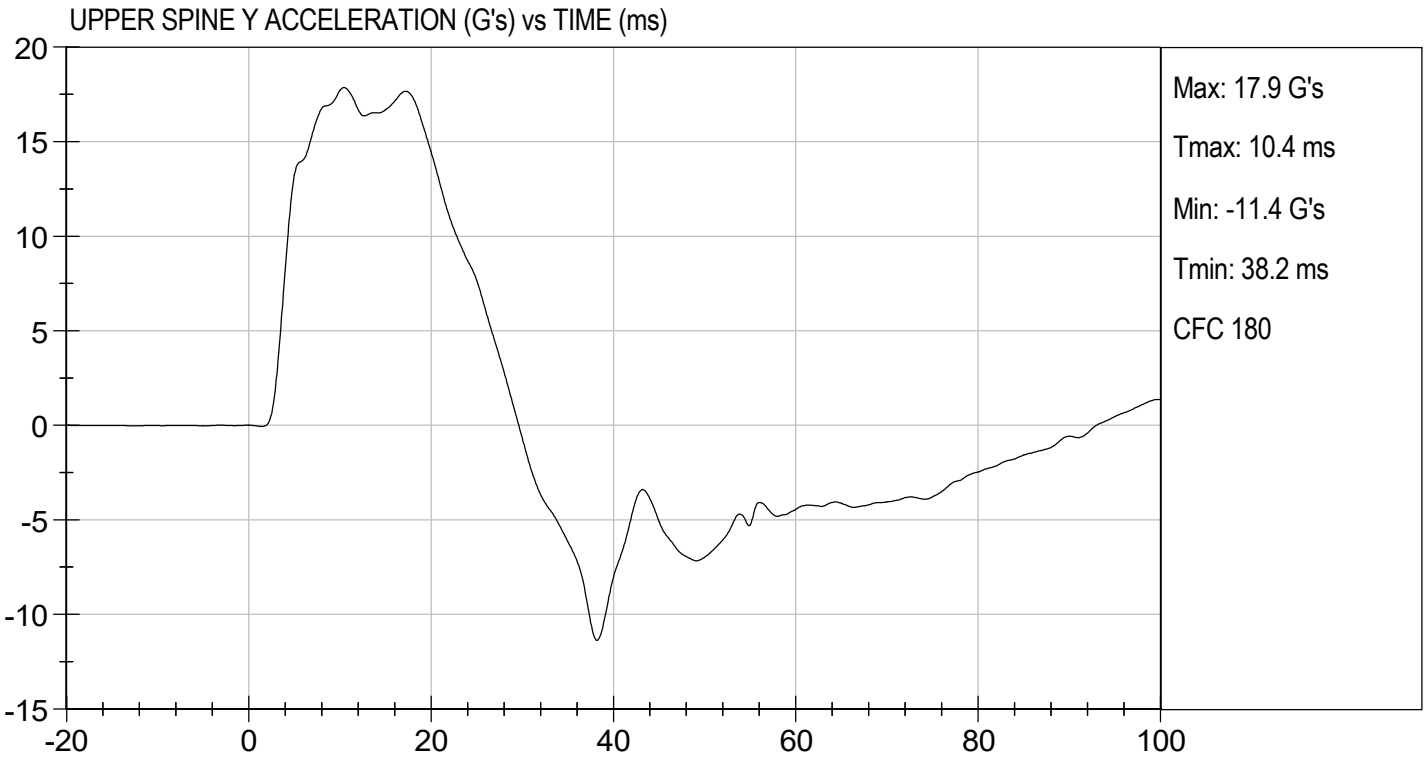
TEST DATE: 05/03/2021
TEST #: D211553



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

TEST DATE: 05/03/2021
TEST #: D211553



**MGA RESEARCH CORPORATION**

**THORAX (WITH ARM) IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211554

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.4 | Pass |
| Humidity | % | 10 to 70 | 44 | 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 | 36 | Pass |
| Upper Rib Displacement | mm | 25 to 32 | 28 | Pass |
| Middle Rib Displacement | mm | 30 to 36 | 31 | Pass |
| Lower Rib Displacement | mm | 32 to 38 | 34 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 34 to 43 | 38 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 29 to 37 | 33 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

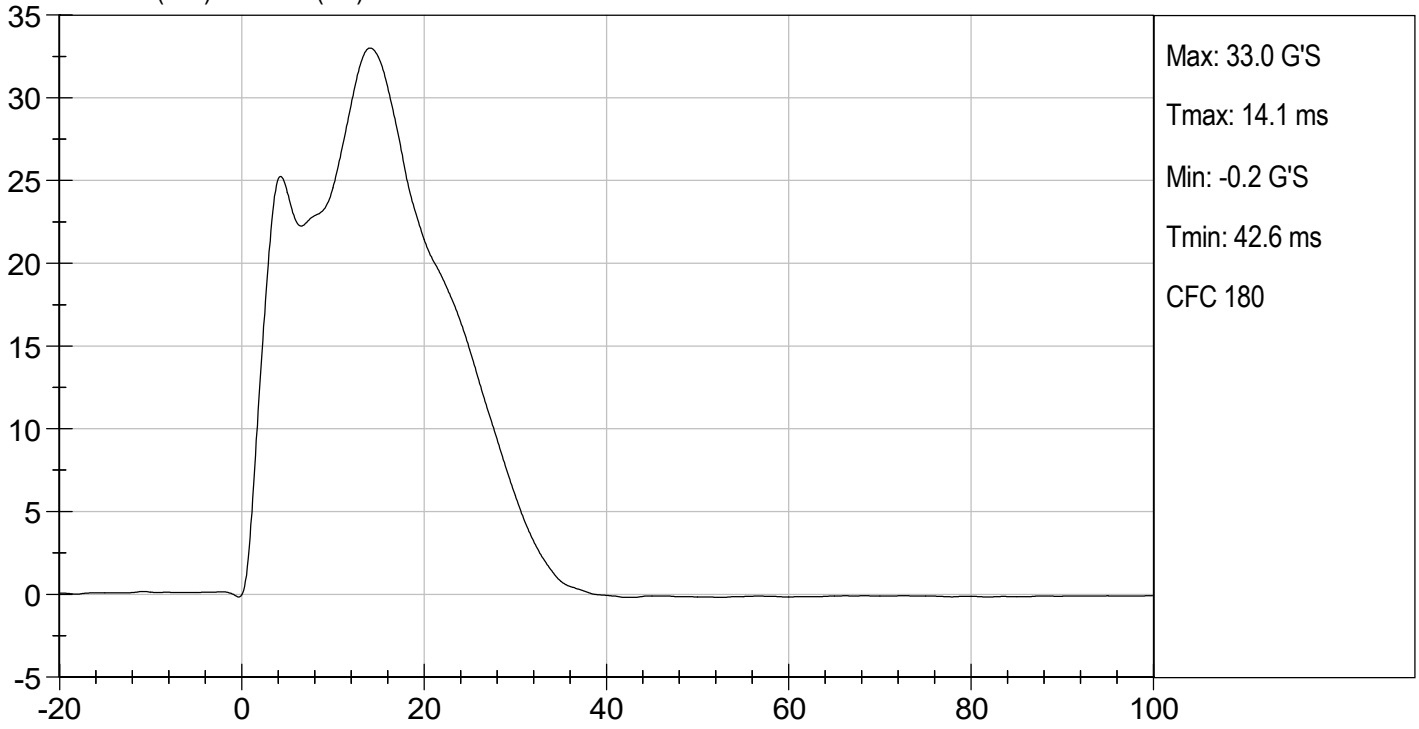
05/03/2021
Test Date

Approved By

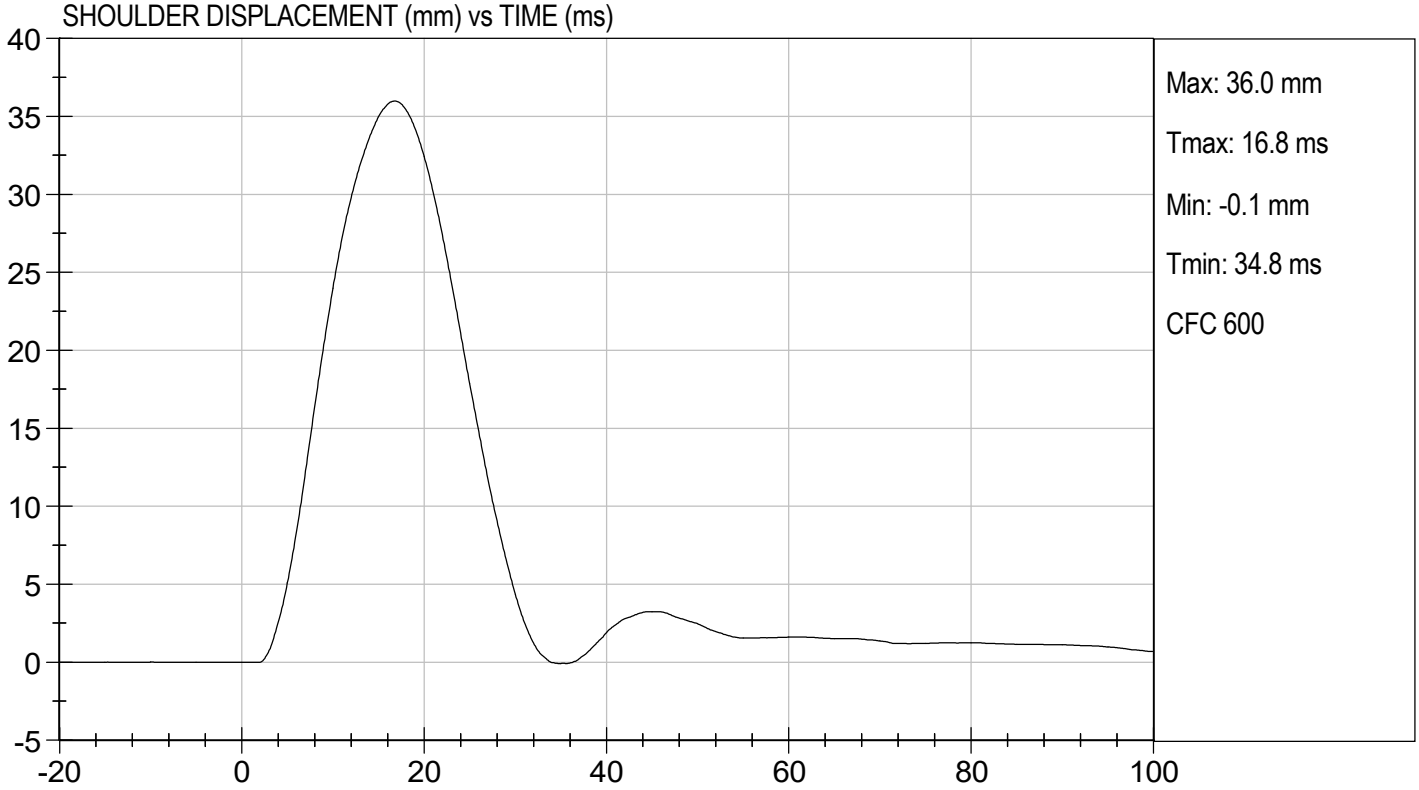
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 05/03/2021
TEST #: D211554

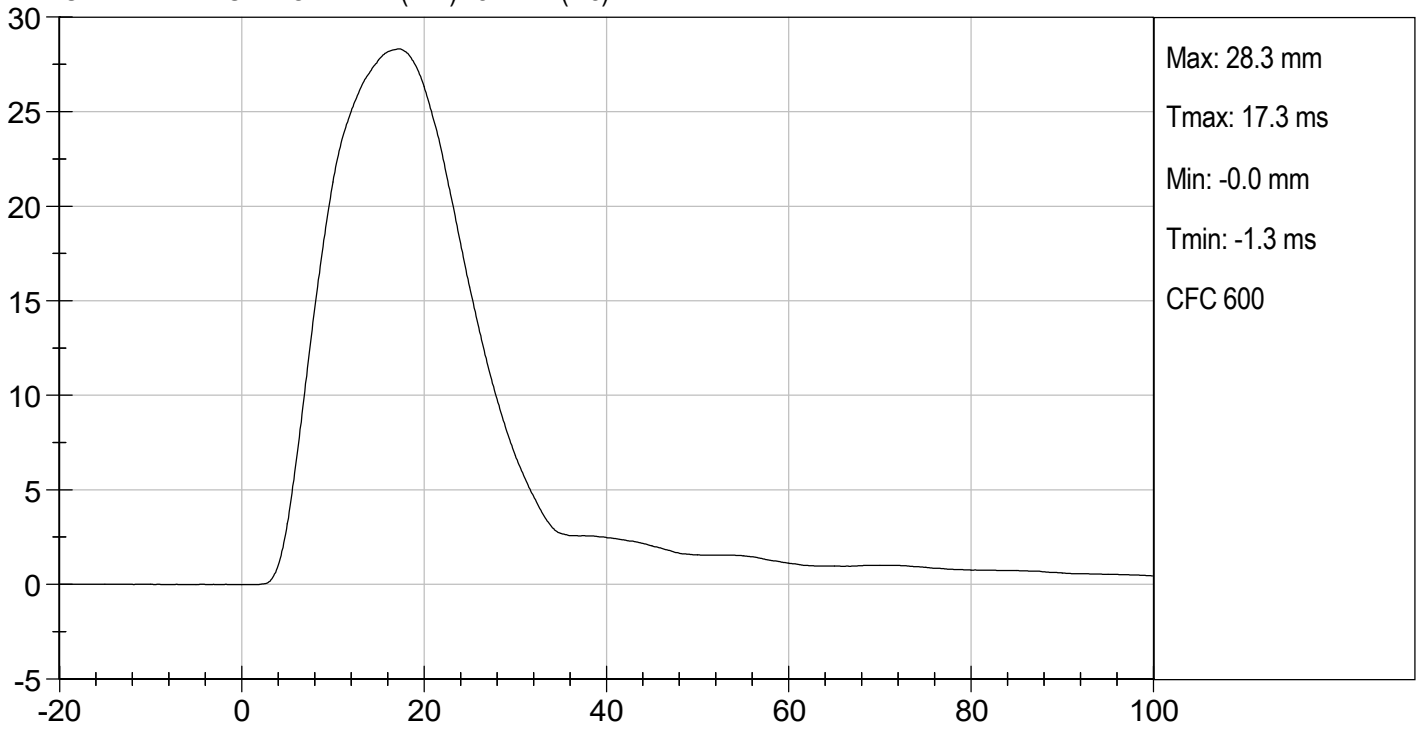
PROBE (G'S) vs TIME (ms)



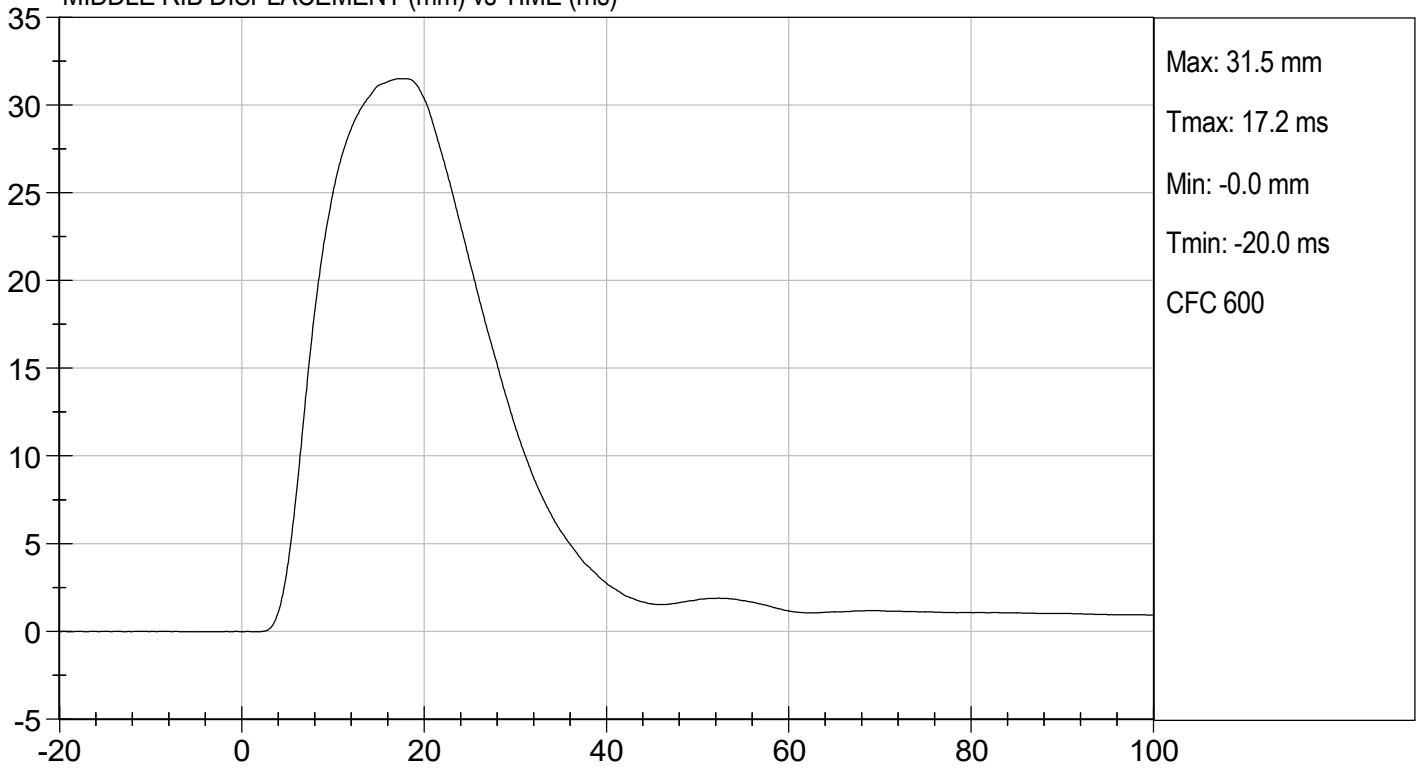

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



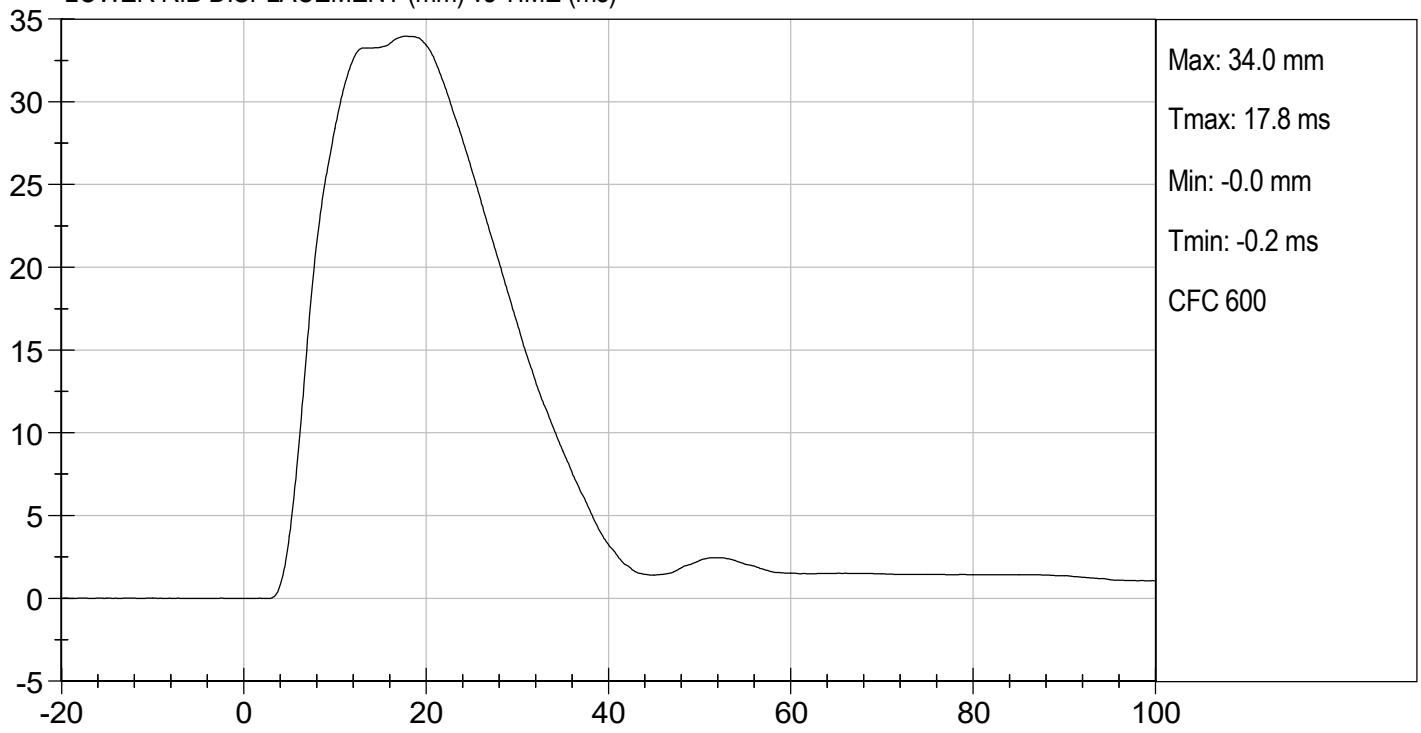

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



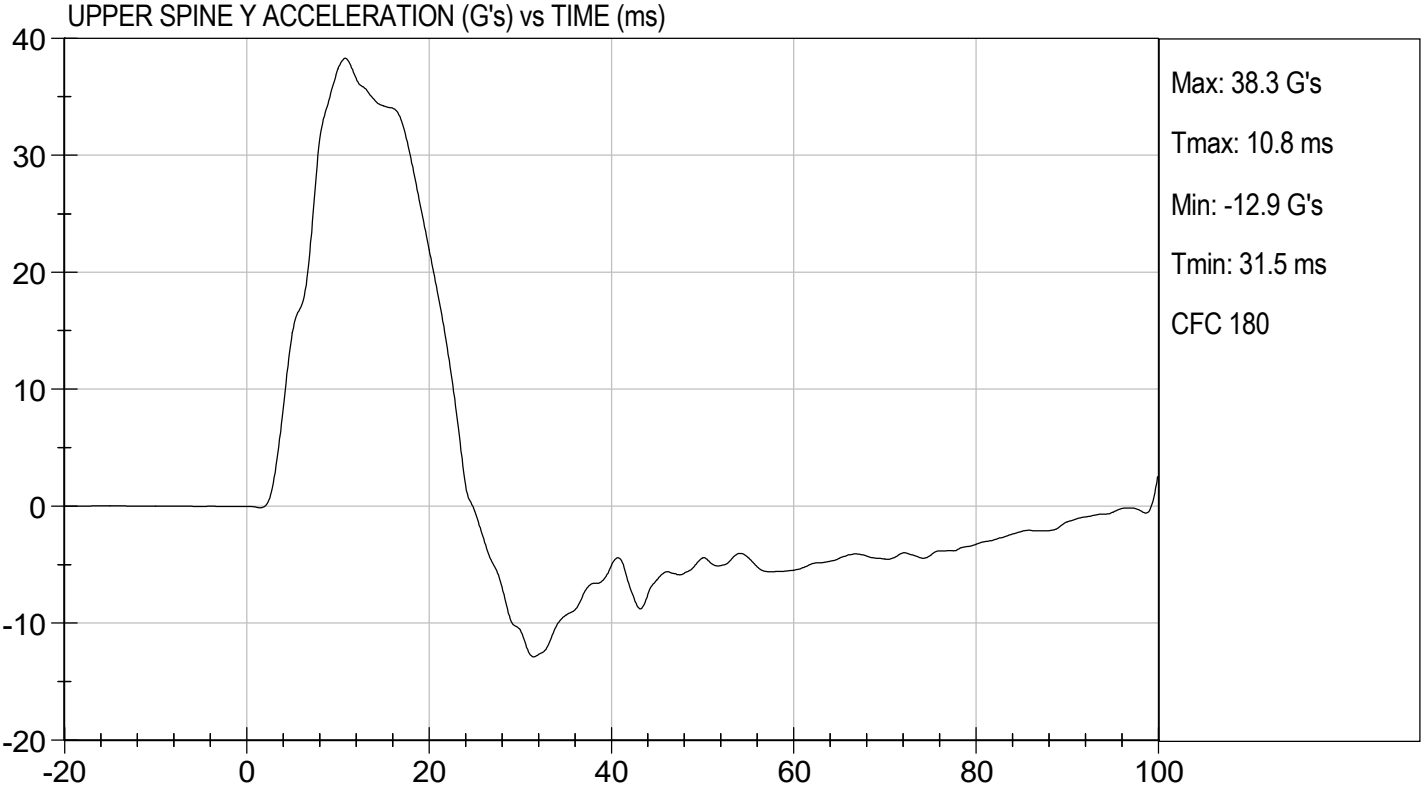
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 05/03/2021
TEST #: D211554

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

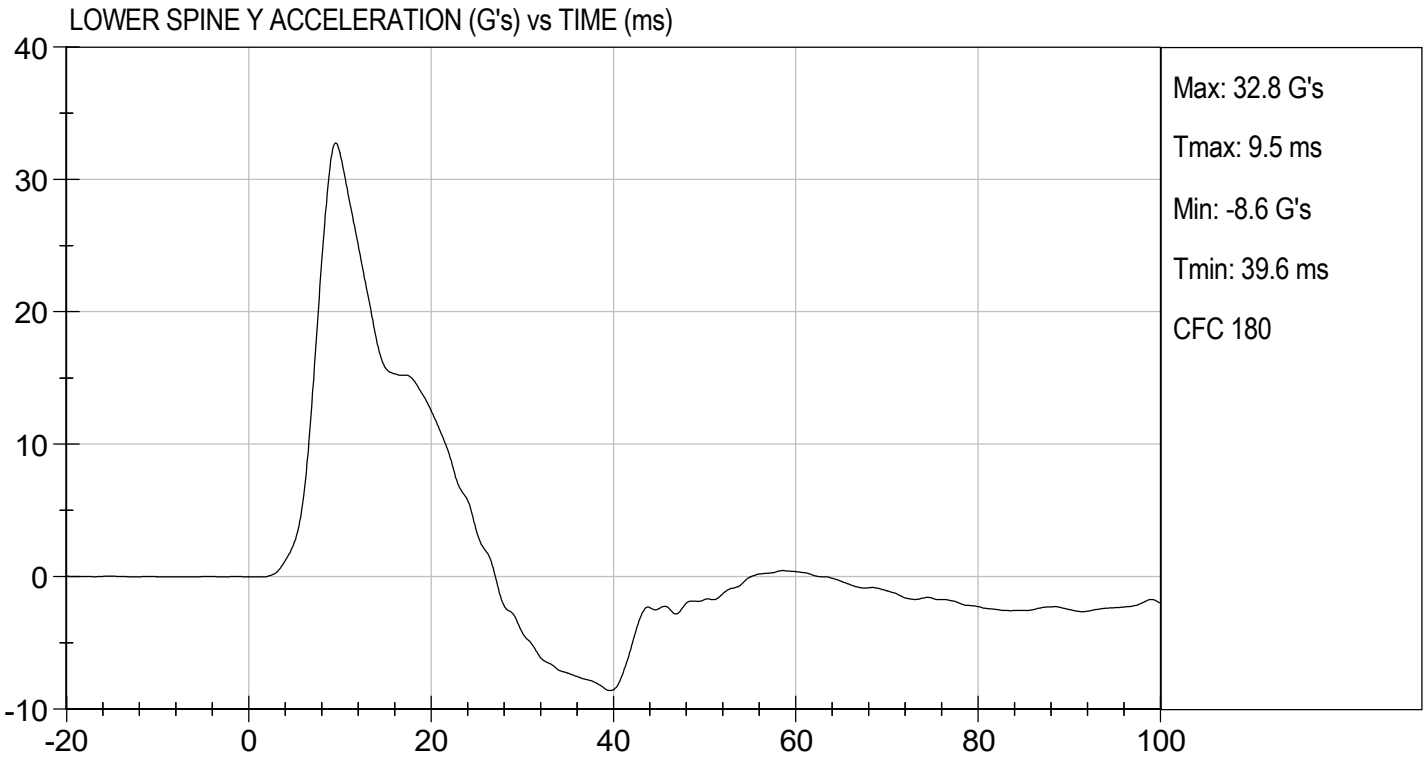



UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 05/03/2021
TEST #: D211554



**MGA RESEARCH CORPORATION**

**THORAX (WITHOUT ARM) IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211555

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.4 | Pass |
| Humidity | % | 10 to 70 | 44 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.30 | Pass |
| Maximum Probe Acceleration | G's | 14 to 18 | 15 | Pass |
| Upper Rib Displacement | mm | 32 to 40 | 39 | Pass |
| Middle Rib Displacement | mm | 39 to 45 | 42 | Pass |
| Lower Rib Displacement | mm | 35 to 43 | 39 | 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

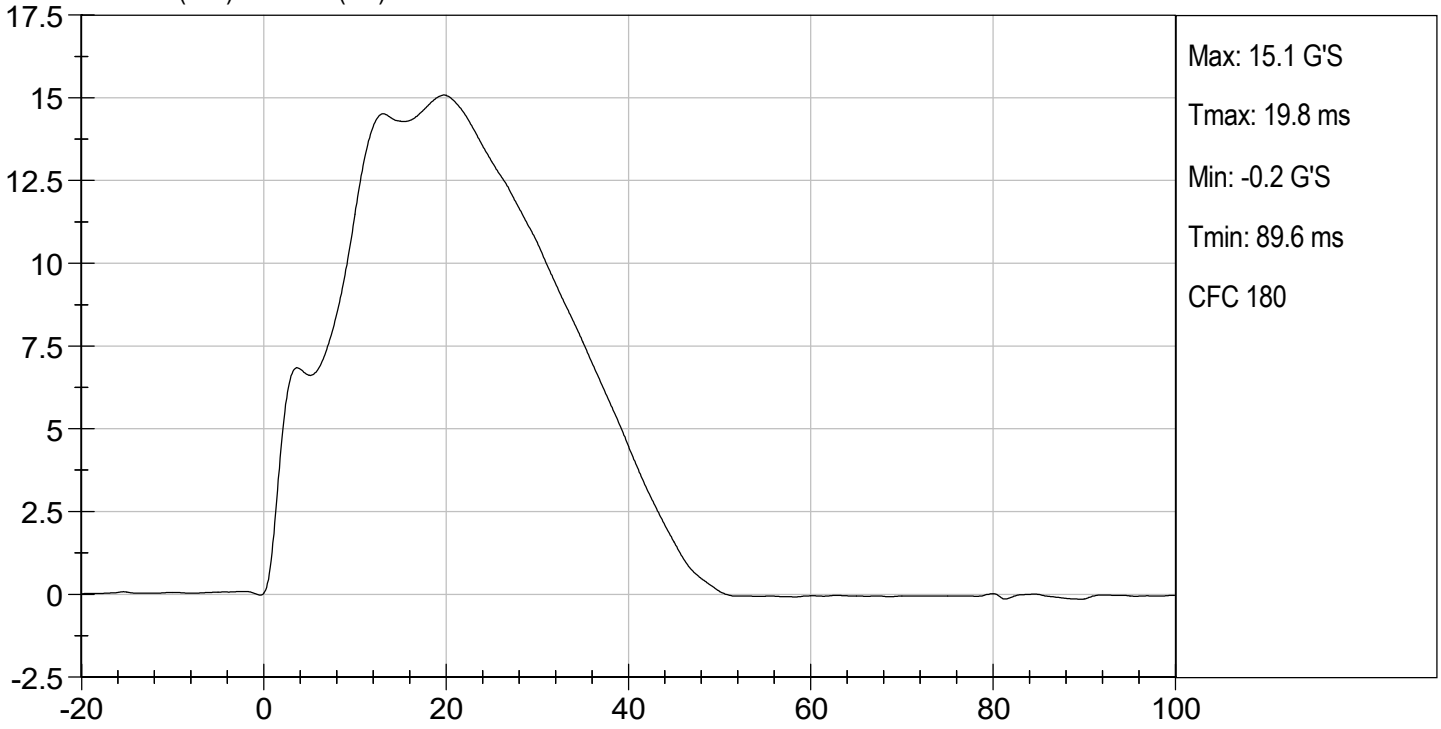
05/03/2021
Test Date

Approved By

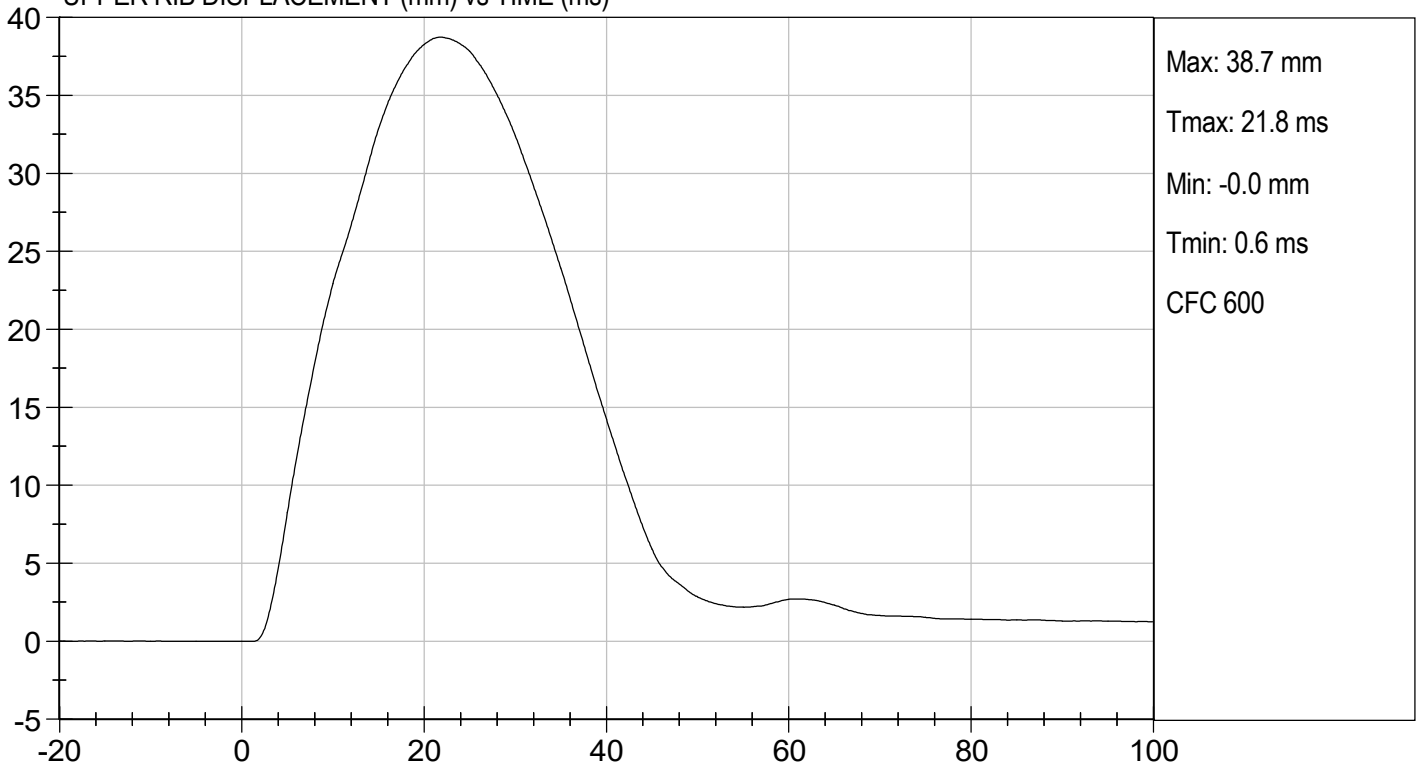
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 05/03/2021
TEST #: D211555

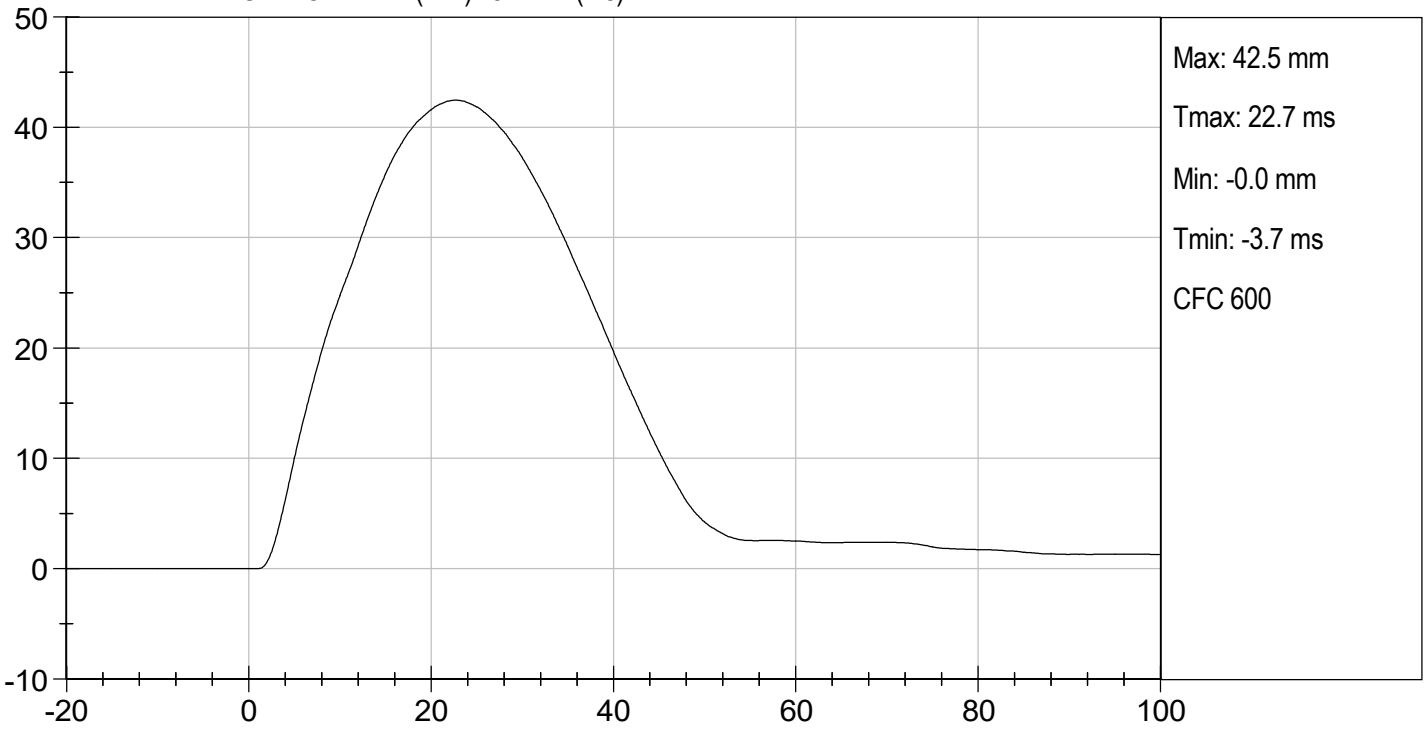
PROBE (G'S) vs TIME (ms)



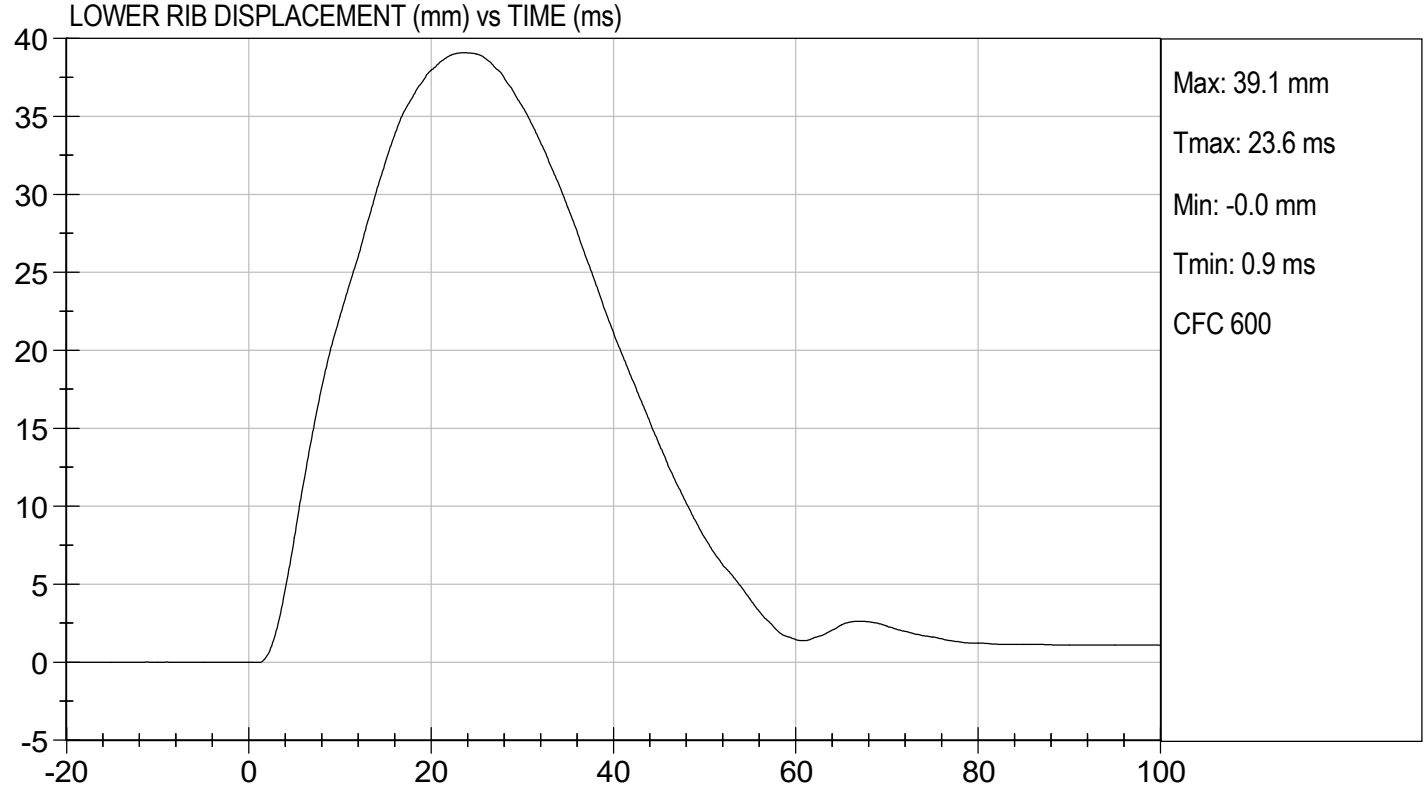

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



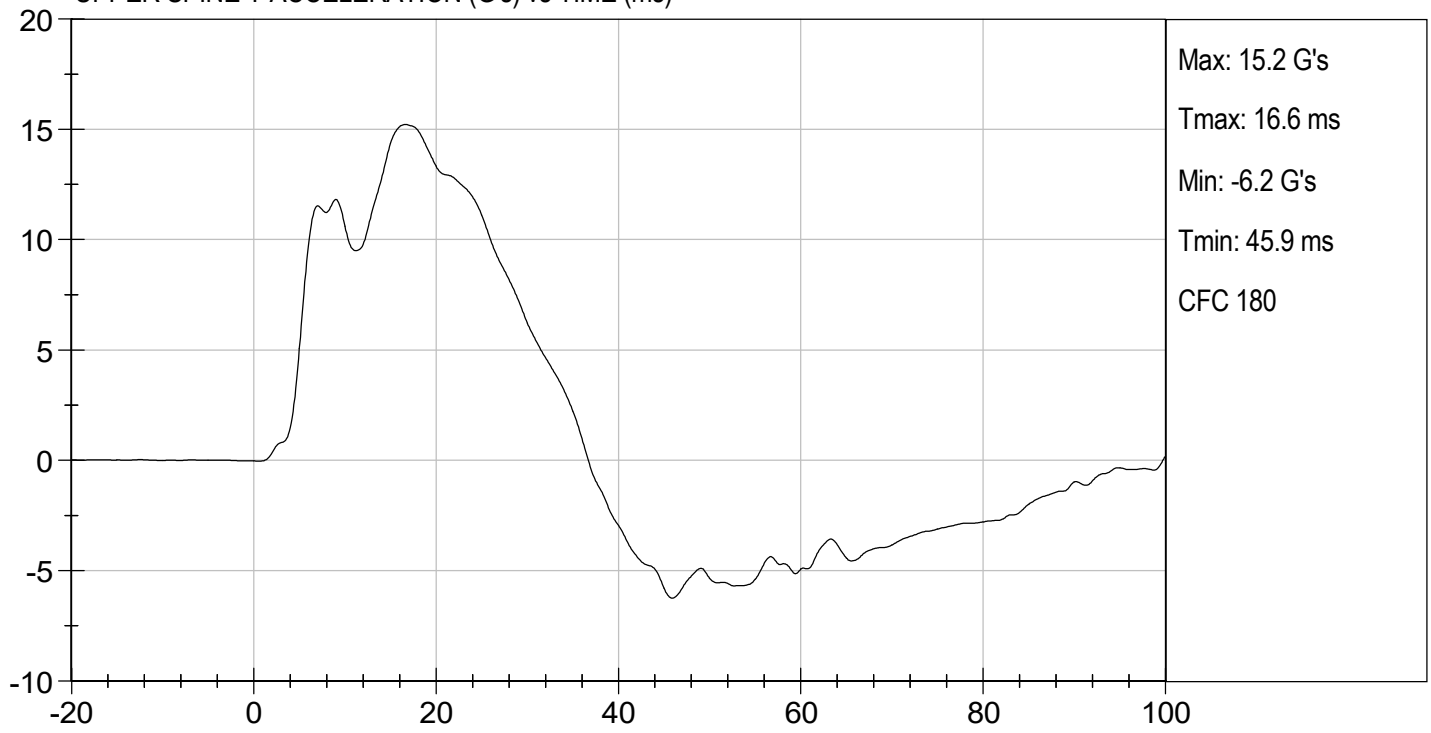

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



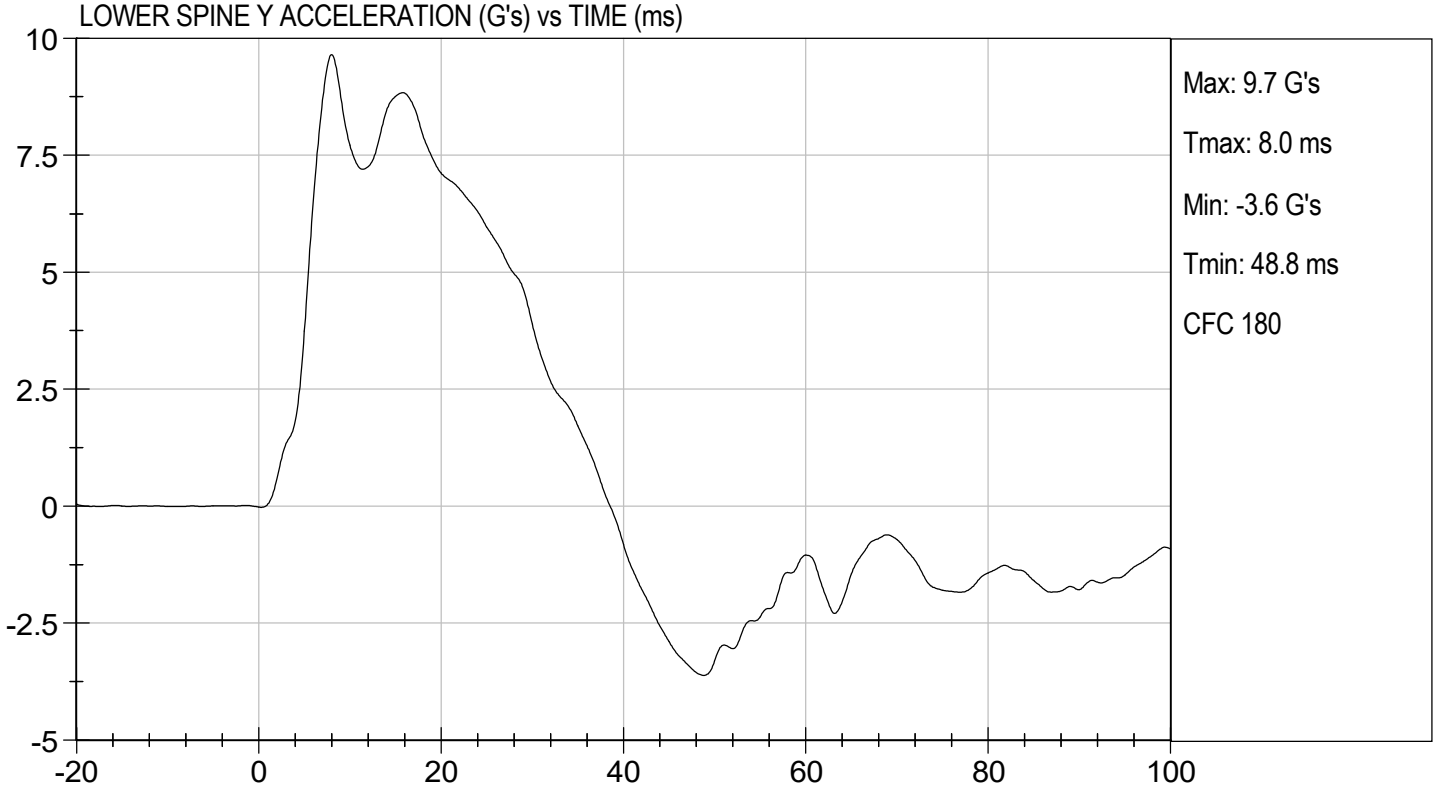
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 05/03/2021
TEST #: D211555

UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)




LOWER SPINE Y ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**ABDOMINAL IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211556

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.4 | Pass |
| Humidity | % | 10 to 70 | 44 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.38 | Pass |
| Maximum Probe Acceleration | G's | 12 to 16 | 13 | Pass |
| Upper Abdomen Rib Displacement | mm | 36 to 47 | 42 | Pass |
| Lower Abdomen Rib Displacement | mm | 33 to 44 | 39 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 9 to 14 | 12 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

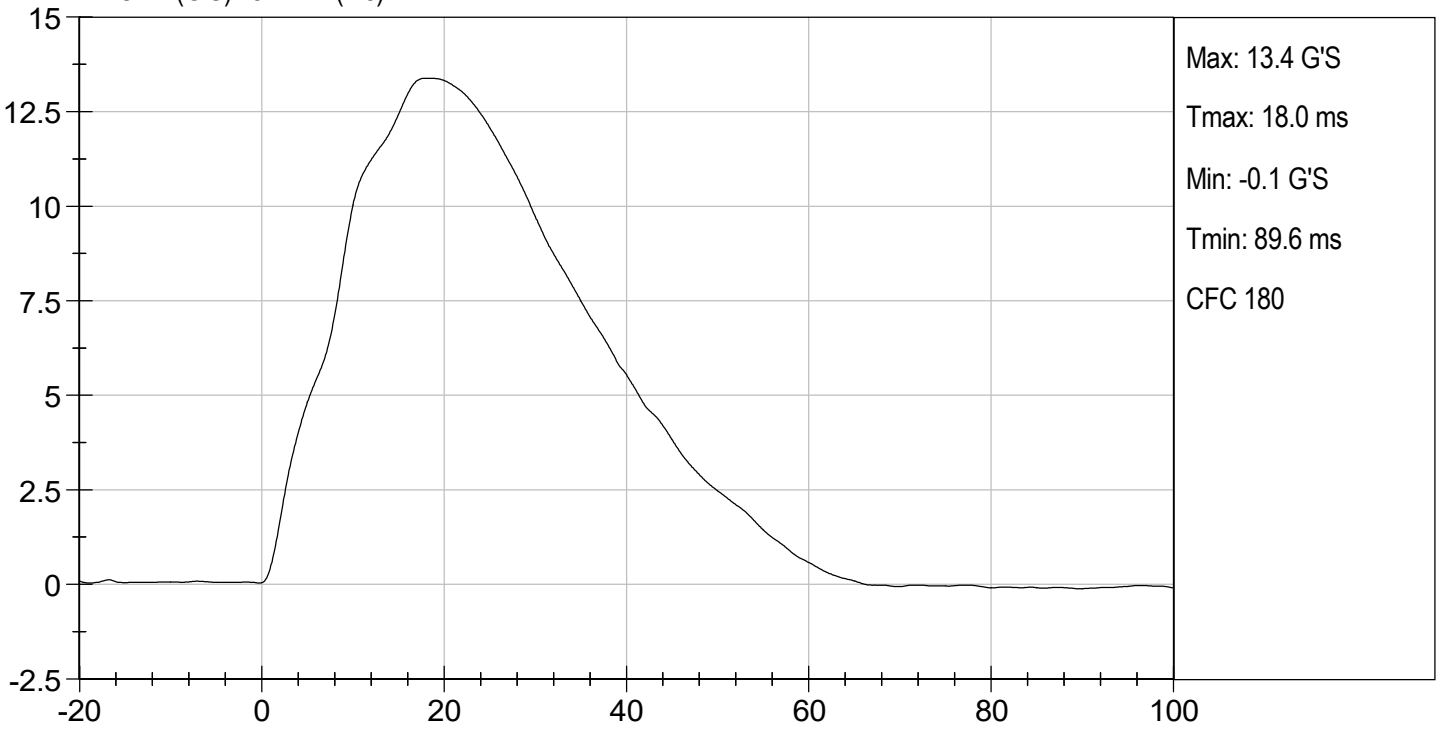
05/03/2021
Test Date

Approved By

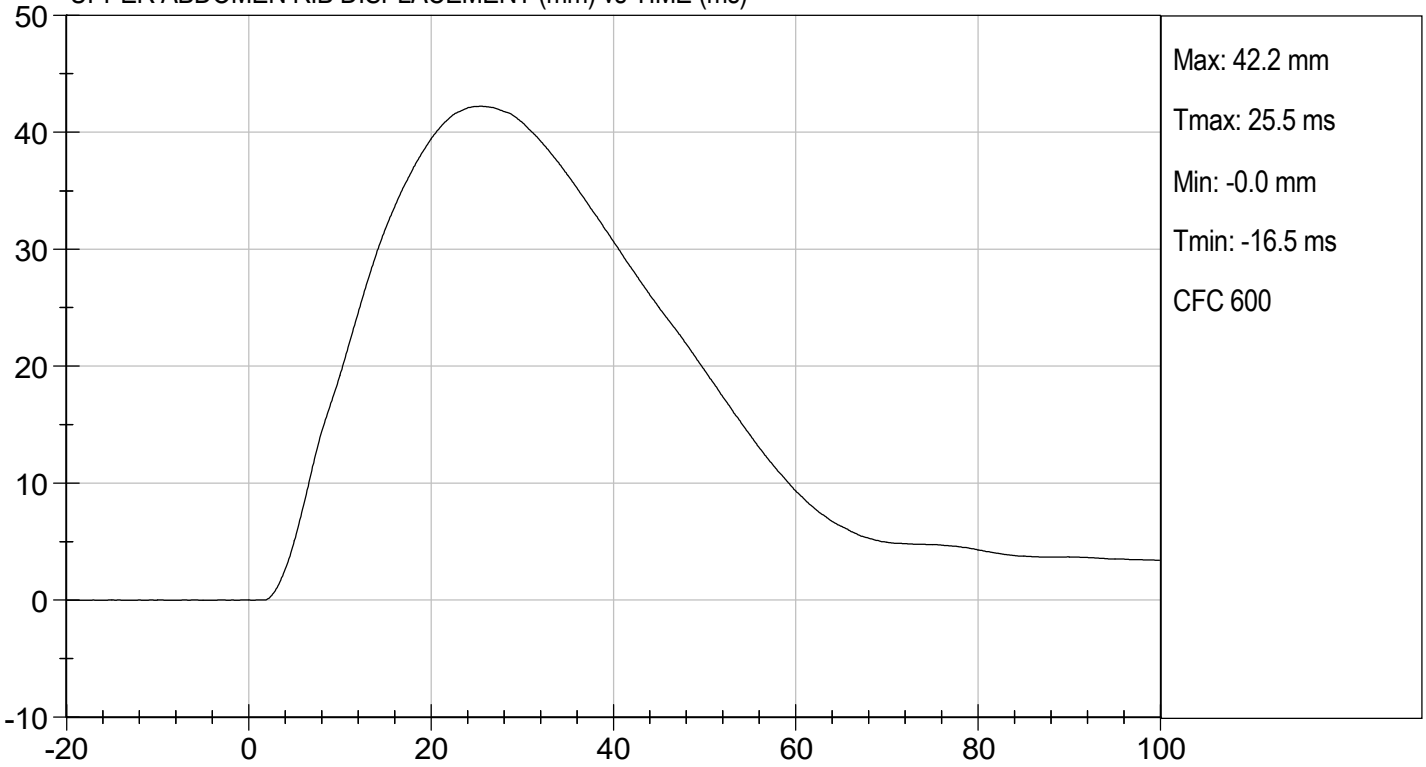
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 05/03/2021
TEST #: D211556

PROBE (G'S) vs TIME (ms)



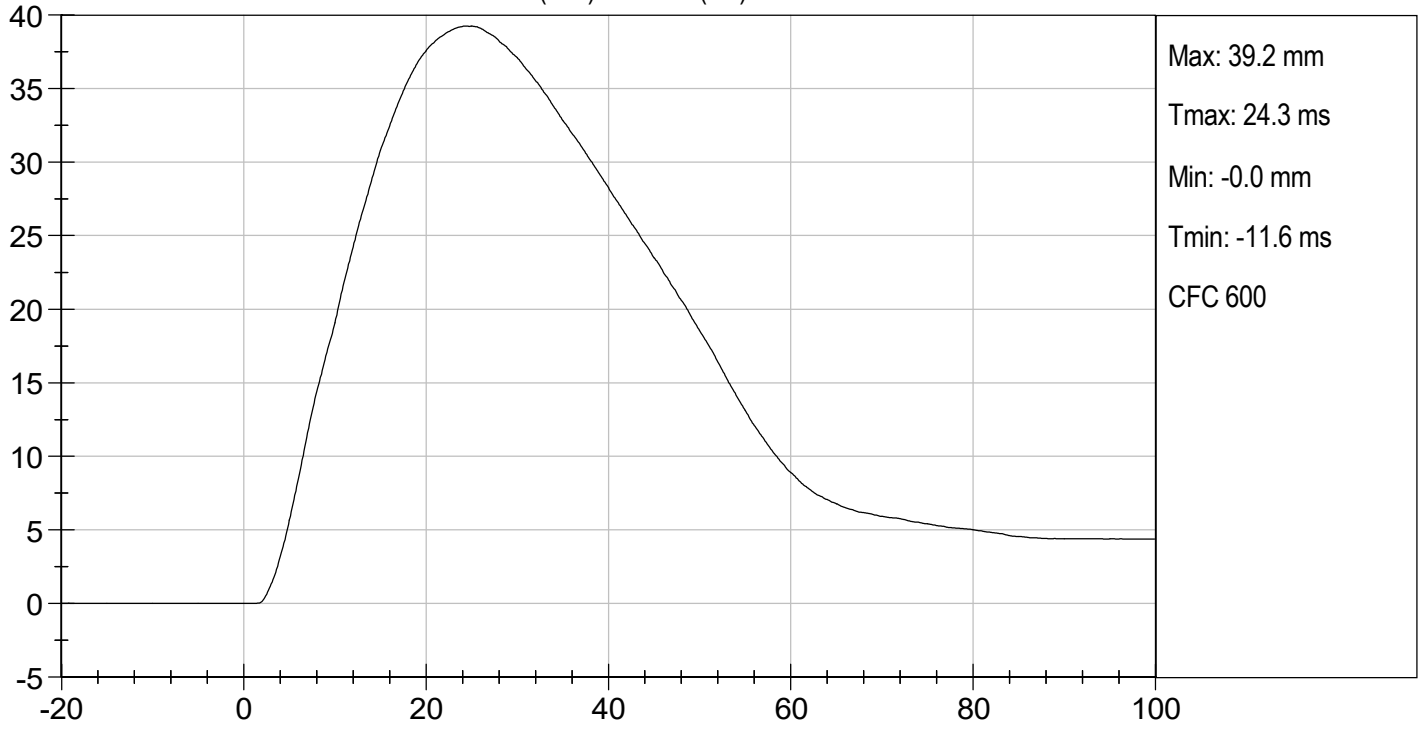

UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



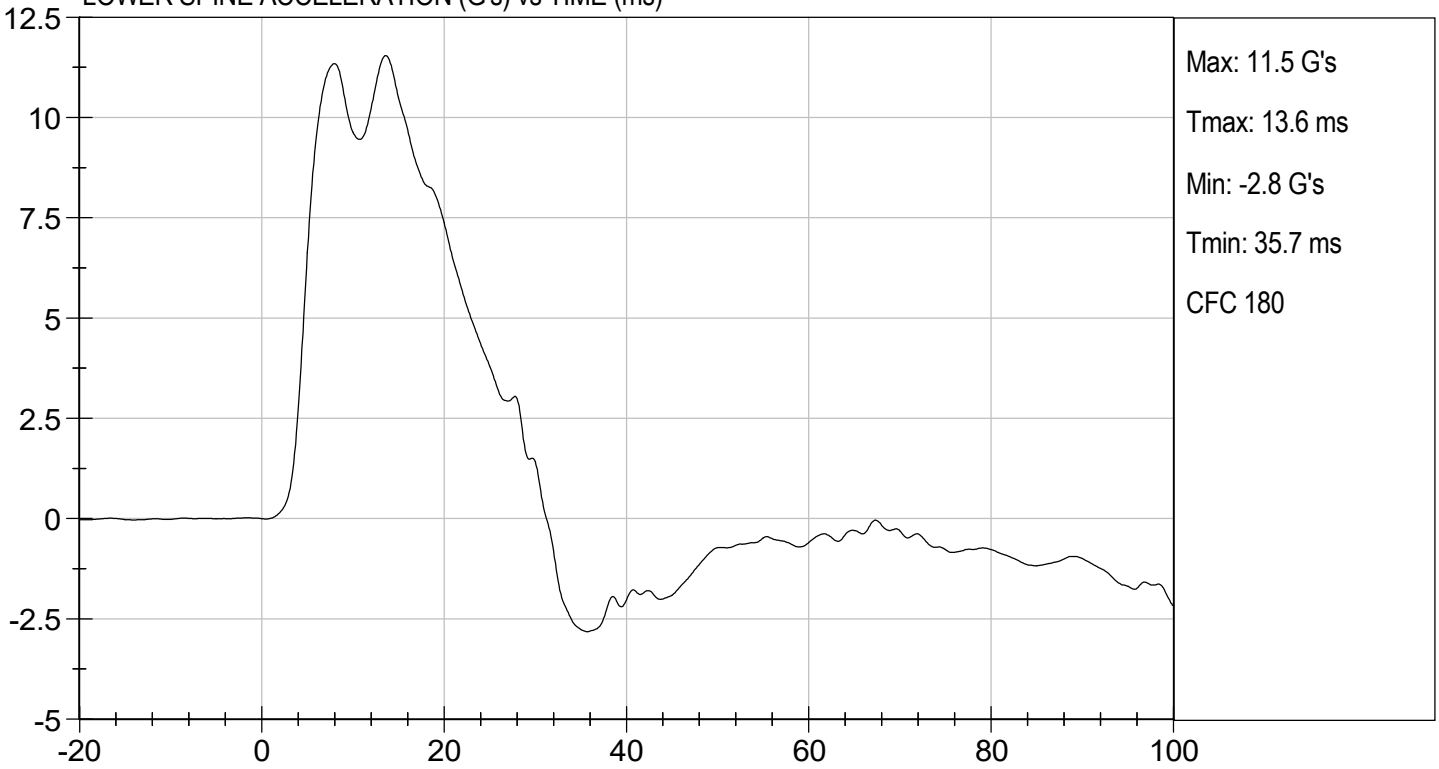
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 05/03/2021
TEST #: D211556

LOWER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)




LOWER SPINE ACCELERATION (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**PELVIS IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211557

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.4 | Pass |
| Humidity | % | 10 to 70 | 44 | Pass |
| Impact Velocity | m/s | 6.60 to 6.80 | 6.61 | Pass |
| Maximum Probe Acceleration | G's | 38 to 47 | 42 | Pass |
| Pelvis Y Acceleration After 6 ms | G's | 34 to 42 | 37 | Pass |
| Peak Acetabulum Force | N | 3600 to 4300 | 3,837 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

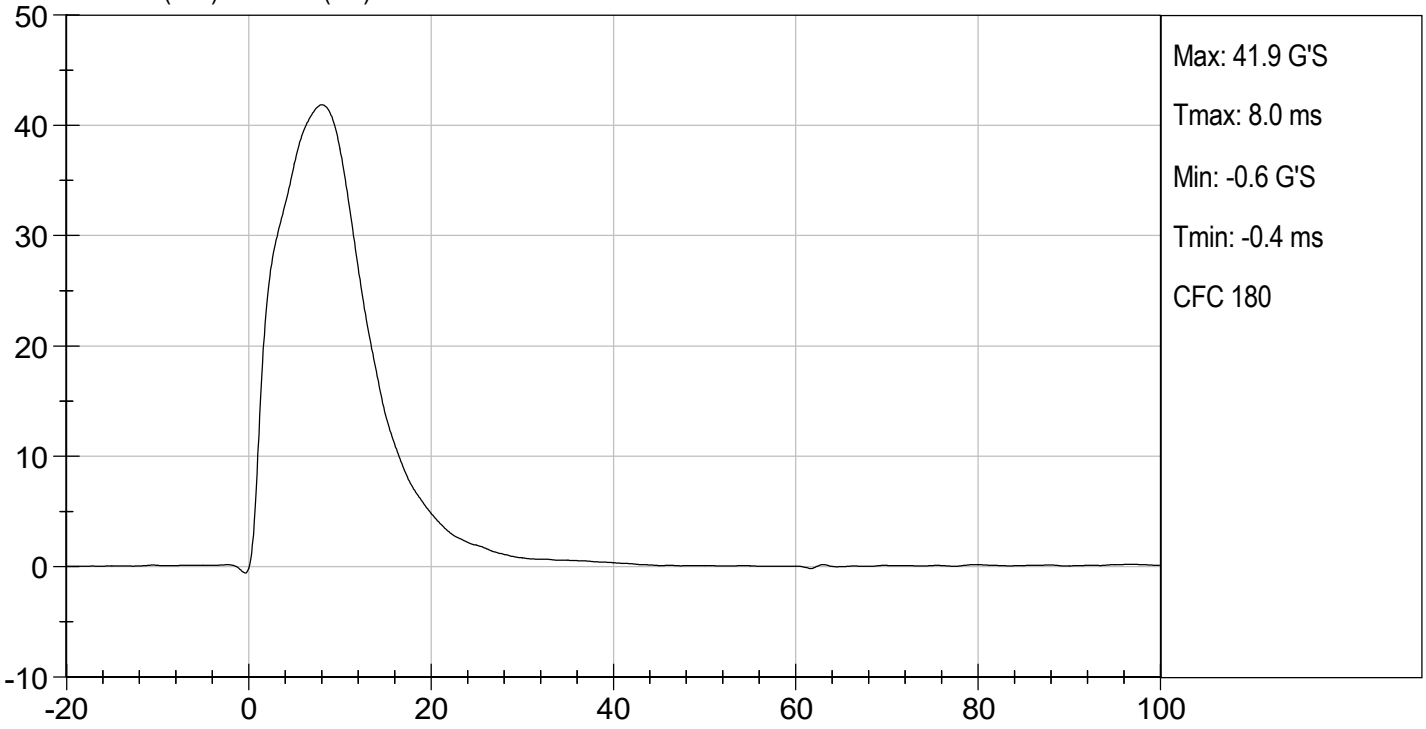
05/03/2021
Test Date

Approved By

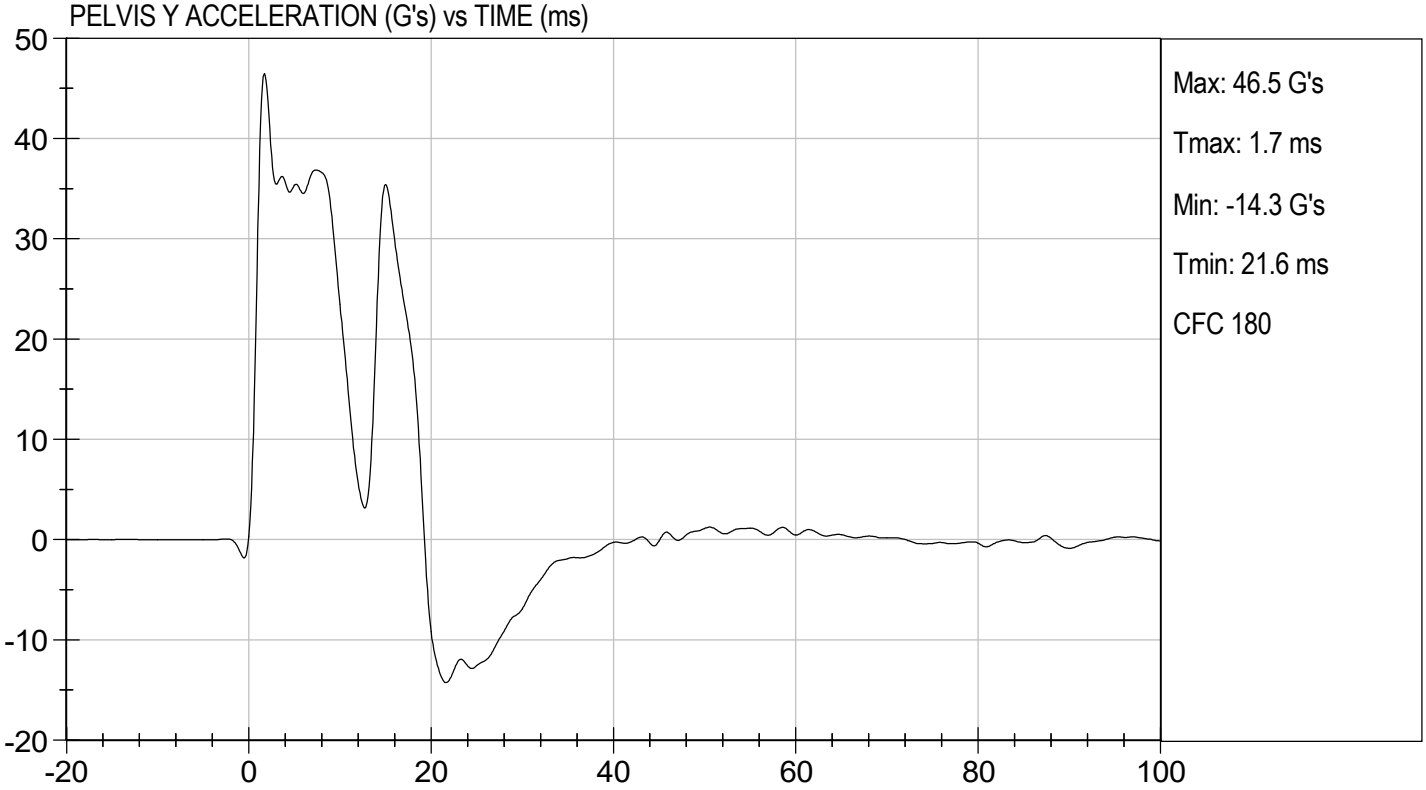
TEST DESC: PELVIS IMPACT
VELOCITY: 21.67 ft/s, 6.61 m/s

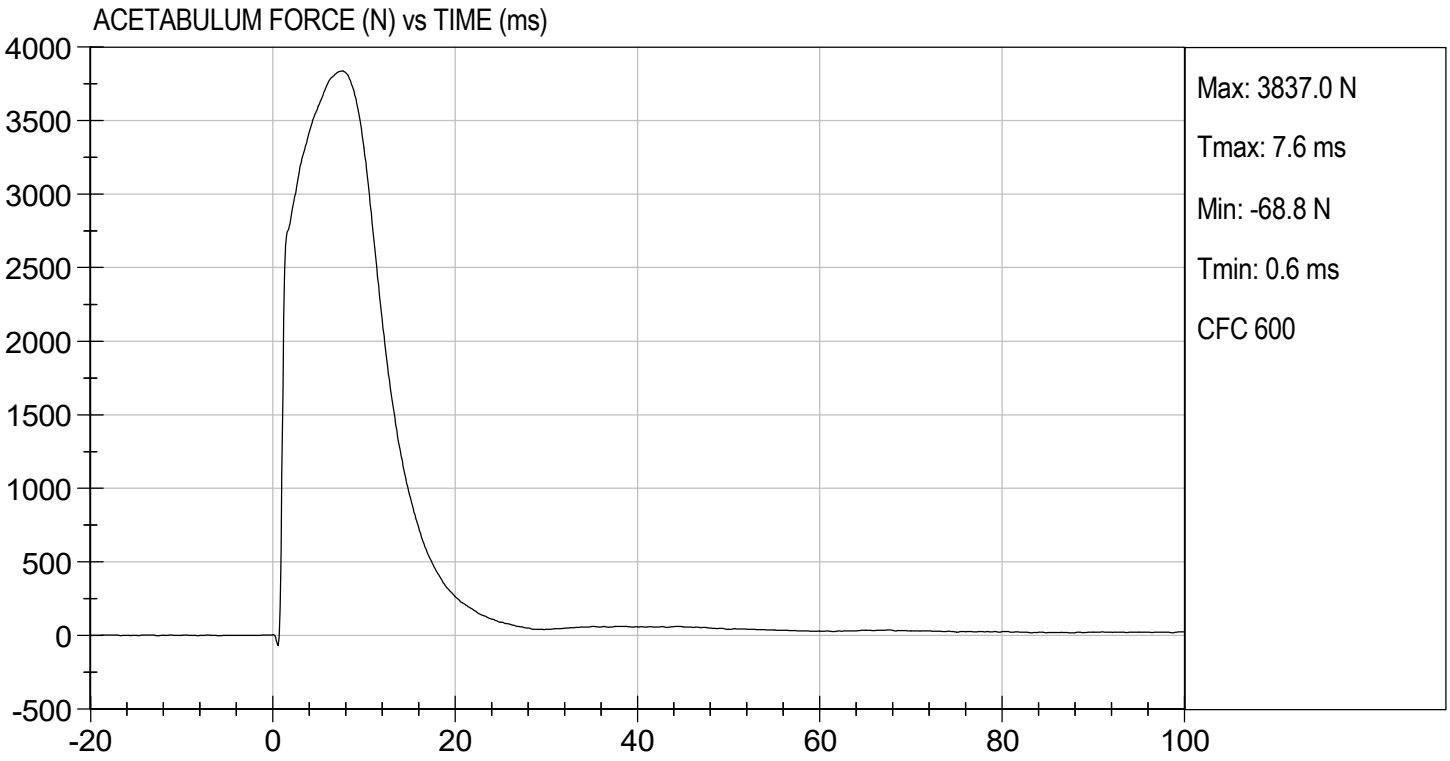
TEST DATE: 05/03/2021
TEST #: D211557

PROBE (G'S) vs TIME (ms)




PELVIS Y ACCELERATION (G's) vs TIME (ms)




ACETABULUM FORCE (N) vs TIME (ms)
4000
3500
3000
2500
2000
1500
1000
500
0
-500
-20
0
20
40
60
80
100
Max: 3837.0 N
Tmax: 7.6 ms
Min: -68.8 N
Tmin: 0.6 ms
CFC 600

**MGA RESEARCH CORPORATION**

**ILIAC IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D211558

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Humidity | % | 10 to 70 | 33 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.23 | Pass |
| Maximum Probe Acceleration | G's | 36 to 45 | 39 | Pass |
| Pelvis Y Acceleration | G's | 28 to 39 | 33 | Pass |
| Peak Pelvis Iliac Force | N | 4100 to 5100 | 4,397 | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

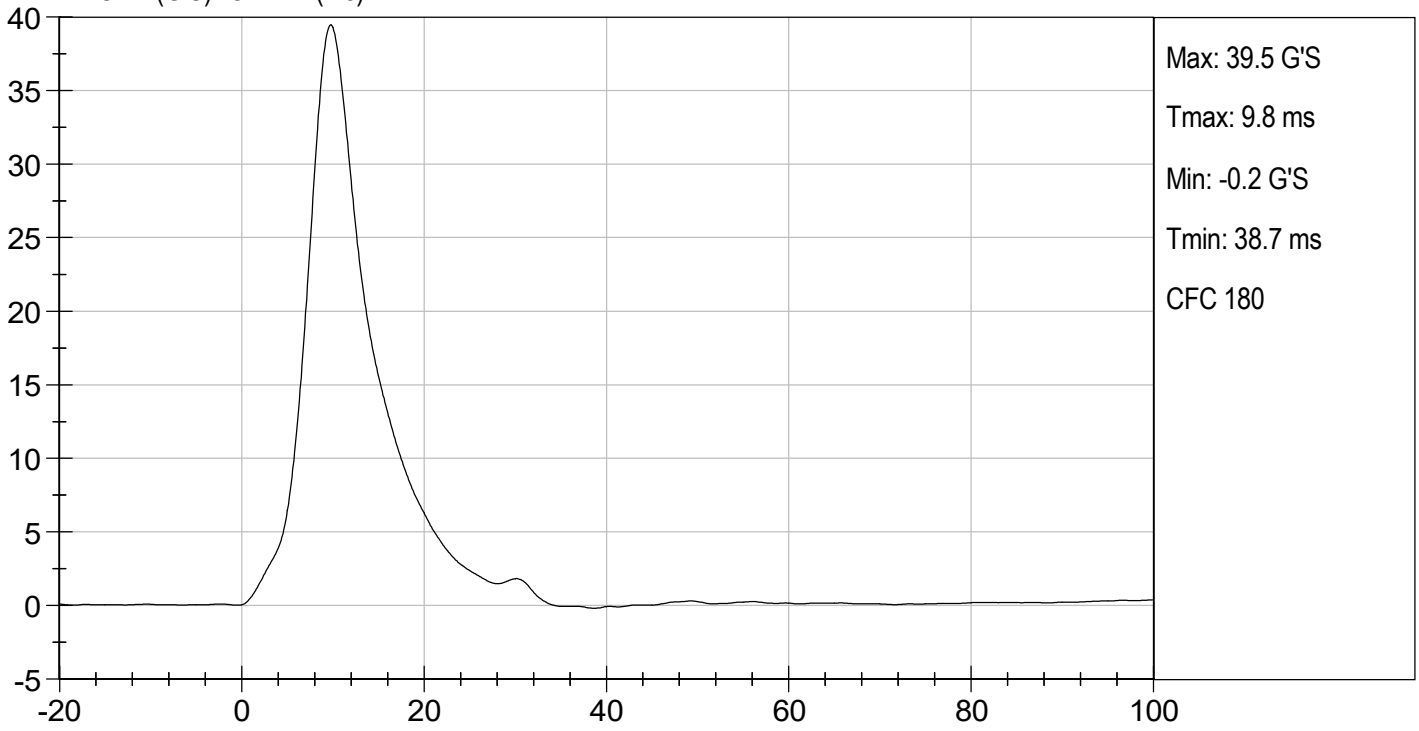
04/30/2021
Test Date

Approved By

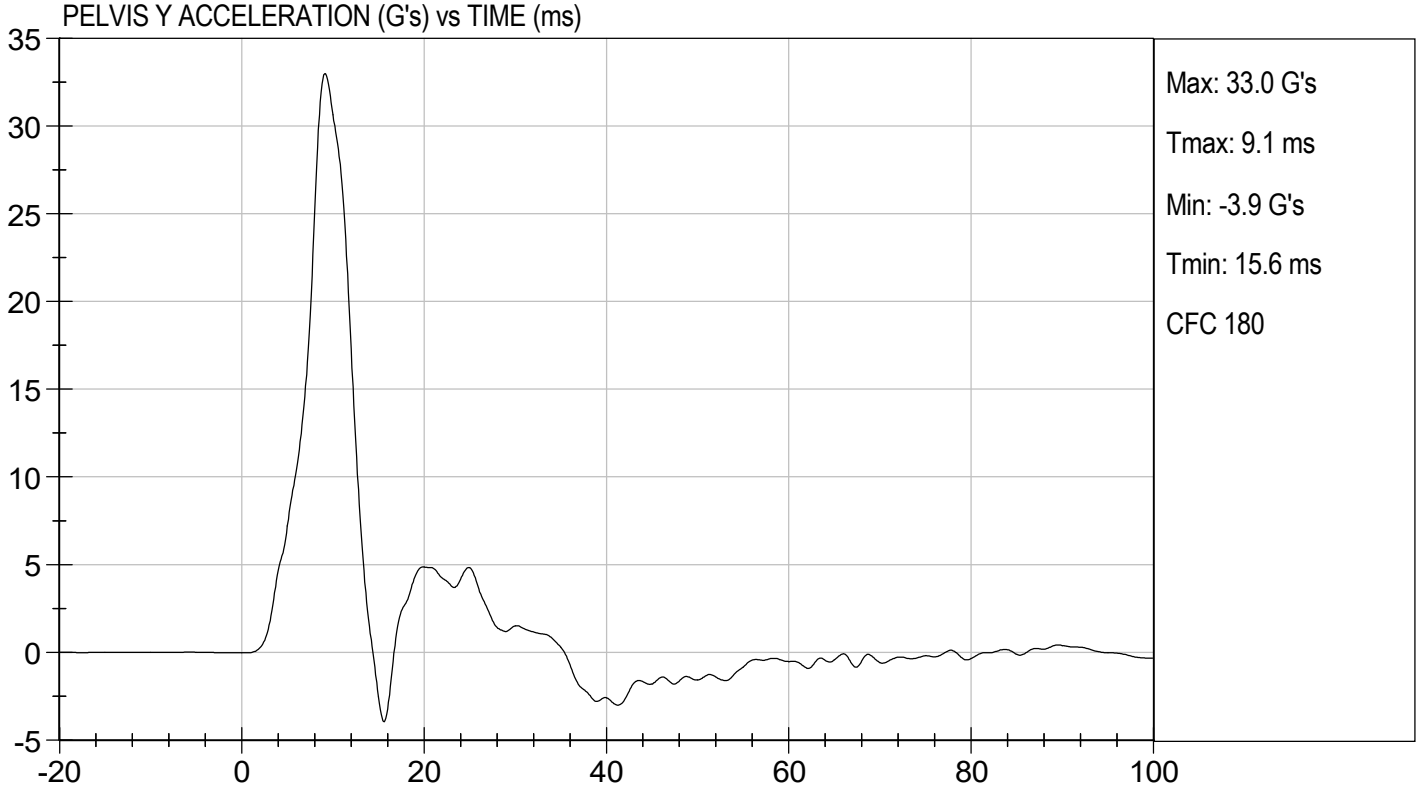
TEST DESC: ILIAC
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 04/30/2021
TEST #: D211558

PROBE (G'S) vs TIME (ms)

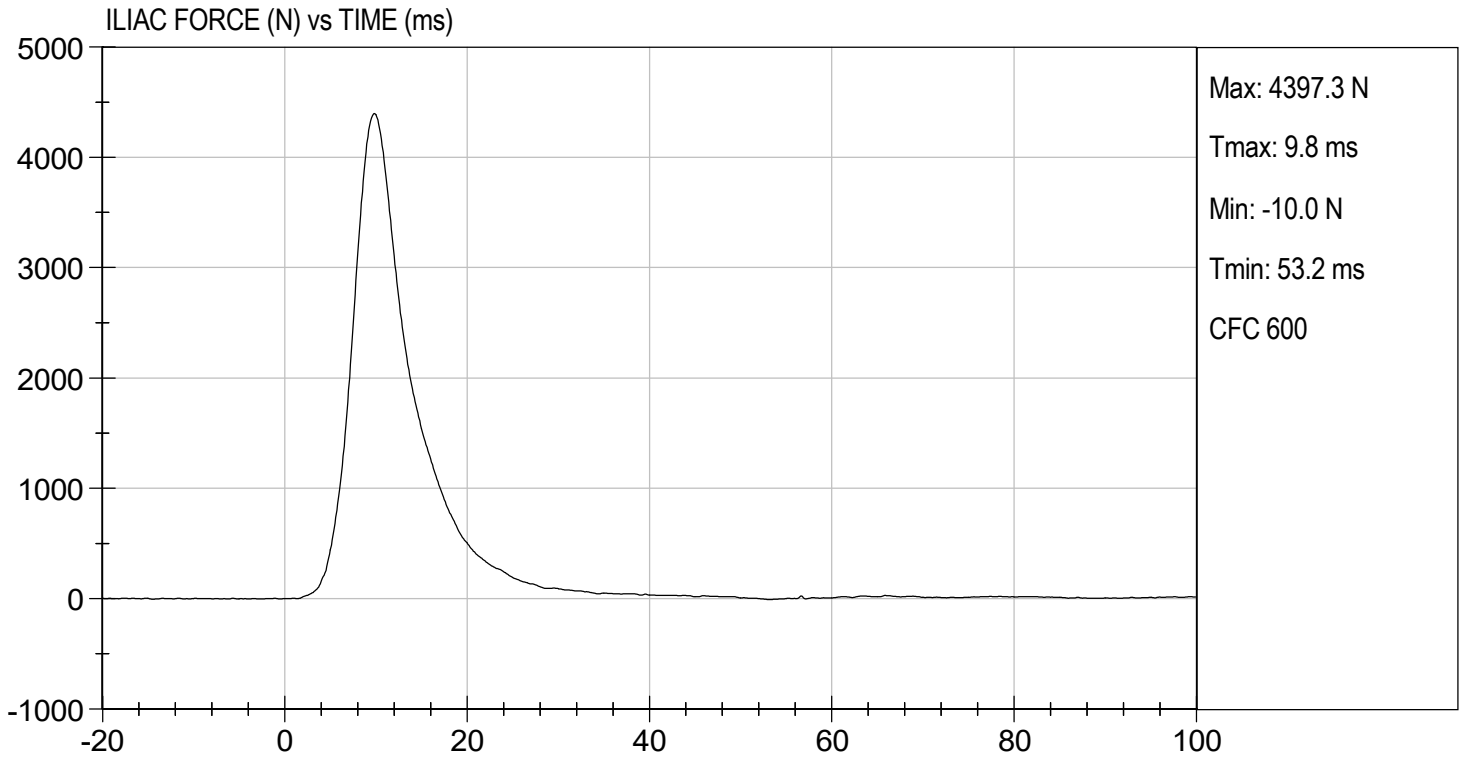



PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILIAC
VELOCITY: 13.89 ft/s, 4.23 m/s

TEST DATE: 04/30/2021
TEST #: D211558



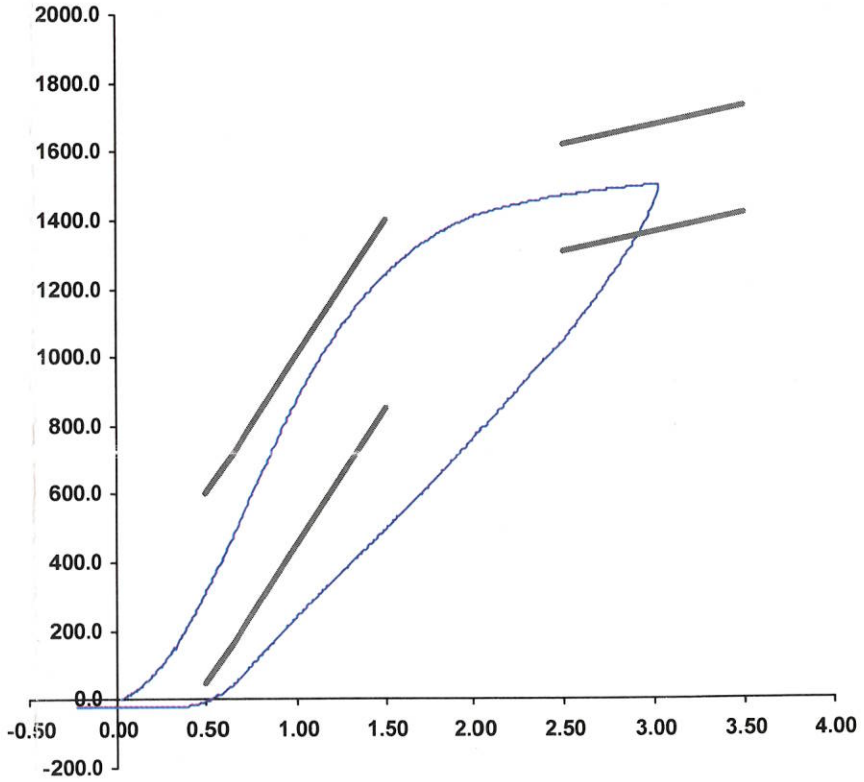
SACO RESEARCH

## SID-IIs Pelvis Plug Certification Test

Plug S/N 14003
Test Number 13477
Report Number 13522
Test Date 5/22/2020 11:14:44 AM

| | Test Results | Spec Min | Spec Max |
|---|---|---|---|
| Force @ 0.5 mm (N) | 318.15 | 50.00 | 600.00 |
| Force @ 1.5 mm (N) | 1,239.67 | 850.00 | 1,400.00 |
| Force @ 2.5 mm (N) | 1,467.17 | 1,306.00 | 1,618.00 |
| Force @ 3.0 mm (N) | 1,497.72 | 1,361.00 | 1,673.00 |

Force (-N) vs Extension (-mm)




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 22-May-20
SACO Research

By : _____ Date 5-22-2020

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

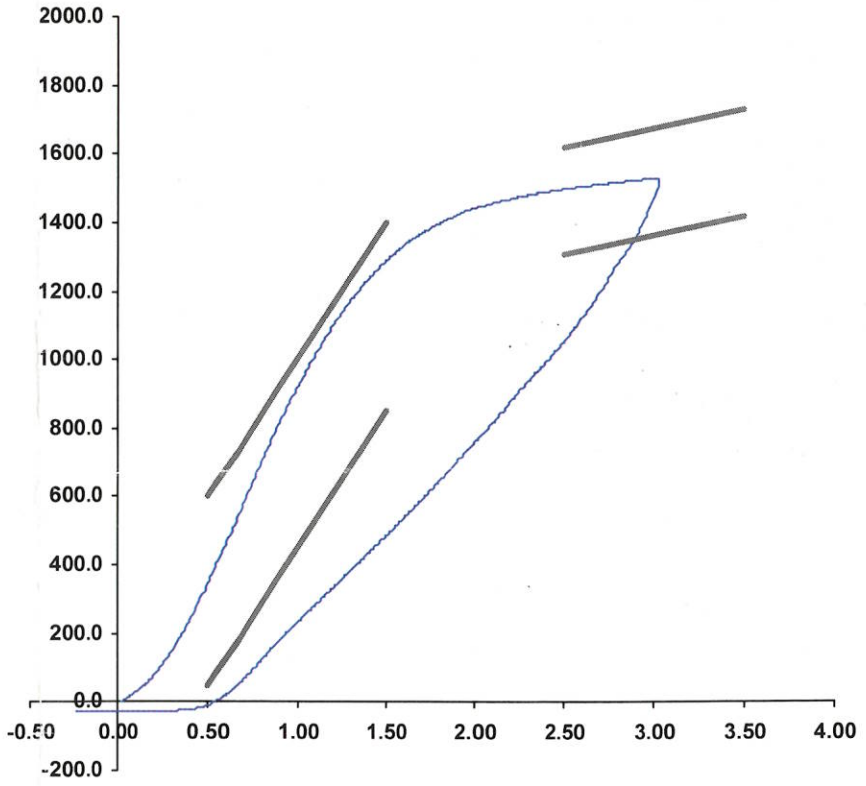
SACO RESEARCH

## SID-IIs Pelvis Plug Certification Test

Plug S/N 14065
Test Number 13539
Report Number 13584
Test Date 5/25/2020 11:21:42 AM

| | Test Results | Spec Min | Spec Max |
|---|---|---|---|
| Force @ 0.5 mm (N) | 355.28 | 50.00 | 600.00 |
| Force @ 1.5 mm (N) | 1,287.50 | 850.00 | 1,400.00 |
| Force @ 2.5 mm (N) | 1,495.81 | 1,306.00 | 1,618.00 |
| Force @ 3.0 mm (N) | 1,528.01 | 1,361.00 | 1,673.00 |

Force (-N) vs Extension (-mm)




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 14061

Part Number 180-4450

Template No 107 25-May-20
SACO Research

By : DC Date : 5-25-2020

# APPENDIX D
# TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

**Table 1 – Dummy Instrumentation (ES-2re)**

| | | | ES-2re S/N F032 | | |
|---|---|---|---|---|---|
| | | | Serial Number | Manufacturer | Calibration Date |
| Head CG Accelerometers | | X | P79750 | Endevco | 01/20/2021 |
| | | Y | P79751 | Endevco | 01/20/2021 |
| | | Z | P79753 | Endevco | 01/20/2021 |
| | | Xr | P79711 | Endevco | 01/20/2021 |
| | | Yr | P79712 | Endevco | 01/20/2021 |
| | | Zr | P88170 | Endevco | 01/20/2021 |
| Thorax Rib Displacement Potentiometers | Upper | Y | G176 | Honeywell | 12/21/2020 |
| | Middle | Y | G169 | Honeywell | 12/21/2020 |
| | Lower | Y | G164 | Honeywell | 12/21/2020 |
| Abdomen Load Cells | Forward | Y | ABG1513 | Denton | 07/27/2020 |
| | Middle | Y | ABG1531 | Denton | 07/27/2020 |
| | Rear | Y | ABG1536 | Denton | 07/27/2020 |
| Lower Spine Accelerometers (T12) | | X | P79574 | Endevco | 01/20/2021 |
| | | Y | P82097 | Endevco | 01/20/2021 |
| | | Z | P82603 | Endevco | 01/20/2021 |
| Public Symphysis Load Cell | | Y | PG462 | Denton | 07/27/2020 |

**Table 2 – Dummy Instrumentation (SID-IIs)**

| | | | | SID-IIs S/N 306 | | |
|---|---|---|---|---|---|---|
| | | | | Serial Number | Manufacturer | Calibration Date |
| Head CG Accelerometers | | | X | P79445 | Endevco | 01/18/2021 |
| | | | Y | P79721 | Endevco | 01/18/2021 |
| | | | Z | P79724 | Endevco | 01/18/2021 |
| | | | Xr | P84999 | Endevco | 01/18/2021 |
| | | | Yr | P85000 | Endevco | 01/18/2021 |
| | | | Zr | P85001 | Endevco | 01/18/2021 |
| Head Angular Rate Sensors | | | X | ARS7391 | DTS | 08/04/2020 |
| | | | Y | ARS7475 | DTS | 08/04/2020 |
| | | | Z | ARS7516 | DTS | 08/04/2020 |
| Displacement Potentiometers | Thoracic Rib | Upper | Y | G033 | FTSS | 12/22/2020 |
| | | Middle | Y | 2403 | Servo | 12/31/2020 |
| | | Lower | Y | G1270 | FTSS | 12/22/2020 |
| | Abdominal Rib | Upper | Y | G032 | FTSS | 12/22/2020 |
| | | Lower | Y | G1304 | FTSS | 12/22/2020 |
| Lower Spine Accelerometers (T12) | | | X | P96332 | Endevco | 01/18/2021 |
| | | | Y | P96335 | Endevco | 01/18/2021 |
| | | | Z | P96341 | Endevco | 01/18/2021 |
| Acetabulum Load Cell | | | Y | ACG268 | Denton | 11/23/2020 |
| Iliac Wing Load Cell | | | Y | IWG273 | Denton | 11/23/2020 |
| Pelvis Plug (struck side) | | | | 14003 | SACO | 05/22/2020 |
| Pelvis Plug (non-struck side) | | | | 14065 | SACO | 05/25/2020 |

**Table 3 – Vehicle Instrumentation**

| | | | Serial Number | Manufacturer | Calibration Date |
|---|---|---|---|---|---|
| 1 | Vehicle Center of Gravity | X | A377295 | MSI | 03/12/2021 |
| | Vehicle Center of Gravity | Y | A377308 | MSI | 03/12/2021 |
| | Vehicle Center of Gravity | Z | A370346 | MSI | 03/12/2021 |
| 2 | Right Sill at Front Seat | X | A377279 | PCB | 03/10/2021 |
| | Right Sill at Front Seat | Y | A377274 | PCB | 03/10/2021 |
| | Right Sill at Front Seat | Z | A377270 | PCB | 03/10/2021 |
| 3 | Right Sill at Rear Seat | X | PCB1432 | MSI | 02/17/2021 |
| | Right Sill at Rear Seat | Y | PCB1430 | MSI | 02/19/2021 |
| | Right Sill at Rear Seat | Z | PCB1444 | MSI | 02/10/2021 |
| 4 | Left Sill at Front Door | Y | T20368 | MSI | 02/19/2021 |
| 5 | Left Sill at Rear Door | Y | A360951 | MSI | 12/09/2020 |
| 6 | Left A-Post Lower | Y | A370344 | MSI | 03/09/2021 |
| 7 | Left A-Post Middle | Y | A370352 | MSI | 03/09/2021 |
| 8 | Left B-Post Lower | Y | A337226 | MSI | 12/03/2020 |
| 9 | Left B-Post Middle | Y | A356218 | MSI | 12/18/2020 |
| 10 | Front Seat Track | Y | A360949 | MSI | 12/08/2020 |
| 11 | Rear Seat Track or Structure | Y | A370353 | MSI | 11/21/2020 |
| 12 | Right Rear Occ. Compartment | Y | A370356 | MSI | 03/09/2021 |
| 13 | Engine Block | X | PCB1437 | MSI | 02/15/2021 |
| | Engine Block | Y | PCB1279 | MSI | 02/15/2021 |
| 14 | Rear Floorpan Above Axle | X | PCB1399 | MSI | 02/17/2021 |
| | Rear Floorpan Above Axle | Y | PCB1403 | MSI | 02/15/2021 |
| | Rear Floorpan Above Axle | Z | PCB1337 | MSI | 02/09/2021 |

**Table 4 – MDB Instrumentation**

| | | Serial Number | Manufacturer | Calibration Date |
|---|---|---|---|---|
| MDB Center of Gravity | X | PCB796D | PCB | 06/03/2020 |
| MDB Center of Gravity | Y | PCB246D | PCB | 06/03/2020 |
| MDB Center of Gravity | Z | PCB794D | PCB | 06/03/2020 |
| Left Frame at Rear Axle Centerline | X | PCB1653D | PCB | 06/03/2020 |
| Left Frame at Rear Axle Centerline | Y | PCB1423D | PCB | 06/03/2020 |