**REPORT NUMBER: SINCAP-MGA-19-049**

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

**FORD MOTOR CO.**
**2019 Ford F-250 SuperCab XL Truck**
**NHTSA No.: M20190210**

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

**Test Date: July 17, 2019**

**Final Report Date: September 19, 2019**

**FINAL REPORT**

**U.S. DEPARTMENT OF TRANSPORTATION**
**National Highway Traffic Safety Administration**
**Office of Crashworthiness Standards**
**Mail Code: NRM-110**
**1200 New Jersey Ave, SE**
**Room W43-410**
**Washington, DC 20590**

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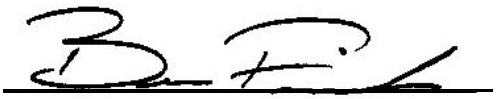
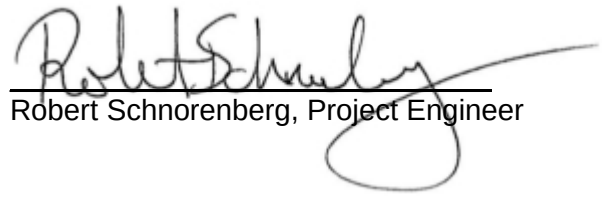
Prepared by: 
Ben Fischer, Project Engineer

Approved by: 
Robert Schnorenberg, Project Engineer

Approval Date: September 19, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

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

Date: _____

## TECHNICAL REPORT DOCUMENTATION PAGE

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| 4. Title and Subtitle | 5. Report Date |
|---|---|
| Final Report of New Car Assessment Program<br>Side Impact MDB Testing of 2019 Ford F-250 SuperCab XL Truck,<br>NHTSA No.: M20190210 | September 19, 2019 |
| | **6. Performing Organization Code**<br>MGA |
| **7. Author(s)**<br>Ben Fischer, Project Engineer | **8. Performing Organization Report No.**<br>SINCAP-MGA-19-049 |
| ***9. Performing Organization Name and Address***<br>MGA Research Corporation<br>5000 Warren Road<br>Burlington, WI 53105 | **10. Work Unit No.** |
| | **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 2019 Ford F-250 SuperCab XL Truck in accordance with the specifications of the Office of Crashworthiness Standards NCAP Side Laboratory Test Procedure for the generation of consumer information on vehicle side crash protection. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on July 17, 2019.

The impact velocity of the Moving Deformable Barrier (MDB) was 61.86 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle at the time of impact was 21.6°C. The target vehicle post-test maximum crush was 172 mm at level 1. The test vehicle's performance was as follows:

| Measurement Description | Units | Driver ATD (ES-2re) | |
|---|---|---|---|
| | | Threshold | Result |
| Head Injury Criteria ($HIC_{36}$) | | 1000 | 12 |
| Maximum Thorax Rib Deflection | mm | 44 | 18 |
| Total Abdominal Force | N | 2500 | 517 |
| Pubic Symphysis Force | N | 6000 | 556 |
| Resultant Lower Spine Acceleration | g | 82* | 23 |

| Measurement Description | Units | Passenger ATD (SID-IIs) | |
|---|---|---|---|
| | | Threshold | Result |
| Head Injury Criteria ($HIC_{36}$) | | 1000 | 37 |
| Resultant Lower Spine Acceleration | g | 82 | 19 |
| Total Pelvic Force (sum of acetabular and iliac forces) | N | 5525 | 246 |
| Maximum Thoracic Rib Deflection | mm | 38* | 2 |
| Maximum Abdomen Rib Deflection | mm | 45* | 0 |

*Proposed IARV

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



| ***17. Key Words*** | ***18. Distribution Statement*** |
|---|---|
| New Car Assessment Program (NCAP)<br>Side Impact<br>MDB<br>ES-2re<br>SID-IIs | Copies of this report are available from:<br>National Highway Traffic Safety Administration<br>Technical Information Services Division, NPO-411<br>1200 New Jersey Ave, SE<br>Washington, DC 20590 |

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|---|---|---|---|
| Unclassified | Unclassified | 227 | |

## TABLE OF CONTENTS

## SECTION 1
## TEST PURPOSE AND PROCEDURE

This moving deformable barrier side impact test is part of the MY 2019 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00353. The purpose of this test is to generate comparative side impact performance in a 2019 Ford F-250 SuperCab XL Truck. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Laboratory Test Procedure dated October 2015.

## SECTION 2
## SUMMARY OF TEST RESULTS

A 2019 Ford F-250 SuperCab XL Truck was impacted on the left (driver's) side by a Moving Deformable Barrier (MDB) which was moving forward in a 27° crabbed position to the tow road guidance system at a velocity of 61.86 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 July 17, 2019. 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 October 2015. 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
Primary Head CG 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 | 12 |
| Maximum Thorax Rib Deflection | mm | 44 | 18 |
| Total Abdominal Force | N | 2500 | 517 |
| Pubic Symphysis Force | N | 6000 | 556 |
| Resultant Lower Spine Acceleration | g | 82* | 23 |

| Measurement Description | Units | Passenger ATD (SID-IIs) | |
|---|---|---|---|
| | | Threshold | Result |
| Head Injury Criteria ($HIC_{36}$) | | 1000 | 37 |
| Resultant Lower Spine Acceleration | g | 82 | 19 |
| Total Pelvic Force (sum of acetabular and iliac forces) | N | 5525 | 246 |
| Maximum Thoracic Rib Deflection | mm | 38* | 2 |
| Maximum Abdomen Rib Deflection | mm | 45* | 0 |

*Proposed IARV

Supplemental restraint information is given below:

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

| Restraint Type | Struck Side Driver | | Struck Side Left Rear Passenger | |
|---|---|---|---|---|
| | Mounted | Deployed | Mounted | Deployed |
| Frontal Airbag | Yes | No | | |
| Knee Airbag | No | | | |
| Side Curtain Airbag | Yes | Yes | Yes | Yes |
| Side Torso/Pelvis Airbag | Yes | Yes | No | |
| 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**

Passenger Head ARS X, Y, Z were not installed.
Vehicle CG Y recorded no valid data after 15 ms.
Left Front Sill Y recorded questionable data between 32-38 ms.
Left Rear Sill Y recorded no valid data after 22 ms.
Left Lower B-Post Y was not installed.
Left Mid B-Post Y was not installed.

## SECTION 3
## OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

**TEST VEHICLE INFORMATION AND OPTIONS**

| | | | |
|---|---|---|---|
| NHTSA No. | M20190210 | Traction Control System (TCS) | Yes |
| Model Year | 2019 | Auto-Leveling System | No |
| Make | Ford | Automatic Door Locks (ADL) | Yes |
| Model | F-250 SuperCab XL | Power Window Auto-Reverse | Yes |
| Body Style | Truck | Other Optional Feature | No |
| VIN | 1FT7X2A64KED99364 | Driver Front Airbag | Yes |
| Body Color | Magnetic | Driver Curtain Airbag | Yes |
| Odometer Reading (km/mi) | 47 km / 29 mi | Driver Head/Torso Airbag | No |
| Engine Displacement (L) | 6.2 L | Driver Torso Airbag | No |
| Type/No. Cylinders | V8 | Driver Torso/Pelvis Airbag | Yes |
| Engine Placement | Longitudinal | Driver Pelvis Airbag | No |
| Transmission Type | Automatic | Driver Knee Airbag | No |
| Transmission Speeds | 6 | Rear Pass. Curtain Airbag | Yes |
| Overdrive | Yes | Rear Pass. Head/Torso Airbag | No |
| Final Drive | RWD | Rear Pass. Torso Airbag | No |
| Roof Rack | No | Rear Pass. Torso/Pelvis Airbag | No |
| 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 Restraint Feature | N/A |

| | |
|---|---|
| Does owner's manual provide instruction to turn off automatic door locks? | Yes |

**DATA FROM CERTIFICATION LABEL**

| | |
|---|---|
| Manufactured By | FORD MOTOR CO. |
| Date of Manufacture | 01/19 |

| | |
|---|---|
| GVWR (kg) | 4536 |
| GAWR Front (kg) | 1792 |
| GAWR Rear (kg) | 2876 |

**VEHICLE SEATING AND WEIGHT CAPACITY DATA**

| Measured Parameter | Front | Rear | Third | Total | |
|---|---|---|---|---|---|
| Designated Seating Capacity (DSC) | 3 | 3 | | 6 | |
| Capacity Weight (VCW) (kg) | | | | 1769 | (A) |
| DSC x 68.04 kg | | | | 408 | (B) |
| Rated Cargo and Luggage Weight (RCLW) (kg) | | | | 136* | (A-B) |

* Rated Cargo and Luggage Weight (RCLW) limited to maximum of 300 lbs (136 kg).

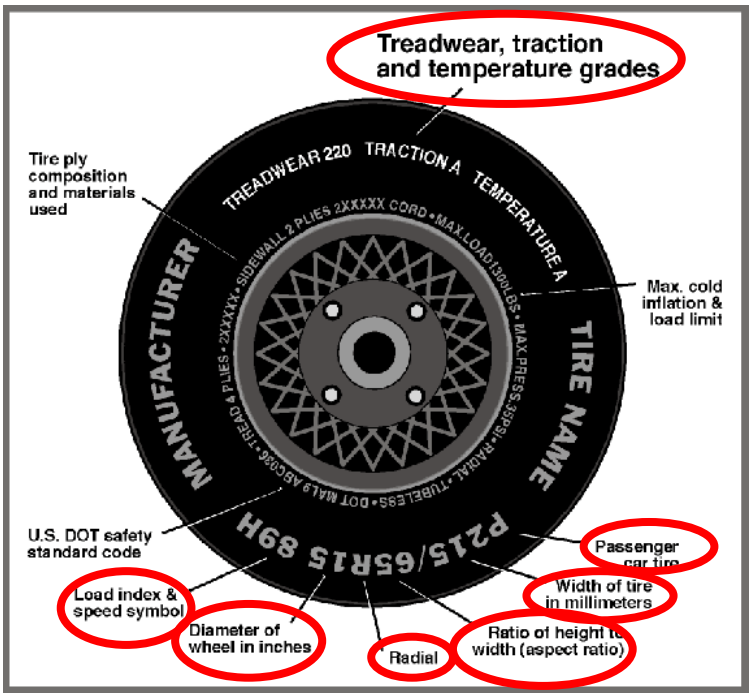
**VEHICLE SEAT TYPE**

| Seating Location | Type of Seat Pan | | | | Type of Seat Back | | |
|---|---|---|---|---|---|---|---|
| | Bucket | Bench | Split Bench | Contoured | Fixed | Adjustable | |
| | | | | | | Manual | Power |
| 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: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019

**VEHICLE TIRE INFORMATION**




| Measured Parameter | Front | Rear |
|---|---|---|
| Max. Tire Pressure (kPa) | 550 | 550 |
| Cold Pressure (kPa) | 420 | 520 |
| Recommended Tire Size | LT275/65R18 | LT275/65R18 |
| Tire Size on Vehicle | LT275/65R18 | LT275/65R18 |
| Tire Manufacturer | Continental | Continental |
| Tire Model | ContiTrac | ContiTrac |
| Treadwear | None | None |
| Traction | None | None |
| Temperature Grade | None | None |
| Tire Plies Sidewall | 2 Polyester | 2 Polyester |
| Tire Plies Body | 2 Polyester, 2 Steel, 2 Polyamide | 2 Polyester, 2 Steel, 2 Polyamide |
| Load Index/Speed Symbol | 123 / 120 S | 123 / 120 S |
| Tire Material | Rubber | Rubber |
| DOT Safety Code Left | A3B9 H00R 5118 | A3B9 H00R 5118 |
| DOT Safety Code Right | A3B9 H00R 5118 | A3B9 H00R 5119 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

**TEST VEHICLE TIRE PRESSURES**

| | Units | LF | RF | LR | RR |
|---|---|---|---|---|---|
| As Delivered | kPa | 380 | 380 | 460 | 460 |
| Tire Placard | kPa | 420 | 420 | 520 | 520 |
| Owner's Manual | kPa | 420 | 420 | 520 | 520 |
| As Tested | kPa | 420 | 420 | 520 | 520 |

**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 | 777.0 | 597.0 | | 815.5 | 704.0 | | 816.5 | 724.5 | |
| Right | kg | 768.5 | 593.5 | | 781.0 | 693.5 | | 761.0 | 699.0 | |
| Ratio | % | 56.5% | 43.5% | | 53.3% | 46.7% | | 52.6% | 47.4% | |
| Totals | kg | 1545.5 | 1190.5 | 2736.0 | 1596.5 | 1397.5 | 2994.0 | 1577.5 | 1423.5 | 3001.0 |

**TARGET TEST WEIGHT CALCULATION**

| Measured Parameter | Units | Value | |
|---|---|---|---|
| Total Delivered Weight (UVW) | kg | 2736.0 | (A) |
| Sum of Actual Weight of 2 P572 ATDs Used | kg | 129 | (B) |
| Rated Cargo/Luggage Weight (RCLW) | kg | 136 | (C) |
| Calculated Test Vehicle Target Weight (TVTW) | kg | 3001.0 | (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 | 943 | 943 | Yes |
| Right Front | mm | 942 | 934 | Yes |
| Right Rear | mm | 1030 | 1030 | Yes |
| Left Rear | mm | 1045 | 1035 | Yes |
| Vehicle CG (Aft of Front Axle) | mm | 1783 | 1755 | |
| Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline) | mm | 23 | 13 | |

* 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: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

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

| Component Description | Units | Weight |
|---|---|---|
| Weight of Ballast Added | kg | 110 |
| Components Removed: none | kg | |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

**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 | Fixed | Fixed | Fixed |
| Front Passenger Seat | Fixed | Fixed | Fixed |
| Front Center Seat | Fixed | Fixed | Fixed |
| 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 | Fixed | 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 | Fixed | Fixed | Max | Fixed | Fixed | Fixed |
| | | | Mid | Fixed | Fixed | Fixed |
| | | | Min | Fixed | Fixed | Fixed |
| Struck Side Rear Seat | Fixed | Fixed | Max | Fixed | Fixed | Fixed |
| | | | Mid | Fixed | Fixed | Fixed |
| | | | Min | Fixed | Fixed | Fixed |
| Non-Struck Side Rear Seat | Fixed | Fixed | Max | Fixed | Fixed | Fixed |
| | | | Mid | Fixed | Fixed | Fixed |
| | | | Min | Fixed | Fixed | Fixed |
| Rear Center Seat | Fixed | Fixed | Max | Fixed | Fixed | Fixed |
| | | | Mid | Fixed | Fixed | Fixed |
| | | | Min | Fixed | Fixed | Fixed |

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

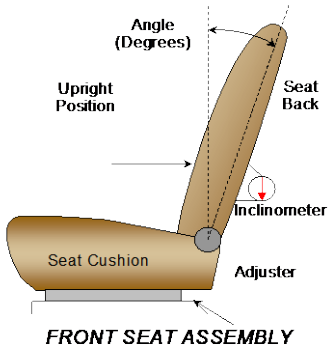
Test Vehicle: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

**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 | 255 | 38 | 131 | 19 |
| Front Passenger Seat | 255 | 38 | 131 | 19 |
| Front Center Seat | Fixed | | Fixed | |
| 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 passenger's seat back is positioned in a similar manner as the driver's seat back. The struck side rear seat back is adjusted following Appendix C, "Positioning Dummies in the Test Vehicle" in the NCAP Laboratory Test Procedure dated October 2015. The rear center and non-struck side rear outboard seat backs are positioned to match 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 | 49.1 | 28 | 2.5 | 9 |
| Front Passenger Seat | 52.2 | 28 | 0.4 | 9 |
| Front Center Seat | Fixed | | Fixed | |
| Struck Side Rear Seat | Fixed | | 3.9 | |
| Non-Struck Side Rear Seat | Fixed | | 3.9 | |
| Rear Center Seat | Fixed | | 3.9 | |

Driver seat back angle measured on headrest post.
Left rear passenger seat back angle measured on headrest post.

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

### SEAT BELT ANCHORAGE ADJUSTMENT

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1.

| | Total # of Positions | Placed in Position # |
|---|---|---|
| Driver Seat | 4 | 0 (Uppermost as 0) |
| Rear Seat | Fixed | |

### HEAD RESTRAINT ADJUSTMENT

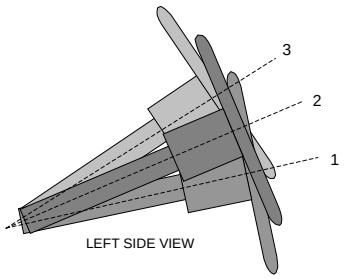
The driver's head restraint is adjusted to the highest and most full forward in-use position. The struck-side rear passenger's head restraint is adjusted to the lowest and most full forward in-use position.

| | 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.

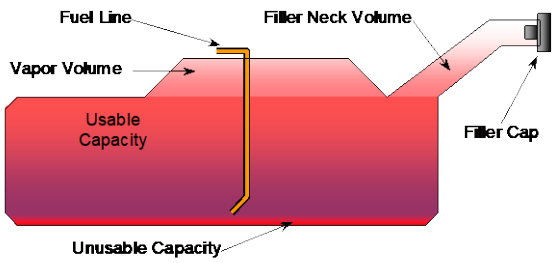
| | Wheel Angle (°) | Fore/Aft Position (mm) |
|---|---|---|
| Lowermost, Position 1 | 69.7 | |
| Geometric Center, Position 2 | 67.7 | |
| Uppermost, Position 3 | 65.7 | |
| Telescoping Steering Wheel Travel | | 42 |
| Test Position | 67.7 | 21 |



*STEERING COLUMN ASSEMBLY*

### FUEL PUMP

The vehicle is equipped with an electronic fuel pump. The electric fuel pump operates for 3 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 3 seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls the fuel pump is deactivated. Also, the fuel pump is shut-off by the restraint control module to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude. 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: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

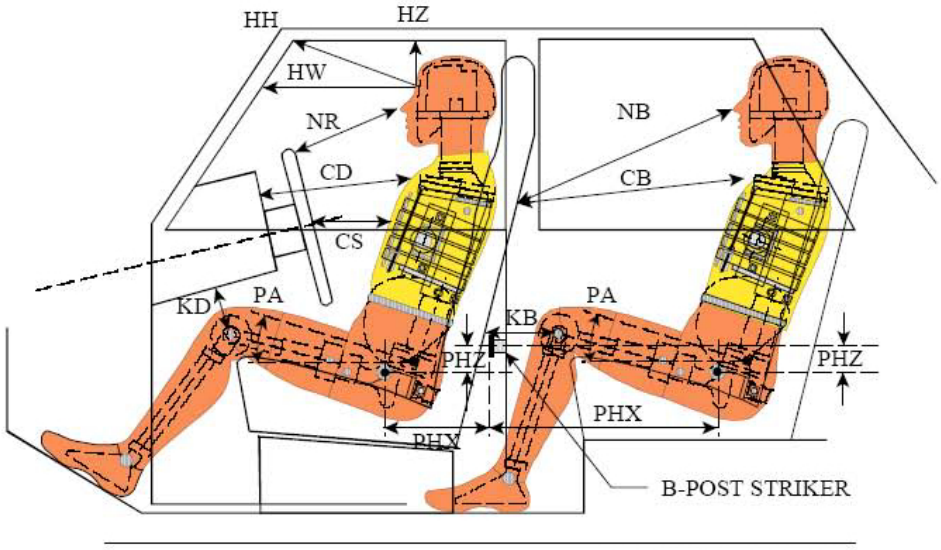
**FUEL TANK CAPACITY DATA**

| | **Liters** |
|---|---|
| Usable Capacity of Standard Tank (see Form No. 1) | 128.7 |
| Usable Capacity of Optional Tank (see Form No. 1) | |
| Usable Capacity of Standard Tank as Specified in Owner's Manual | 128.7 |
| Usable Capacity of Optional Tank as Specified in Owner's Manual | |
| 93% of Usable Capacity | 119.7 |
| Actual Amount of Solvent Used | 119.6 |
| 1/3 of Usable Capacity | 42.9 |

Is the actual amount of solvent used in the test equal to 93% ± 1%
of the Usable Capacity stated in Form No. 1? **YES**

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




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

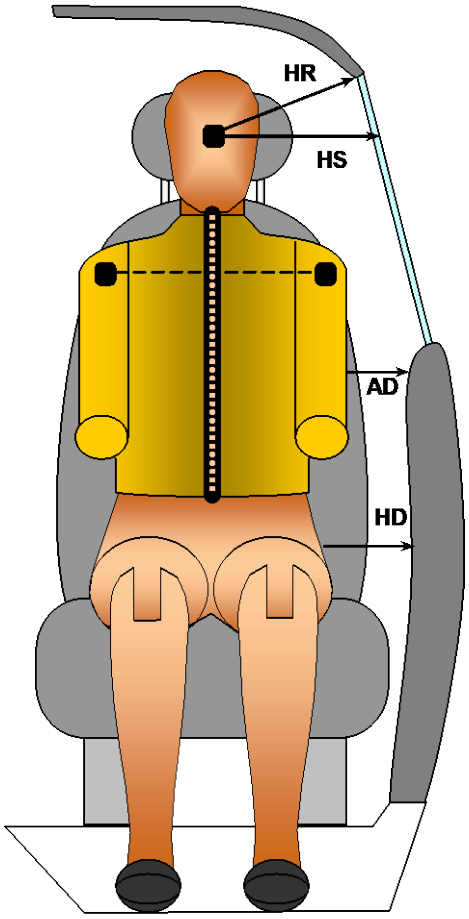
**LEFT SIDE VIEW**

| Driver Code | Pass. Code | Measurement Description | Driver | | Passenger | |
|---|---|---|---|---|---|---|
| | | | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| HH | | Head to Header | 497 | 16.1 | | |
| HW | | Head to Windshield | 697 | 0 | | |
| HZ | HZ | Head to Roof Liner | 198 | 90 | 316 | 90 |
| NR | NB | Nose to Rim/Seat Back | 474 | 11.1 | 418 | 14.8 |
| CD | CB | Chest to Dashboard/Seat Back | 640 | 8.7 | 436 | 8.4 |
| CS | | Chest to Steering Wheel | 405 | 8.9 | | |
| KDL | KBL | Left Knee to Dash/Seat Back | 160 | 22.4 | 176 | 18.0 |
| KDR | KBR | Right Knee to Dash/Seat Back | 143 | 25.5 | 178 | 18.8 |
| PAX | PAX | Pelvic Tilt Angle X | | 23.8 | | 19.9 |
| PAY | PAY | Pelvic Tilt Angle Y | | -0.5 | | 0.7 |
| PHX | PHX | Hip Point to Striker (X-Axis) | 308 | | 506* | |
| PHZ | PHZ | Hip Point to Striker (Z-Axis) | 60 | | 17* | |

* Measurements taken to driver door striker face

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019

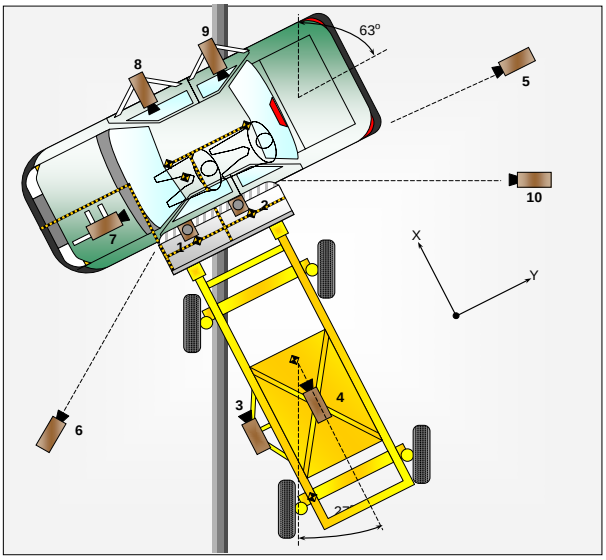


*FRONT VIEW OF DUMMY*

| Code | Measurement Description | Driver | Passenger |
|---|---|---|---|
| | | Length (mm) | |
| HR | Head to Side Header | 192 | 274 |
| HS | Head to Side Window | 355 | 380 |
| AD | Arm to Door | 129 | 177 |
| HD | Hip Point to Door | 161 | 208 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




**CAMERA LOCATIONS AND DATA**

| No. | Camera View | Coordinates* (mm) | | | Lens (mm) | Frame Rate (fps) |
|---|---|---|---|---|---|---|
| | | X | Y | Z | | |
| 1 | Overhead Overall | 960 | 410 | -4995 | 8.5 | 1000 |
| 2 | Overhead Close-Up | 200 | 0 | -4895 | 20 | 1000 |
| 3 | Left Impact Point (MDB) | | | | 50 | 1000 |
| 4 | Side Overall (MDB) | | | | 16 | 1000 |
| 5 | Rear | 10 | 6940 | -1570 | 24 | 1000 |
| 6 | Left Front | -1830 | -6830 | -1660 | 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 |

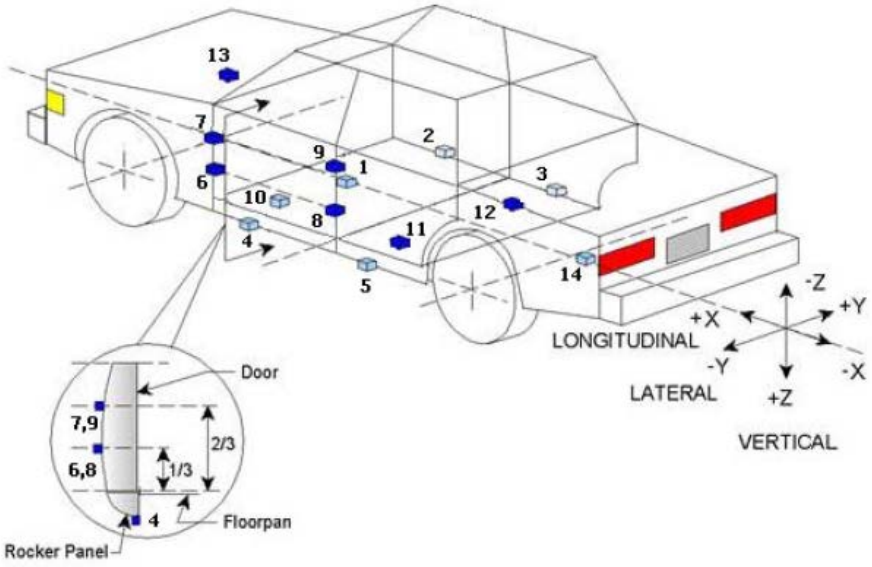
Reference: Impact Point projected to Ground; +X = To Front of MDB, + Y = To Right of MDB, +Z = Down
*All measurements accurate to ±6 mm

**INSTRUMENTATION**

| | Number of Channels |
|---|---|
| Driver Dummy | 16 |
| Passenger Dummy | 16 |
| Vehicle Structure | 21 |
| MDB Accelerometers | 5 |
| MDB Contacts | 2 |
| Total | 60 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019



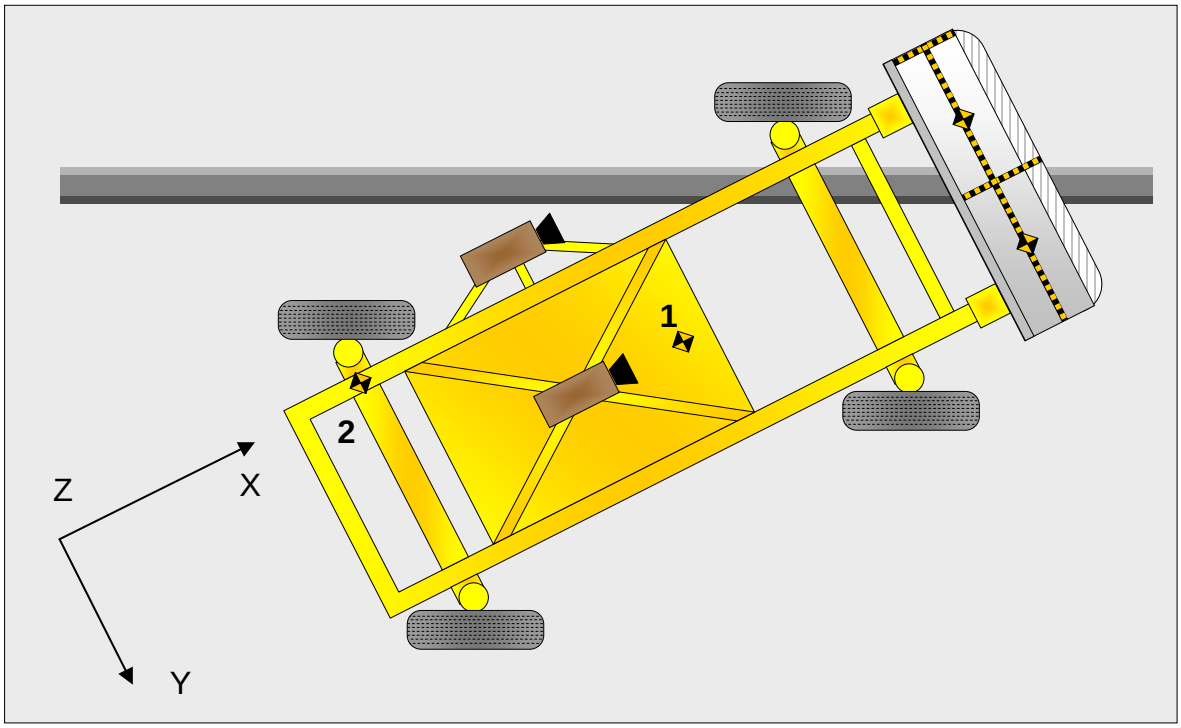

**TEST VEHICLE ACCELEROMETER LOCATIONS**

| No. | ID | Coordinates (mm) | | |
|---|---|---|---|---|
| | | X | Y | Z |
| 1 | Vehicle CG | 3361 | -22 | -655 |
| 2 | Right Sill at Front Seat | 3314 | 864 | -485 |
| 3 | Right Sill at Rear Seat | 2510 | 864 | -521 |
| 4 | Left Sill at Front Door | 3743 | -864 | -470 |
| 5 | Left Sill at Rear Door | 2833 | -864 | -493 |
| 6 | Left Lower A-Post | 4370 | -906 | -771 |
| 7 | Left Middle A-Post | 4365 | -896 | -1113 |
| 8 | Left Lower B-Post | | | |
| 9 | Left Middle B-Post | | | |
| 10 | Front Seat Track | 3502 | -434 | -682 |
| 11 | Rear Seat Structure | 2798 | -388 | -711 |
| 12 | Rt. Rear Occ. Compartment | 2791 | 445 | -697 |
| 13 | Engine Block | 4919 | 0 | -1302 |
| 14 | Rear Above Axle | 1398 | 0 | -840 |

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

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




**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)

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

**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 | Headliner | Curtain Airbag, C-Pillar |
| Left Side of Head | Curtain Airbag, Headliner | Curtain Airbag, C-Pillar |
| Back of Head | Headrest | C-Pillar |
| Left Shoulder | Curtain Airbag | Door Panel, C-Pillar |
| Upper Torso | Side Torso/Pelvis Airbag, Seatback | None |
| Lower Torso | Side Torso/Pelvis Airbag, Seatback | None |
| Left Hip | Side Torso/Pelvis Airbag, Seat Cushion | Seat Cushion |
| 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 window cracked |
| Other Notable Effects | None |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

| Restraint Type | Struck Side Driver | | Struck Side Left Rear Passenger | |
|---|---|---|---|---|
| | Mounted | Deployed | Mounted | Deployed |
| Frontal Airbag | Yes | No | | |
| Knee Airbag | No | | | |
| Side Curtain Airbag | Yes | Yes | Yes | Yes |
| Side Torso/Pelvis Airbag | Yes | Yes | No | |
| 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 Wheel Base | mm | | 3759 |
| Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point) | mm | | 508 |
| Actual Impact Point (Aft of Front Axle) | mm | | 502 |
| Horizontal Offset (+forward / -rearward) | mm | +/- 50 of intended impact point | 6 |
| Vertical Offset (+down / -up) | mm | +/- 20 of intended impact point | 1 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019

**MDB SPECIFICATIONS**

| Measurement Description | Length (mm) |
|---|---|
| Overall Width of Framework Carriage | 1250 |
| Overall Length Including Honeycomb Face | 4119 |
| Wheelbase of Framework Carriage | 2584 |
| CG Location aft of Front Axle | 1128 |

**MDB WEIGHTS**

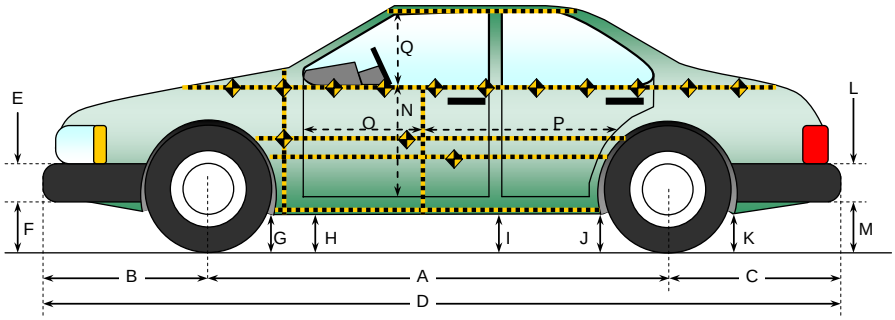
| | Units | Front Axle | Rear Axle | Total |
|---|---|---|---|---|
| Left | kg | 427.9 | 264.0 | |
| Right | kg | 340.6 | 331.2 | |
| Ratio | % | 56.4 | 43.6 | |
| Totals | kg | 768.5 | 595.2 | 1363.7 |

**SPEED AND ANGLE AT IMPACT DATA**

| Measured Parameter | Units | Requirement | Value |
|---|---|---|---|
| Trap No. 1 Velocity (Primary) | km/h | 61.1 to 62.7 | 61.86 |
| Trap No. 2 Velocity (Redundant) | km/h | 61.1 to 62.7 | 62.02 |
| MDB CL to Target Vehicle CL | degrees | 88.5 to 91.5 | 90.7 |
| MDB Forward Line of Motion to Target Vehicle CL | degrees | 62.5 to 63.5 | 63.4 |
| MDB Crabbed Angle to MDB Forward Line of Motion | degrees | 26 to 28 | 26.5 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




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

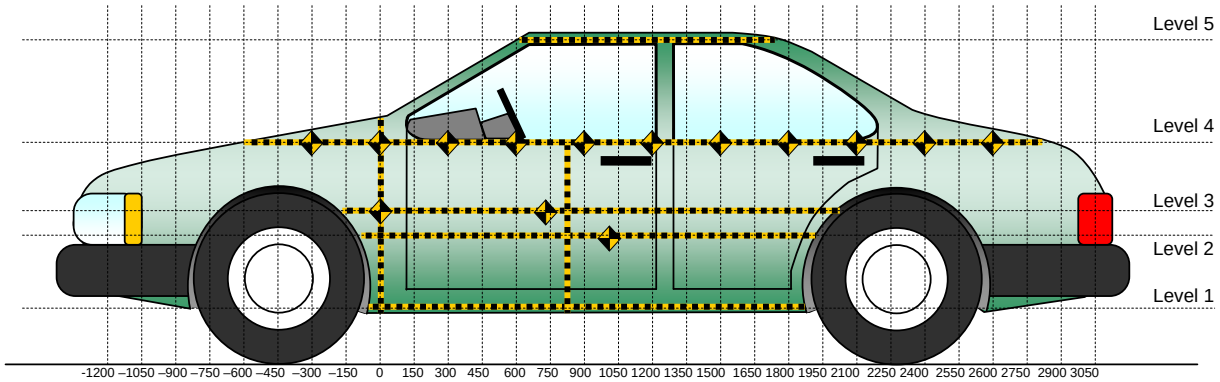
**LEFT SIDE VIEW**

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

| Code | Measurement Description | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|
| A | Wheelbase | 3759 | 3790 | -31 |
| B | Front Axle to FSOV | 977 | 1005 | -28 |
| C | Rear Axle to RSOV | 1323 | 1247 | 76 |
| D | Total Length at Centerline | 6059 | 6042 | 17 |
| E | Front Bumper Thickness | 334 | 334 | 0 |
| F | Front Bumper Bottom to Ground | 335 | 336 | -1 |
| G | Sill Height at Front Wheel Well | 438 | 429 | 9 |
| H | Sill Height at Front Door Leading Edge | 441 | 430 | 11 |
| I | Sill Height at B Pillar | 466 | 452 | 14 |
| J1 | Sill Height at Rear Wheel Well | 484 | 486 | -2 |
| J2 | Pinch Weld Height at Rear Wheel Well | 476 | 483 | -7 |
| K | Sill Height Aft of Rear Wheel Well | 507 | 509 | -2 |
| L | Rear Bumper Thickness | 230 | 230 | 0 |
| M | Rear Bumper Bottom to Ground | 408 | 406 | 2 |
| N | Sill Height to Window Bottom Sill | 936 | 807 | 129 |
| O | Front Door Leading Edge to Impact CL | 689 | 686 | 3 |
| P | Rear Door Trailing Edge to Impact CL | 1236 | 1213 | 23 |
| Q | Front Window Opening | 550 | 557 | -7 |
| R | Right Side Length | 5365 | 5352 | 13 |
| S | Left Side Length | 5365 | 5316 | 49 |
| T | Vehicle Width at B Post | 2028 | 1955 | 73 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




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 | 531 | 172 | 750 |
| 2 | Mid Door | 845 | 161 | 1650 |
| 3 | Occupant H-Point | 993 | 143 | 1650 |
| 4 | Window Sill | 1215 | 94 | 1650 |
| 5 | Window Top | 1872 | 30 | 2100 |

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: 2019 Ford F-250 SuperCab XL Truck NHTSA No.: M20190210
Test Program: NCAP Side MDB Impact Test Test Date: 7/17/2019

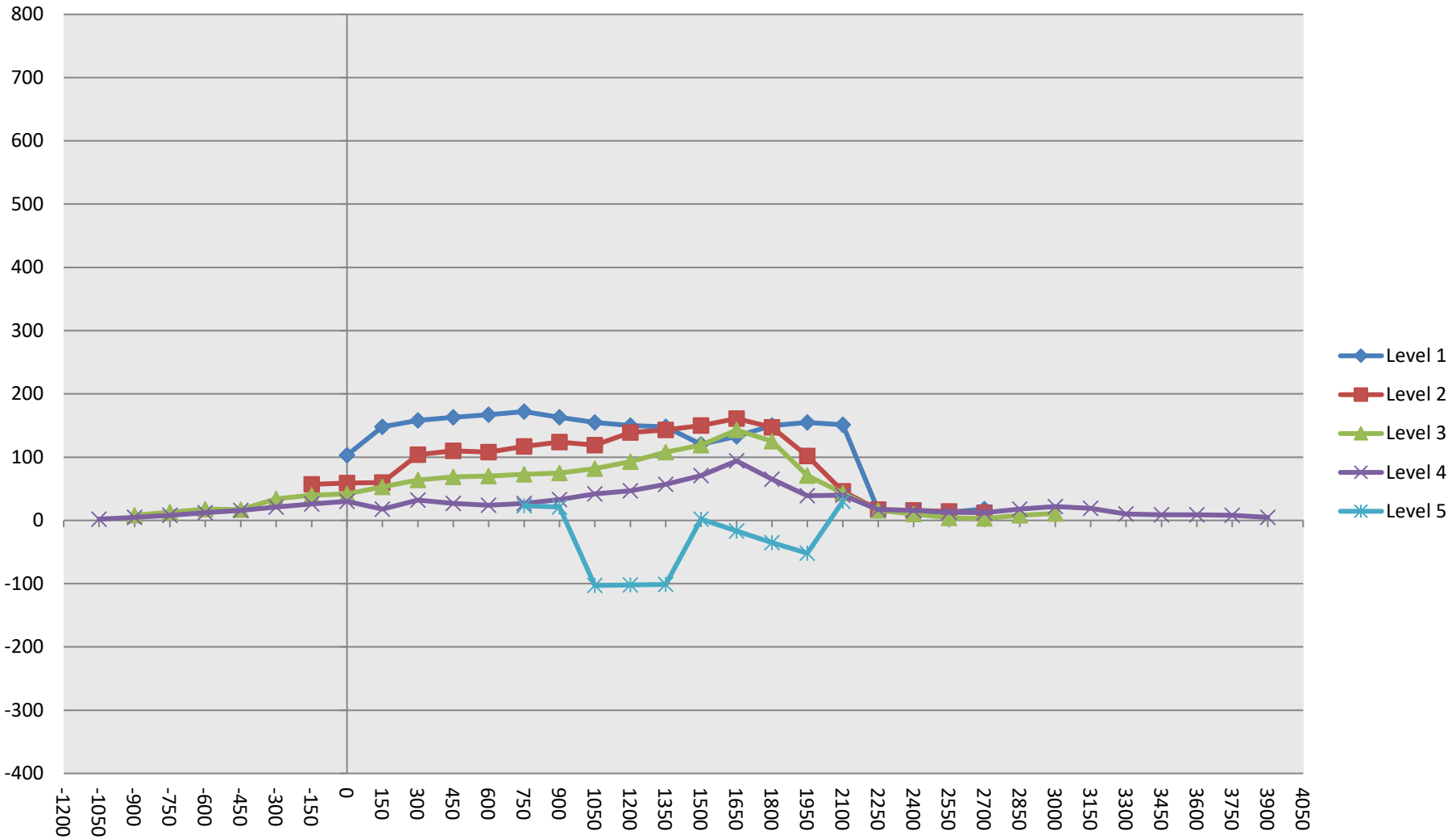
| | Pre-Test | | | | | Post-Test | | | | | Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| -2100 | | | | | | | | | | | | | | | |
| -1950 | | | | | | | | | | | | | | | |
| -1800 | | | | | | | | | | | | | | | |
| -1650 | | | | | | | | | | | | | | | |
| -1500 | | | | | | | | | | | | | | | |
| -1350 | | | | | | | | | | | | | | | |
| -1200 | | | | | | | | | | | | | | | |
| -1050 | | | | 229 | | | | | 231 | | | | | 2 | |
| -900 | | | 138 | 197 | | | | 146 | 202 | | | | 8 | 5 | |
| -750 | | | 102 | 175 | | | | 115 | 183 | | | | 13 | 8 | |
| -600 | | | 94 | 160 | | | | 112 | 172 | | | | 18 | 12 | |
| -450 | | | 97 | 148 | | | | 114 | 164 | | | | 17 | 16 | |
| -300 | | | 84 | 138 | | | | 118 | 159 | | | | 34 | 21 | |
| -150 | | 85 | 93 | 130 | | | 142 | 133 | 156 | | | 57 | 40 | 26 | |
| 0 | 110 | 93 | 104 | 124 | | 213 | 152 | 146 | 154 | | 103 | 59 | 42 | 30 | |
| 150 | 119 | 106 | 101 | 118 | | 267 | 166 | 154 | 136 | | 148 | 60 | 53 | 18 | |
| 300 | 119 | 104 | 98 | 115 | | 277 | 208 | 162 | 147 | | 158 | 104 | 64 | 32 | |
| 450 | 115 | 103 | 95 | 110 | | 278 | 213 | 164 | 137 | | 163 | 110 | 69 | 27 | |
| 600 | 113 | 100 | 92 | 106 | | 280 | 208 | 162 | 130 | | 167 | 108 | 70 | 24 | |
| 750 | 110 | 97 | 90 | 102 | 380 | 282 | 214 | 163 | 129 | 403 | 172 | 117 | 73 | 27 | 23 |
| 900 | 110 | 95 | 88 | 99 | 358 | 273 | 219 | 163 | 132 | 379 | 163 | 124 | 75 | 33 | 21 |
| 1050 | 109 | 94 | 85 | 95 | 354 | 264 | 213 | 167 | 137 | 251 | 155 | 119 | 82 | 42 | -103 |
| 1200 | 108 | 92 | 84 | 94 | 351 | 258 | 231 | 177 | 141 | 249 | 150 | 139 | 93 | 47 | -102 |
| 1350 | 108 | 90 | 83 | 90 | 347 | 256 | 233 | 191 | 147 | 246 | 148 | 143 | 108 | 57 | -101 |
| 1500 | 110 | 94 | 86 | 92 | 345 | 230 | 244 | 205 | 163 | 347 | 120 | 150 | 119 | 71 | 2 |
| 1650 | 114 | 94 | 86 | 91 | 343 | 247 | 255 | 229 | 185 | 326 | 133 | 161 | 143 | 94 | -17 |
| 1800 | 115 | 95 | 87 | 91 | 340 | 265 | 242 | 212 | 156 | 305 | 150 | 147 | 125 | 65 | -35 |
| 1950 | 118 | 96 | 88 | 92 | 338 | 273 | 198 | 159 | 131 | 286 | 155 | 102 | 71 | 39 | -52 |
| 2100 | 117 | 96 | 89 | 93 | 374 | 268 | 142 | 132 | 133 | 404 | 151 | 46 | 43 | 40 | 30 |
| 2250 | 134 | 109 | 102 | 105 | | 150 | 126 | 118 | 122 | | 16 | 17 | 16 | 17 | |
| 2400 | 134 | 110 | 103 | 103 | | 148 | 126 | 113 | 119 | | 14 | 16 | 10 | 16 | |
| 2550 | 132 | 109 | 101 | 104 | | 145 | 123 | 105 | 117 | | 13 | 14 | 4 | 13 | |
| 2700 | 107 | 87 | 97 | 105 | | 125 | 99 | 100 | 117 | | 18 | 12 | 3 | 12 | |
| 2850 | | | 84 | 108 | | | | 92 | 126 | | | | 8 | 18 | |
| 3000 | | | 84 | 109 | | | | 95 | 131 | | | | 11 | 22 | |
| 3150 | | | | 107 | | | | | 126 | | | | | 19 | |
| 3300 | | | | 109 | | | | | 119 | | | | | 10 | |
| 3450 | | | | 117 | | | | | 126 | | | | | 9 | |
| 3600 | | | | 124 | | | | | 133 | | | | | 9 | |
| 3750 | | | | 130 | | | | | 138 | | | | | 8 | |
| 3900 | | | | 137 | | | | | 142 | | | | | 5 | |

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**

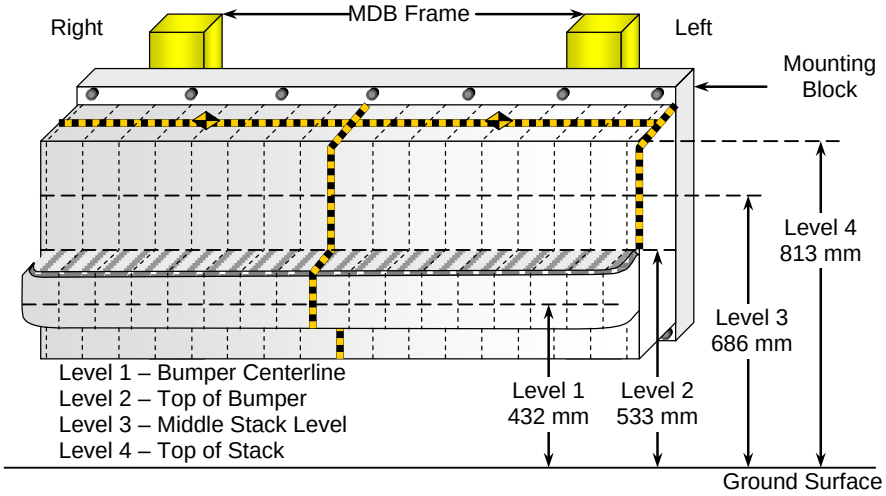
Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test

NHTSA No.: M20190210
Test Date: 7/17/2019



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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




**FRONT** **VIEW**

**MAXIMUM STATIC CRUSH OF HONEYCOMB IMPACT FACE**

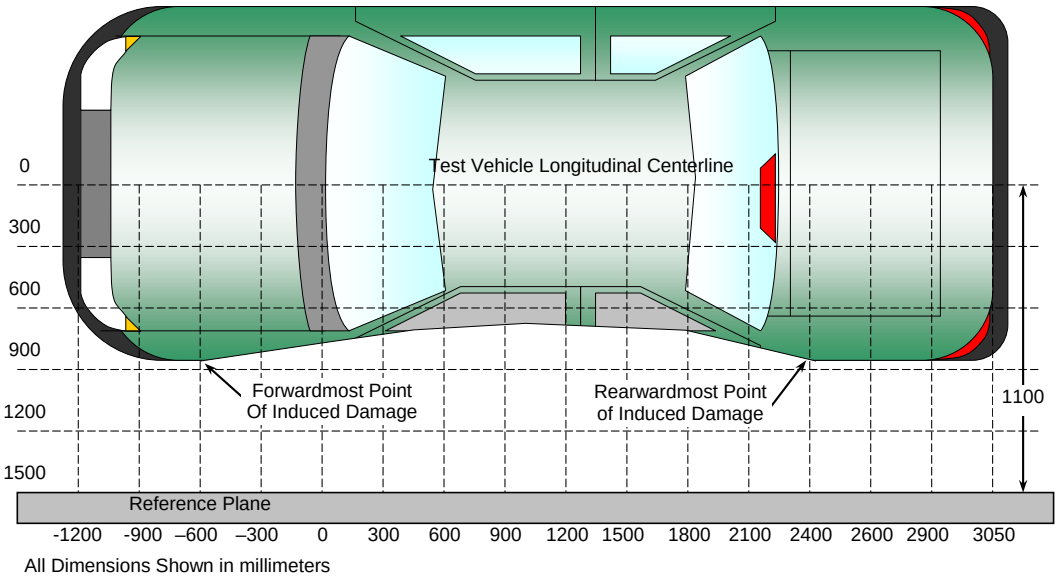
| Vertical Location | | | From Centerline | | Maximum Crush (mm) |
|---|---|---|---|---|---|
| Row | Description | Height (mm) | Distance (mm) | Direction | |
| A | Center of Bumper | 0 | 800 | Right | 115 |
| B | Top of Bumper | 0 | 800 | Right | 158 |
| C | Mid-Level | 0 | 800 | Right | 225 |
| D | Top of Stack | 0 | 800 | Right | 302 |

**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 | 302 | 252 | 225 | 212 | 210 | 227 | 215 | 218 | 200 | 180 | 167 | 166 | 169 | 179 | 179 | 194 | 225 |
| 3 | 225 | 212 | 193 | 177 | 169 | 175 | 168 | 174 | 173 | 168 | 165 | 156 | 155 | 158 | 160 | 172 | 180 |
| 2 | 158 | 143 | 135 | 132 | 124 | 123 | 120 | 115 | 114 | 109 | 107 | 104 | 101 | 100 | 100 | 102 | 100 |
| 1 | 115 | 113 | 103 | 98 | 92 | 88 | 84 | 80 | 79 | 80 | 75 | 69 | 68 | 63 | 63 | 66 | 73 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




**TOP VIEW**

**VEHICLE DAMAGE PROFILE DISTANCES**

| DPD | Distance from Impact Point (mm) | Level | Post-Test (mm) | Pre-Test (mm) | Max. Static Crush (mm) |
|---|---|---|---|---|---|
| 1 | 2070 | 3 | 140 | 89 | 51 |
| 2 | 1674 | 3 | 230 | 86 | 144 |
| 3 | 1278 | 3 | 189 | 83 | 106 |
| 4 | 882 | 3 | 162 | 88 | 74 |
| 5 | 486 | 3 | 161 | 93 | 68 |
| 6 | 90 | 3 | 154 | 101 | 53 |

**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 | 591 | 476 | 115 |
| 2 | 480 mm right of center | 1 | 563 | 463 | 100 |
| 3 | 160 mm right of center | 1 | 543 | 463 | 80 |
| 4 | 160 mm left of center | 1 | 535 | 463 | 72 |
| 5 | 480 mm left of center | 1 | 534 | 463 | 71 |
| 6 | 800 mm left of center | 1 | 549 | 476 | 73 |

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

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019

Test Time: 12:04 pm
Temperature: 21.6°C

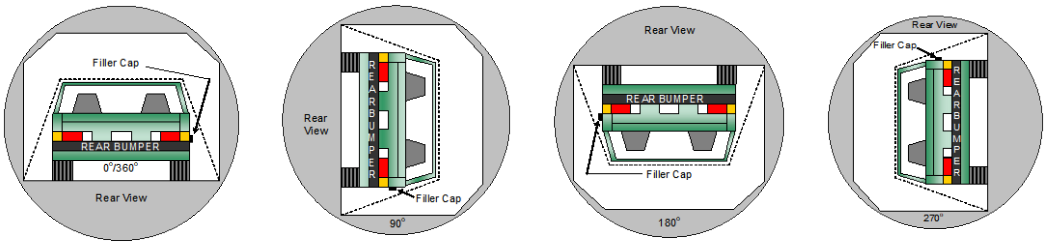
A. From impact until vehicle motion ceases: (Maximum Allowable = 1 ounce) 0.0 oz.

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° | 94 | 300 | 394 |
| 90° to 180° | 88 | 300 | 388 |
| 180° to 270° | 83 | 300 | 383 |
| 270° to 360° | 87 | 300 | 387 |

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

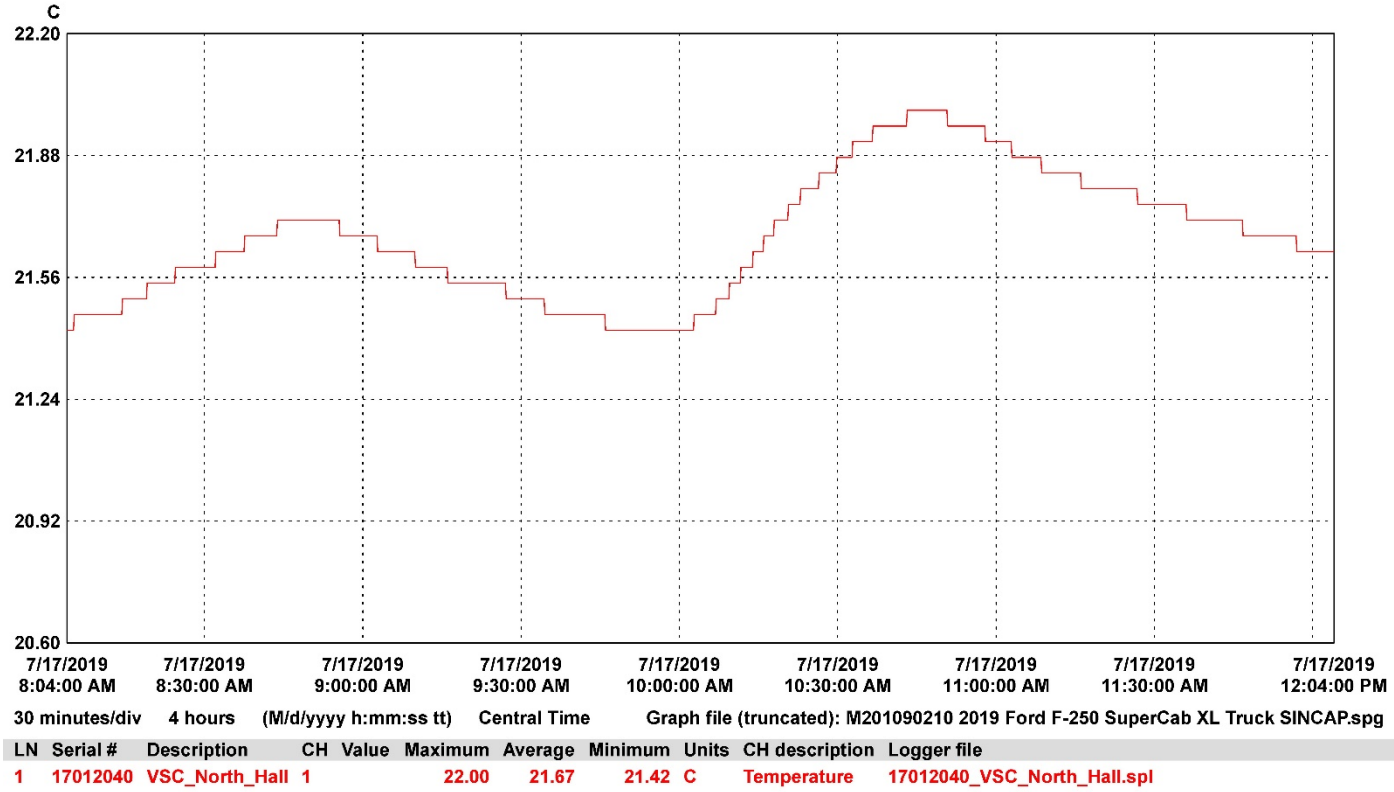
| Test Phase | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|---|---|---|---|---|
| 0° to 90° | 0.0 | 0.0 | 0.0 | |
| 90° to 180° | 0.0 | 0.0 | 0.0 | |
| 180° to 270° | 0.0 | 0.0 | 0.0 | |
| 270° to 360° | 0.0 | 0.0 | 0.0 | |

**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 STABILIZATION DATA**

Test Vehicle: 2019 Ford F-250 SuperCab XL Truck
Test Program: NCAP Side MDB Impact Test
NHTSA No.: M20190210
Test Date: 7/17/2019




| LN | Serial # | Description | CH | Value | Maximum | Average | Minimum | Units | CH description | Logger file |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 17012040 | VSC_North_Hall | 1 | | 22.00 | 21.67 | 21.42 | C | Temperature | 17012040_VSC_North_Hall.spl |

# 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

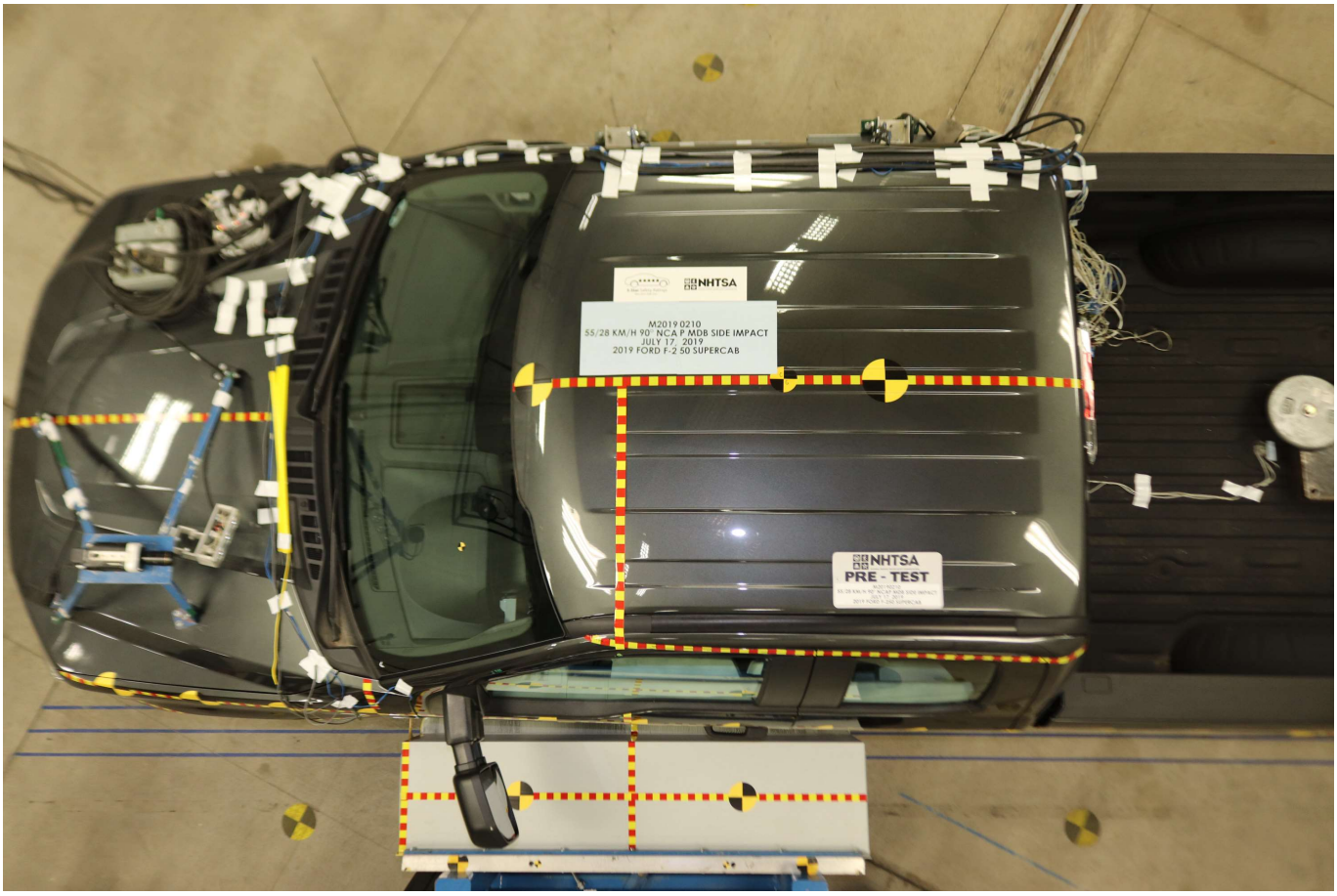


Photo No. 015 - Pre-Test Overhead View of Test Area

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

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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

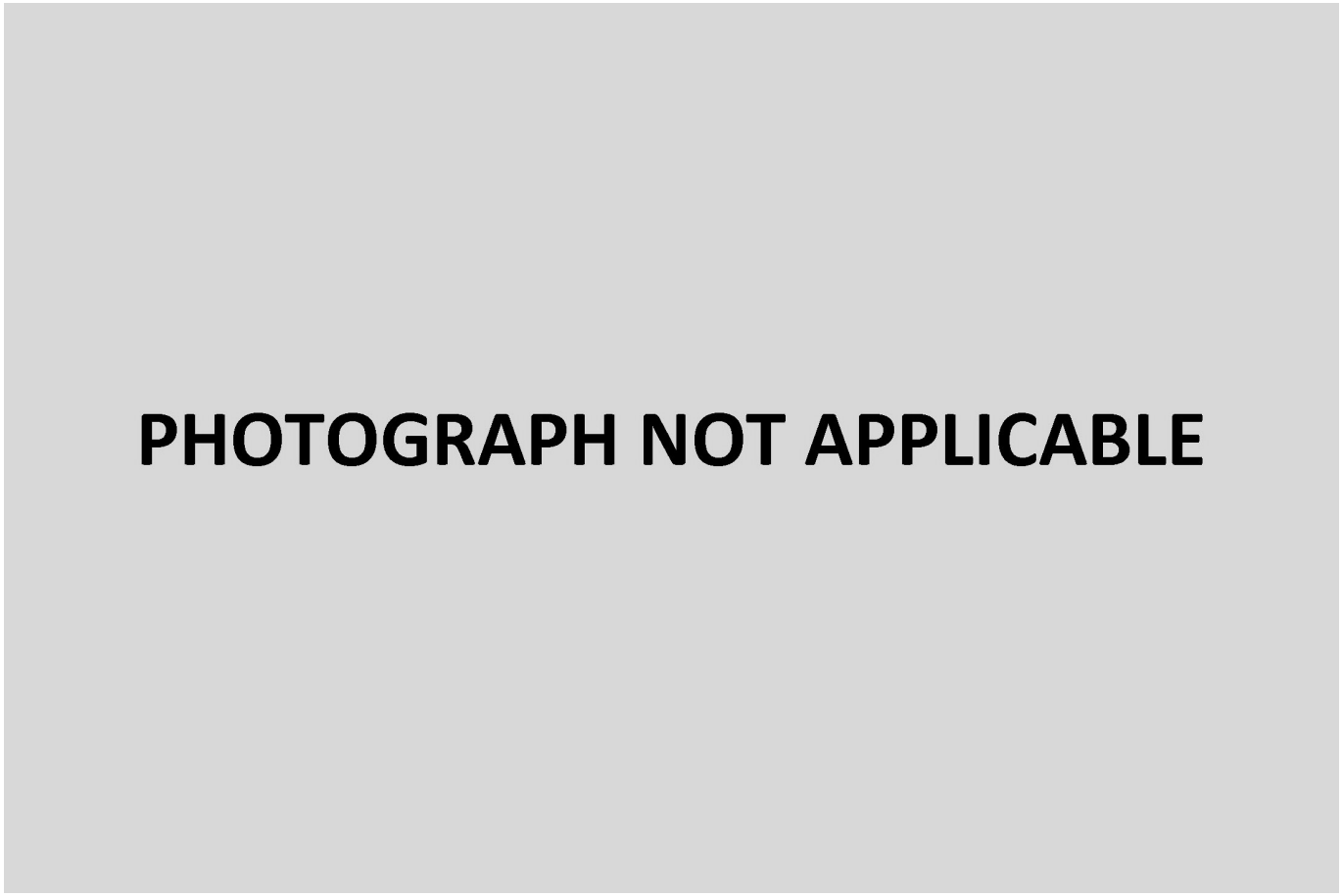


Photo No. 023 - Pre-Test Left Rear Door Latch Close-Up

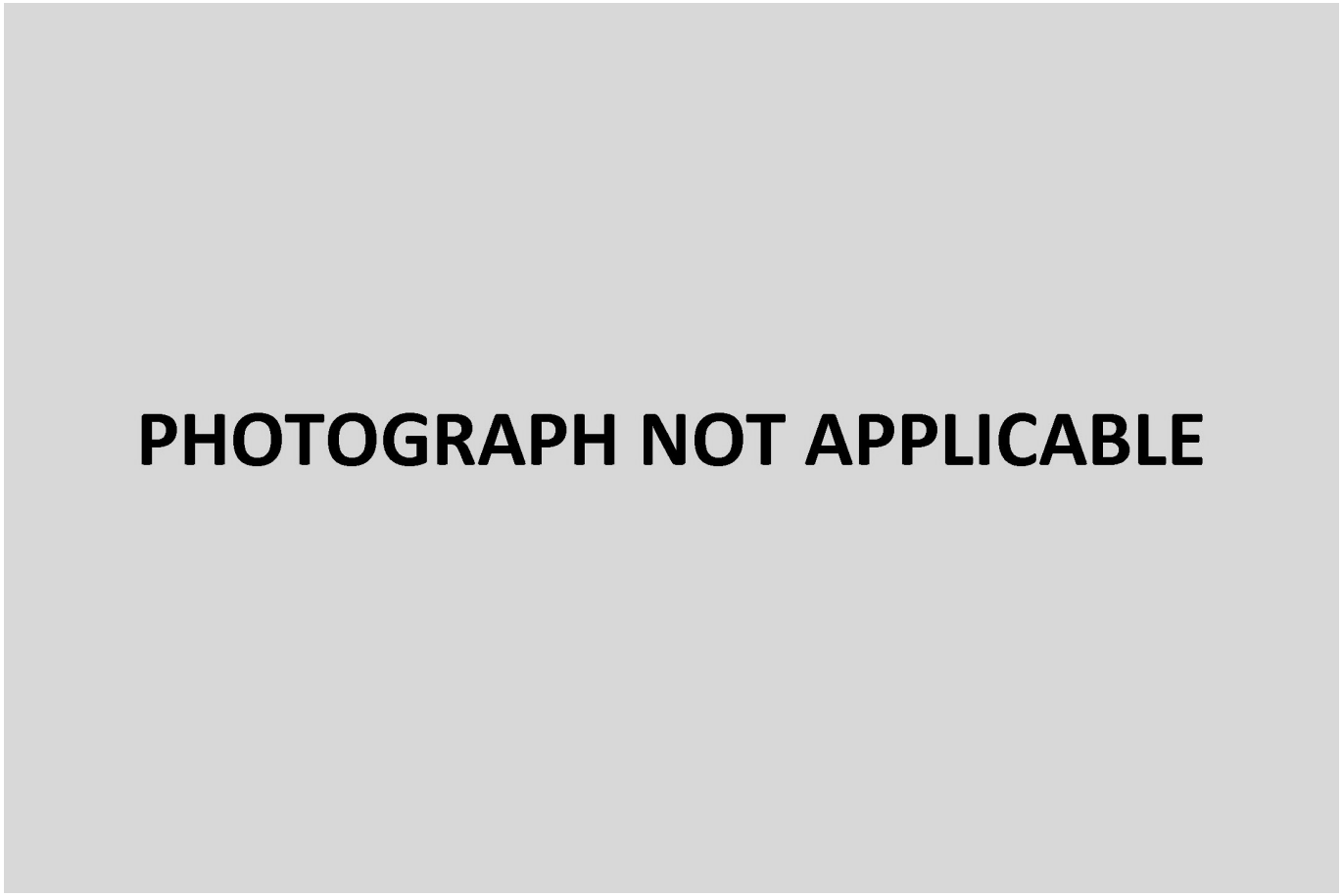


Photo No. 024 - Post-Test Left Rear Door Latch Close-Up

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

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

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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

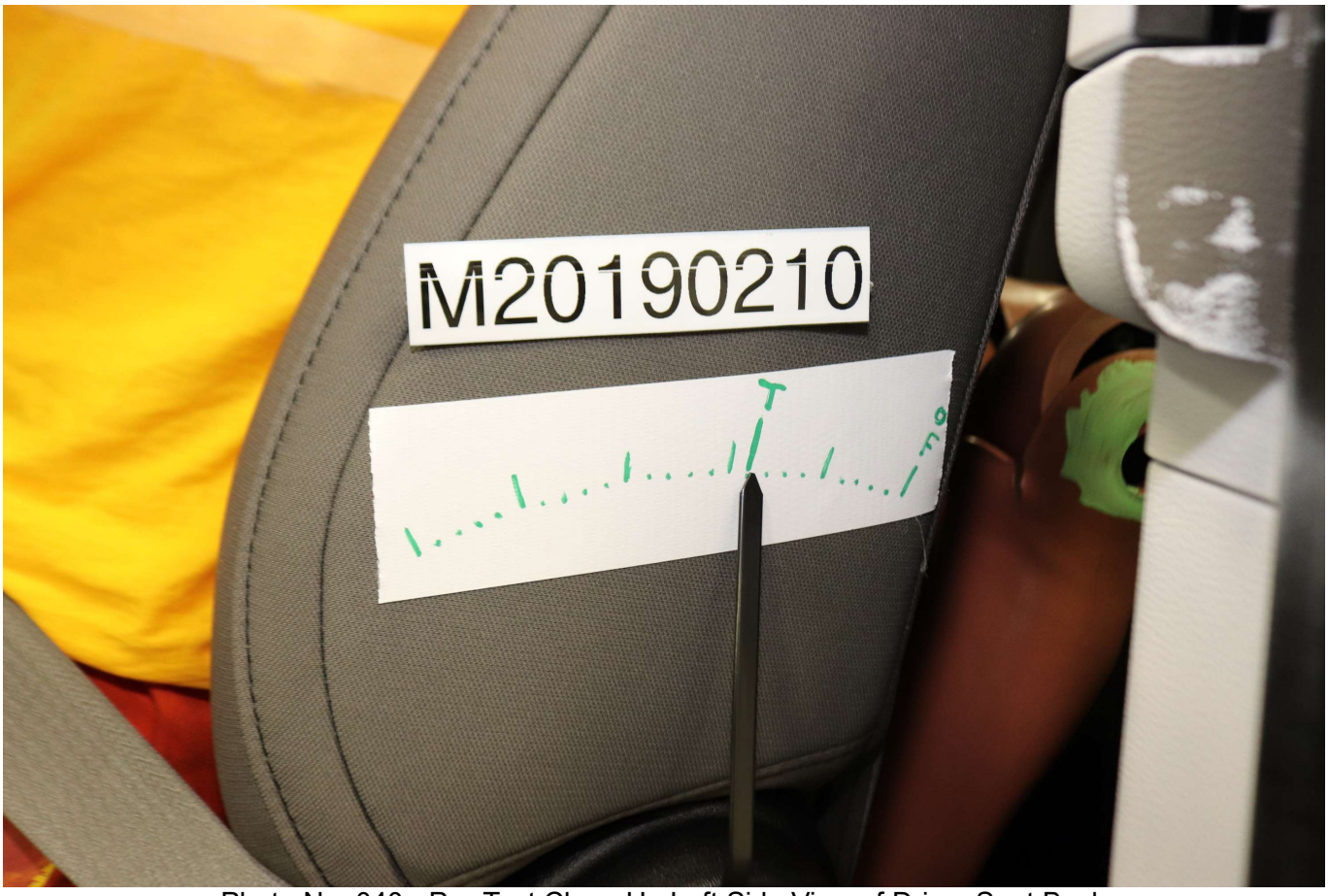

Photo No. 040 - Pre-Test Close-Up Left Side View of Driver Seat Back

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


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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

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


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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

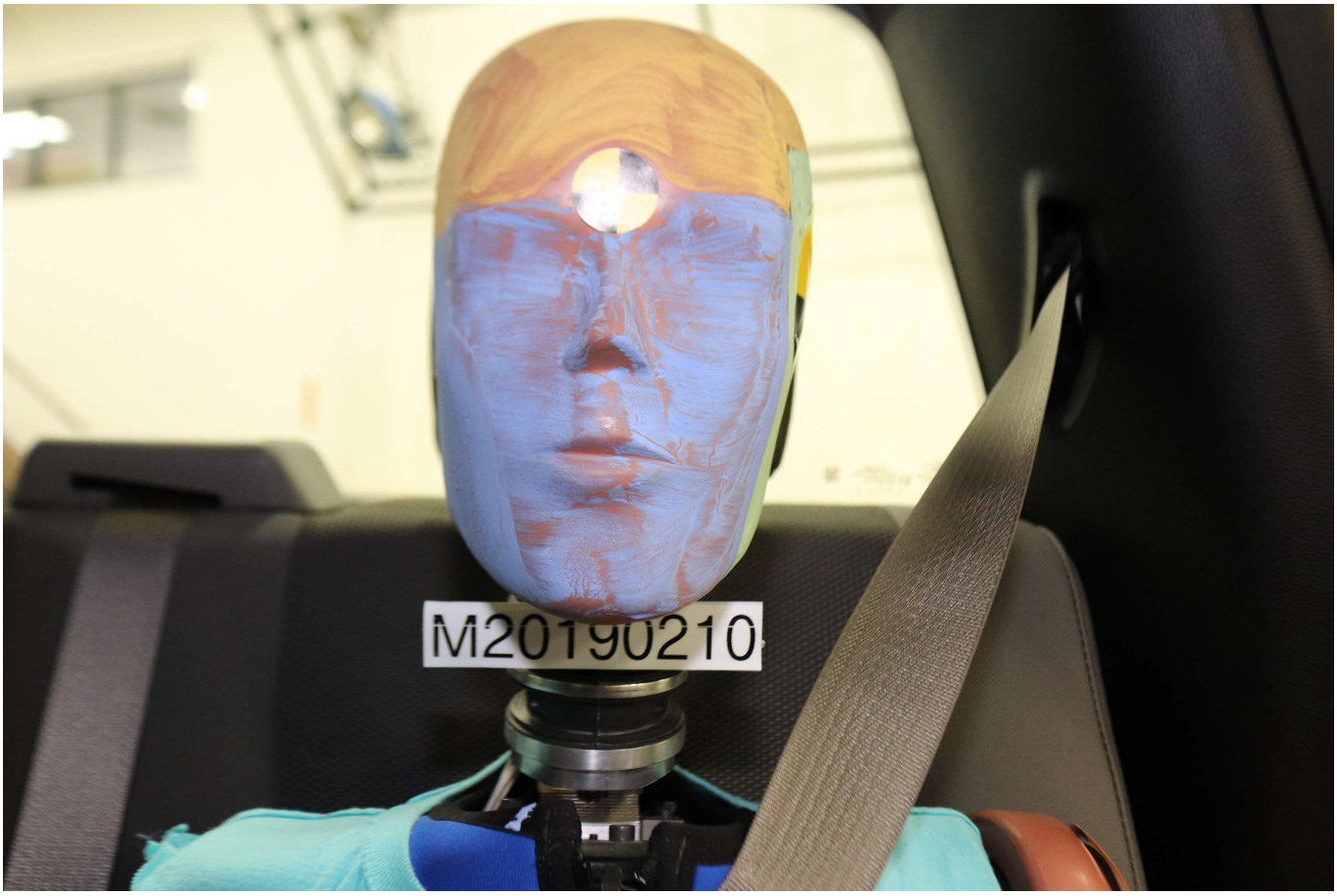

Photo No. 059 - Pre-Test Frontal View of Rear Passenger Dummy Head and Shoulders in Relation to Head Restraint

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

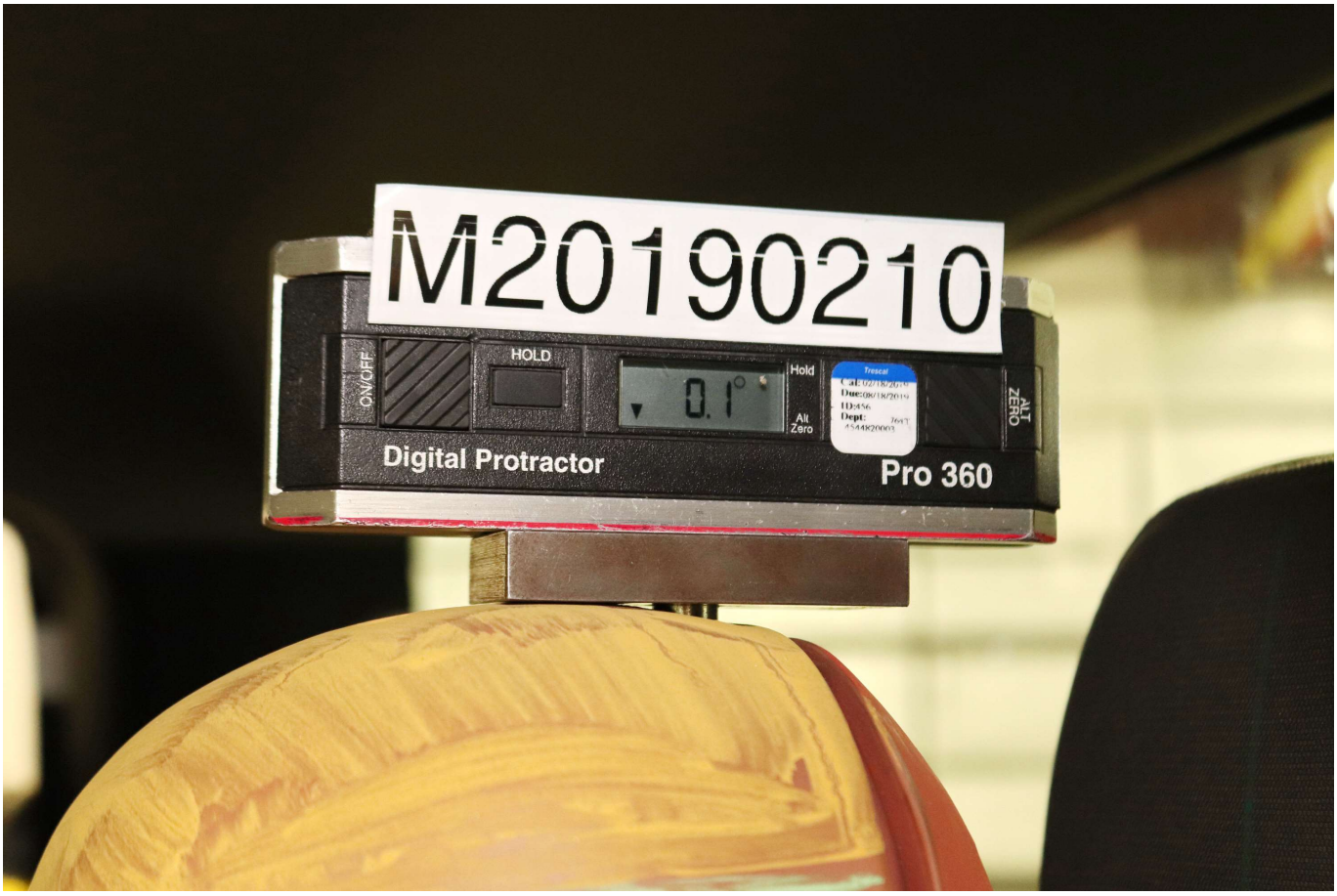

Photo No. 063 - Pre-Test View of Rear Passenger Dummy Head Showing Dummy Head is Level

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

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

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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

PHOTOGRAPH NOT APPLICABLE

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


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

PHOTOGRAPH NOT APPLICABLE

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

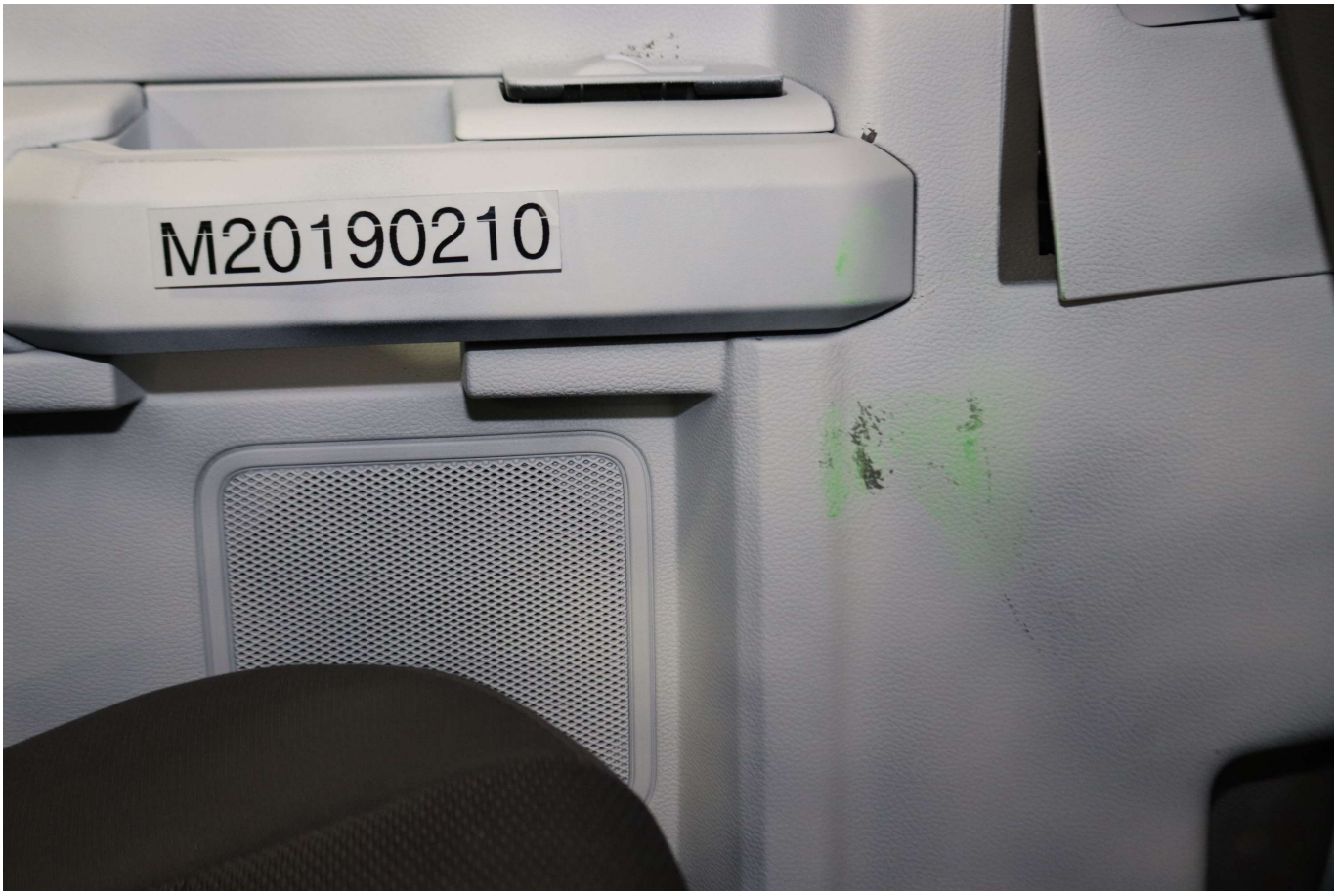

Photo No. 081 - Post-Test Rear Passenger Dummy Close-up Knee Contact View

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

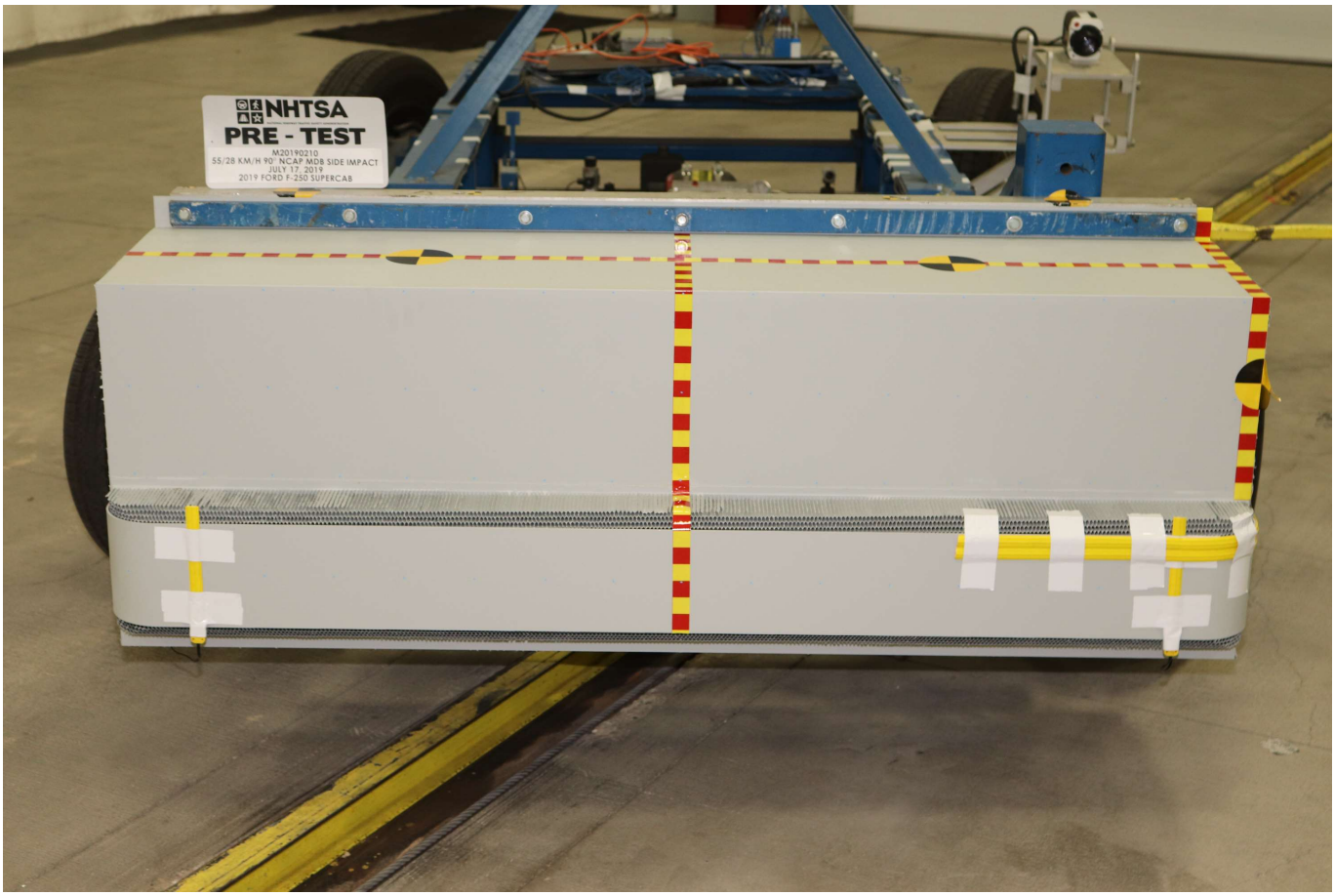

Photo No. 084 - Pre-Test Front View of MDB Impactor Face

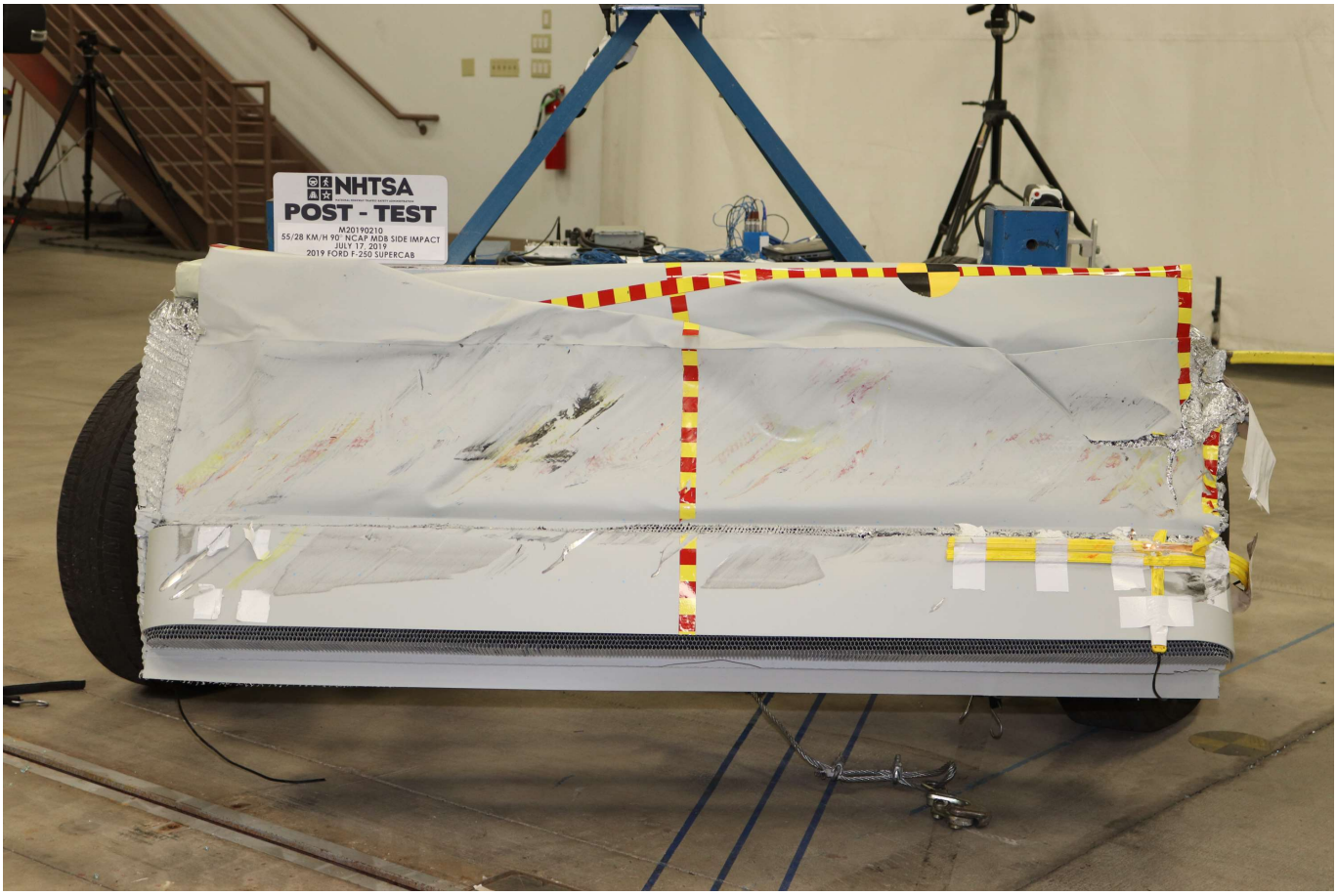

Photo No. 085 - Post-Test Front View of MDB Impactor Face

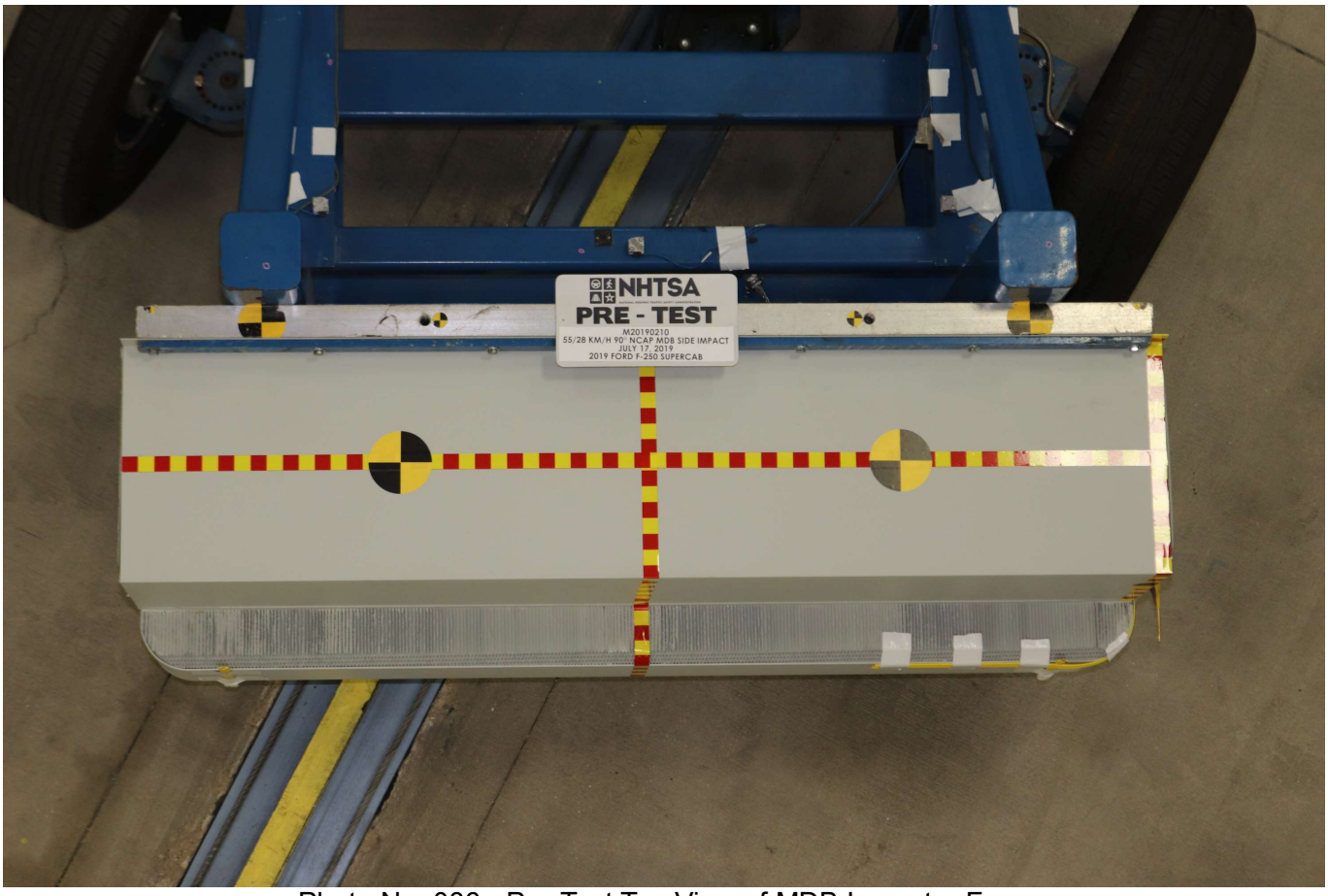

Photo No. 086 - Pre-Test Top View of MDB Impactor Face

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

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

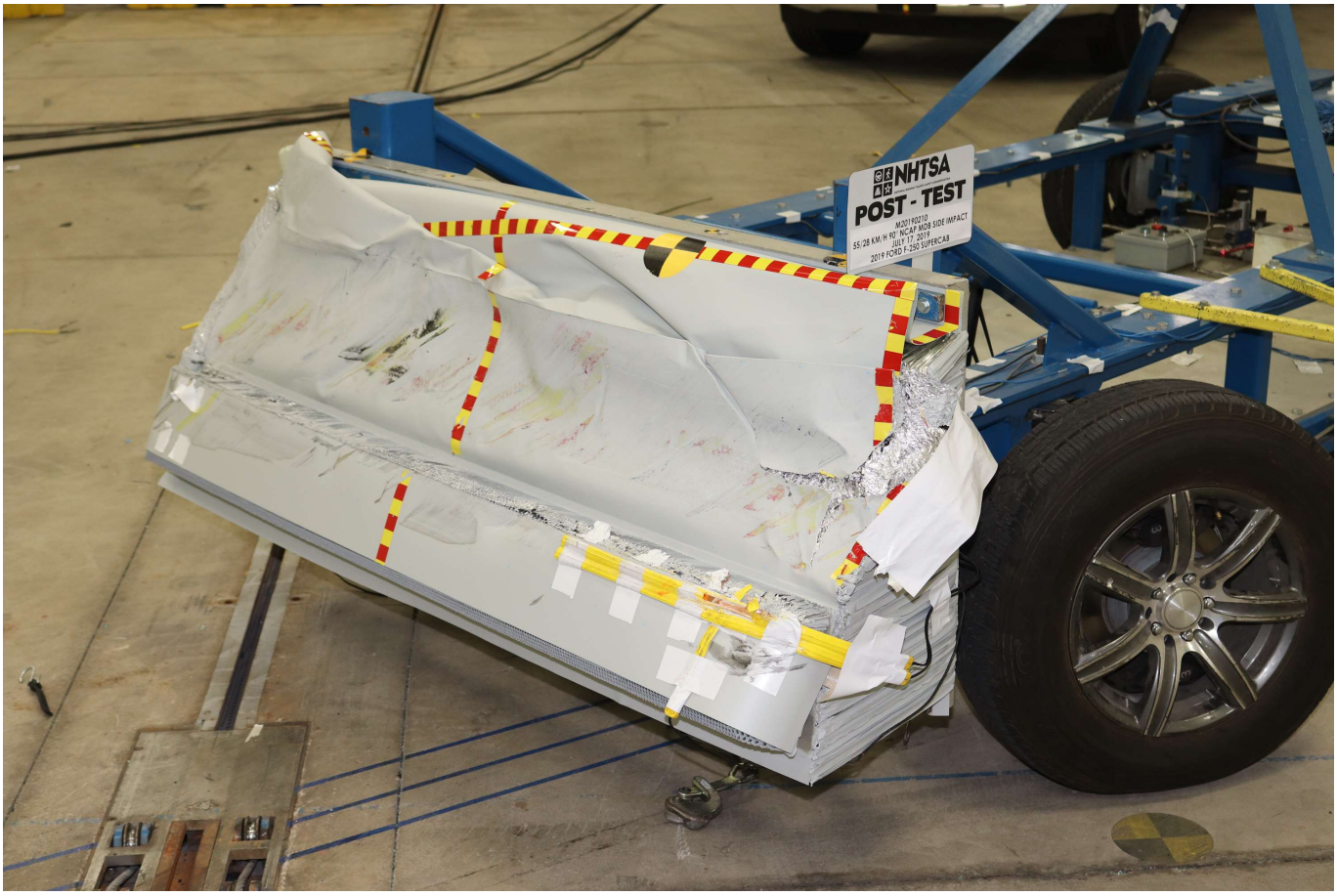


Photo No. 089 - Post-Test Left Side View of MDB Impactor Face


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

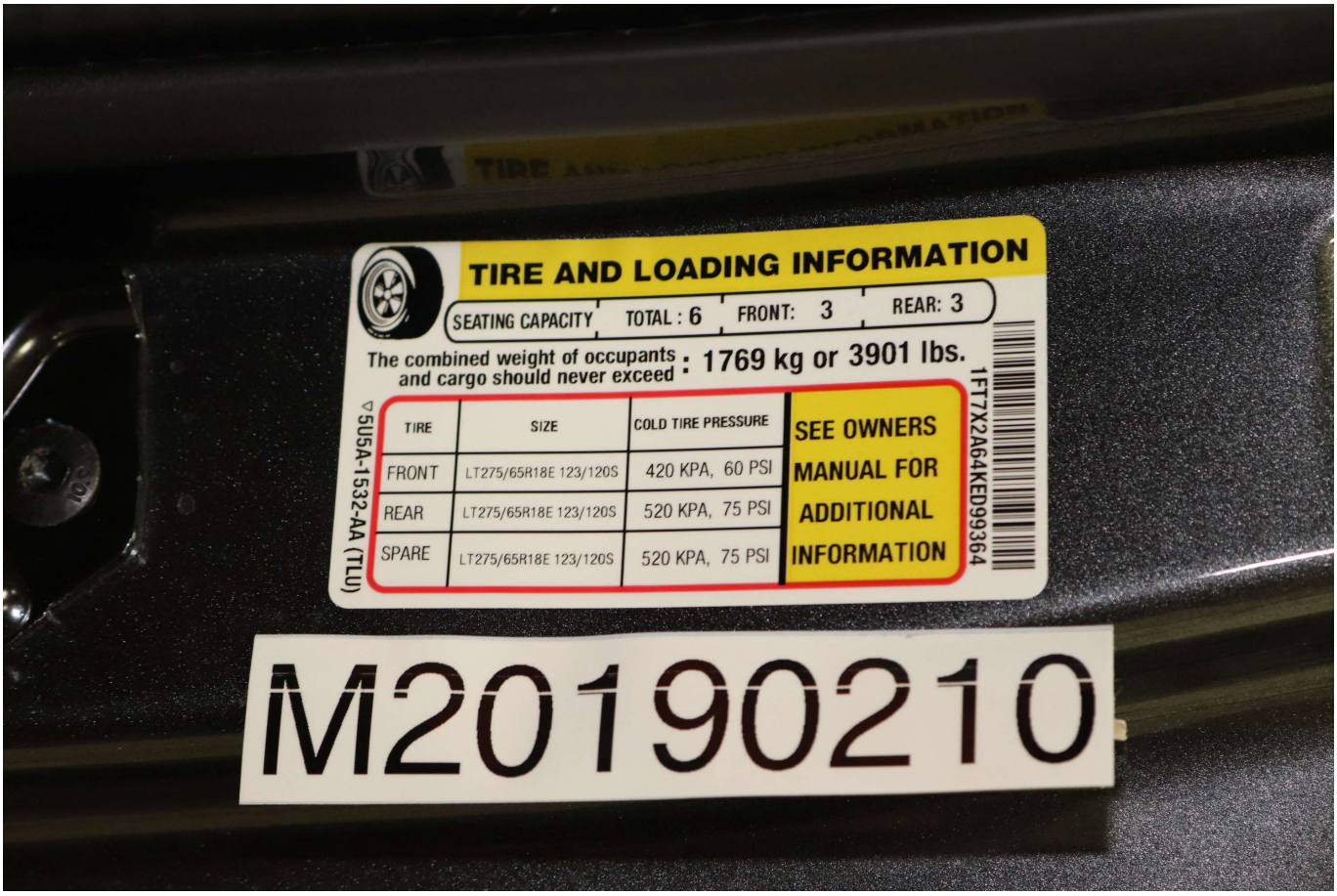

Photo No. 093 - Close-Up View of Vehicle Tire Information Placard or Label

Photo No. 094 - Pre-Test Ballast View

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

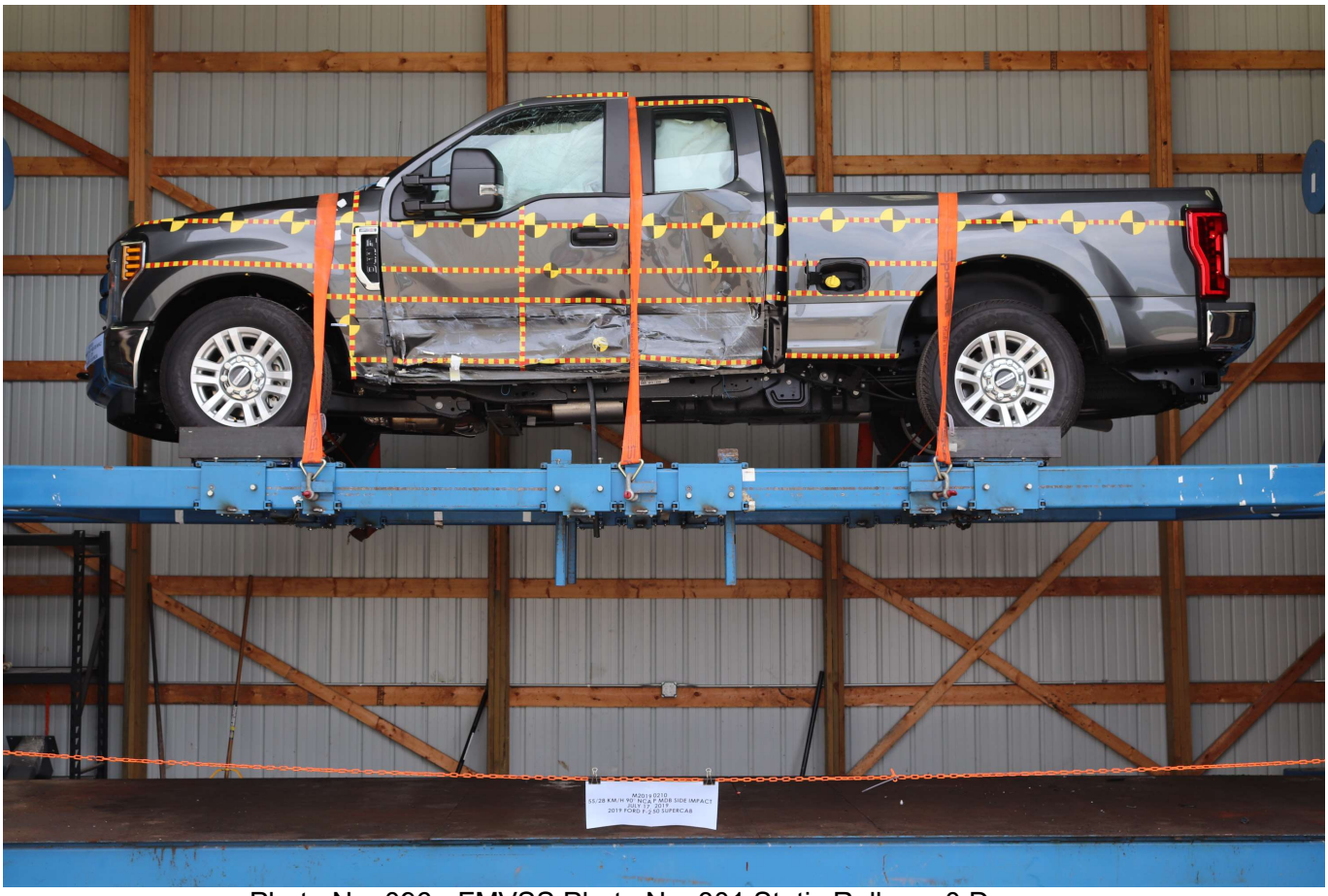
Photo No. 096 - FMVSS Photo No. 301 Static Rollover 0 Degrees


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


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

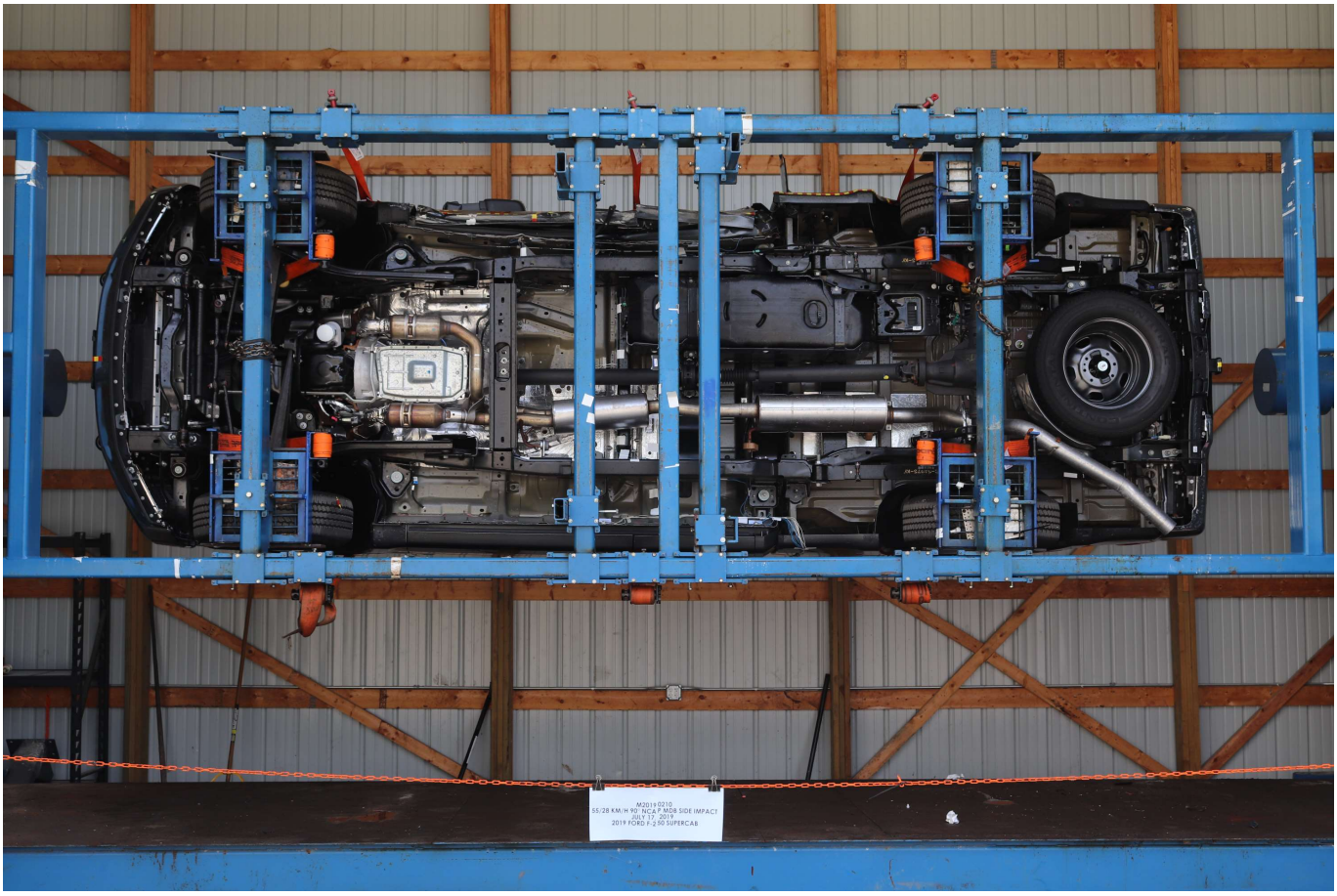

Photo No. 099 - FMVSS Photo No. 301 Static Rollover 270 Degrees

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


Photo No. 101 - Impact Event

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VEHICLE DESCRIPTION
**SUPER DUTY** KE D99364
2019 F250 SRW 4X2 SUPERCAB
XL 148" WB STYLESIDE
6.2L EFI V-8 ENGINE
6-SPEED AUTOMATIC TRANS G
EXTERIOR MAGNETIC
INTERIOR MEDIUM EARTH GRAY CLOTH

**STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE**

**EXTERIOR**
- BOX RAIL/TAILGATE MOLDINGS
- DOOR HANDLES - BLACK
- HEADLAMPS -WIPER ACTIVATED
- LOCKING REMOVABLE TAILGATE
- PICKUP BOX, TIE DOWN HOOKS -NA W/BOX DLT
- SPARE TIRE AND WHEEL LOCK -NA W/BOX DLT
- TOW HOOKS
- TRAILER SWAY CONTROL

**INTERIOR**
- 60/40 FOLD-UP REAR BENCH SEAT
- AIR COND, MANUAL FRONT
- DRIVER SEAT-MANUAL LUMBAR
- OUTSIDE TEMP DISPLAY
- PARTICULATE AIR FILTER
- TILT/TELESCOPE STR COLUMN
- VINYL SUN VISORS

**FUNCTIONAL**
- 4-WHEEL ANTI-LOCK DISC BRAKING SYSTEM
- HILL START ASSIST
- JEWEL EFFECT HEADLAMPS
- MYKEY®
- REAR VIEW CAMERA NA W/BOX DLT
- TWIN I-BEAM INDEPENDENT FRT SUSPENSION W/STAB BAR

**SAFETY/SECURITY**
- ADVANCETRAC WITH RSC
- AIRBAGS - SAFETY CANOPY
- BELT-MINDER CHIME
- DRIVER/PASSENGER AIR BAGS
- SECURILOCK® ANTI-THEFT SYS
- SOS POST CRASH ALERT SYS

**WARRANTY**
- 3YR/36,000 BUMPER / BUMPER
- 5YR/60,000 POWERTRAIN
- 5YR/60,000 ROADSIDE ASSIST
- 5YR/100,000 DIESEL ENGINE

| INCLUDED ON THIS VEHICLE | (MSRP) |
|---|---|
| **OPTIONAL EQUIPMENT/OTHER** | |
| PREFERRED EQUIPMENT PKG.600A | |
| 6-SPEED AUTOMATIC TRANS G | NO CHARGE |
| 3.73 ELECTRONIC-LOCKING AXLE | 390.00 |
| POWER EQUIPMENT GROUP | 915.00 |
| STX APPEARANCE PACKAGE | 1,690.00 |
| .LT275/65R18E BSW ALL SEASON | |
| .CRUISE CONTROL | |
| .AM/FM STEREO MP3/CLK | |
| .SILVER CAST ALUM WHEELS-18" | |
| .SYNC VOICE ACTIVATED SYSTEMS | |
| 10000# GVWR PACKAGE | |
| 50 STATE EMISSIONS | NO CHARGE |
| SPARE TIRE AND WHEEL | NO CHARGE |
| TRAILER BRAKE CONTROLLER | 270.00 |
| TELESCPNG TT MIRR-POWR/HTD | |
| JACK | |
| WHEEL WELL LINERS FRONT & REAR | 325.00 |
| TOUGH BED SPRAY IN BEDLINER | 595.00 |
| CLOTH 40/20/40 SEAT | 100.00 |

| PRICE INFORMATION | (MSRP) |
|---|---|
| BASE PRICE | $35,485.00 |
| TOTAL OPTIONS/OTHER | 4,285.00 |
| TOTAL VEHICLE & OPTIONS/OTHER | 39,770.00 |
| DESTINATION & DELIVERY | 1,595.00 |

SOLD TO 24A 214
Peacock Ford
1875 South Orlando Avenue
Maitland FL 32751

SHIP TO (IF OTHER THAN SOLD TO) 24A 214
Peacock Ford
1875 South Orlando Avenue
Maitland FL 32751

SHIP THROUGH
GROUND EFFECTS LTD
12201 WESTPORT RD
LOUISVILLE KY

RAMP ONE: CA29
RAMP TWO:

FINAL ASSEMBLY PLANT: KENTUCKY
METHOD OF TRANSP.: CONVOY
ITEM #: 24-1120 O/T 2

**TOTAL MSRP $41,365.00**

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**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

1FT7X2A64KED99364

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SCAN OR TEXT 1FKED99364 TO 48028
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www.ford.com/help/privacy-terms/

Photo No. 102 - Monroney Label

## SITTING IN THE CORRECT POSITION

**WARNING:** Sitting improperly, out of position or with the seatback reclined too far can take weight off the seat cushion and affect the decision of the passenger sensing system, resulting in serious injury or death in the event of a crash. Always sit upright against your seat back, with your feet on the floor.

**WARNING:** Do not recline the seatback too far as this can cause the occupant to slide under the seatbelt, resulting in serious injury in the event of a collision.

**WARNING:** Do not place objects higher than the top of the seat backrest. Failure to follow this instruction could result in personal injury or death in the event of a sudden stop or crash.

E68595

When you use them properly, the seat, head restraint, seatbelt and airbags will provide optimum protection in the event of a crash.

We recommend that you follow these guidelines:

- Sit in an upright position with the base of your spine as far back as possible.
- Do not recline the seat backrest so that your torso is more than 30° from the upright position.
- Adjust the head restraint so that the top of it is level with the top of your head and as far forward as possible. Make sure that you remain comfortable.
- Keep sufficient distance between yourself and the steering wheel. We recommend a minimum of 10 in (25 cm) between your breastbone and the airbag cover.
- Hold the steering wheel with your arms slightly bent.
- Bend your legs slightly so that you can press the pedals fully.
- Position the shoulder strap of the seatbelt over the center of your shoulder and position the lap strap tightly across your hips.

Make sure that your driving position is comfortable and that you can maintain full control of your vehicle.

## HEAD RESTRAINTS

**WARNING:** Fully adjust the head restraint before you sit in or operate your vehicle. This will help minimize the risk of neck injury in the event of a crash. Do not adjust the head restraint when your vehicle is moving.



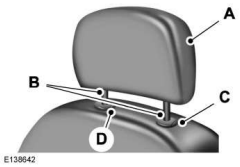
Super Duty (TFE) Canada/United States of America, enUSA, Edition date: 201804, Third-Printing



**WARNING:** The head restraint is a safety device. Whenever possible it should be installed and properly adjusted when the seat is occupied. Failure to adjust the head restraint properly could reduce its effectiveness during certain impacts.

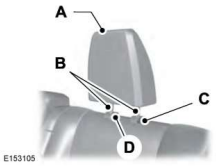
**Note:** *Adjust the seat backrest to an upright driving position before adjusting the head restraint. Adjust the head restraint so that the top of it is level with the top of your head and as far forward as possible. Make sure that you remain comfortable. If you are extremely tall, adjust the head restraint to its highest position.*

**Front Seat Head Restraint**




E138642

**Rear Seat Outermost Head Restraints**




E153105

The head restraints may consist of:

A An energy absorbing head restraint.
B Two steel stems.
C Guide sleeve adjust and release button.
D Guide sleeve unlock and remove button.

### Adjusting the Head Restraint

**Raising the Head Restraint**

Pull the head restraint up.

**Lowering the Head Restraint**

1. Press and hold button C.
2. Push the head restraint down.

**Removing the Head Restraint**

1. Press and hold buttons C and D.
2. Pull the head restraint up.

**Installing the Head Restraint**

Align the steel stems into the guide sleeves and push the head restraint down until it locks.

**Front Row Center and Rear Seat Center (Crew Cab) Head Restraints**

Your vehicle may have head restraints that are non-adjustable. The non-adjustable head restraints consist of:



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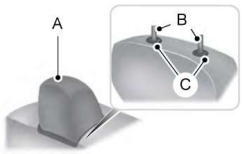



E162872

A An energy absorbing head restraint.
B Two steel stems.
C Guide sleeve unlock and remove button.

**Removing the Head Restraint**

1. Press and hold buttons C.
2. Pull up the head restraint.

**Installing the Head Restraint**

Align the steel stems into the guide sleeves and push the head restraint down until it locks.

**Front Seat Center Head Restraint**

Your vehicle may have a front row center head restraint that you cannot adjust or remove.

**Tilting Head Restraints (If Equipped)**

The front head restraints tilt for extra comfort.

E144727

1. Adjust the seat backrest to an upright driving or riding position.
2. Pivot the head restraint forward toward your head to the desired position.

After the head restraint reaches the forward-most tilt position, pivot it forward again to release it to the rearward, un-tilted position.

**Note:** *Do not attempt to force the head restraint backward after you tilt it. Instead, continue tilting it forward until the head restraint releases to the upright position.*

## MANUAL SEATS (IF EQUIPPED)

**WARNING:** Do not adjust the driver's seat or seatback when your vehicle is moving.



Super Duty (TFE) Canada/United States of America, enUSA, Edition date: 201804, Third-Printing

Photo No. 103 - Head Restraint Use and Adjustment Information from Vehicle Owners Manual

# 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)

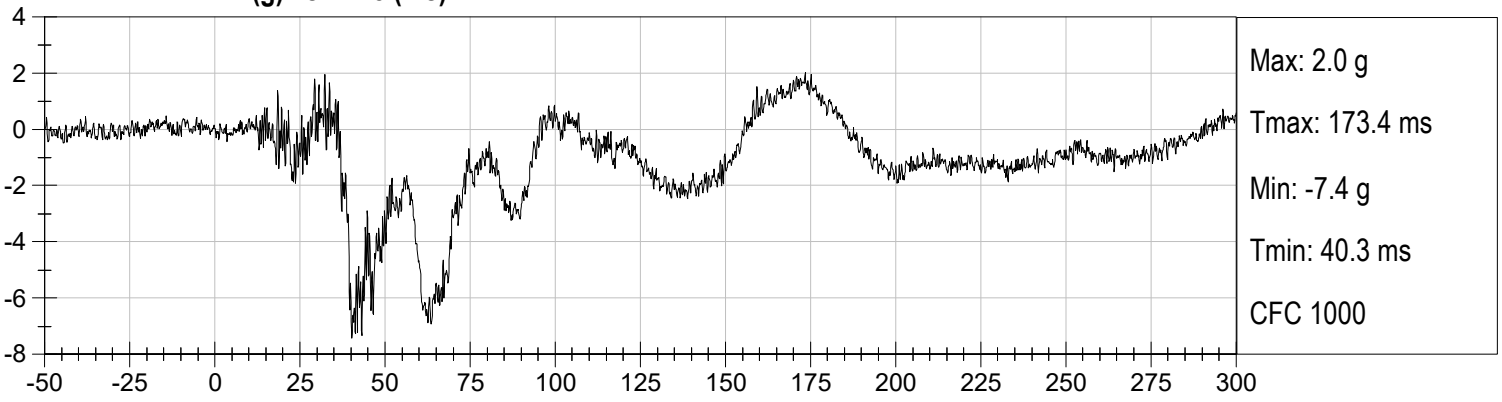
MDB Rear Acceleration (X)

MDB Rear Acceleration (Y)

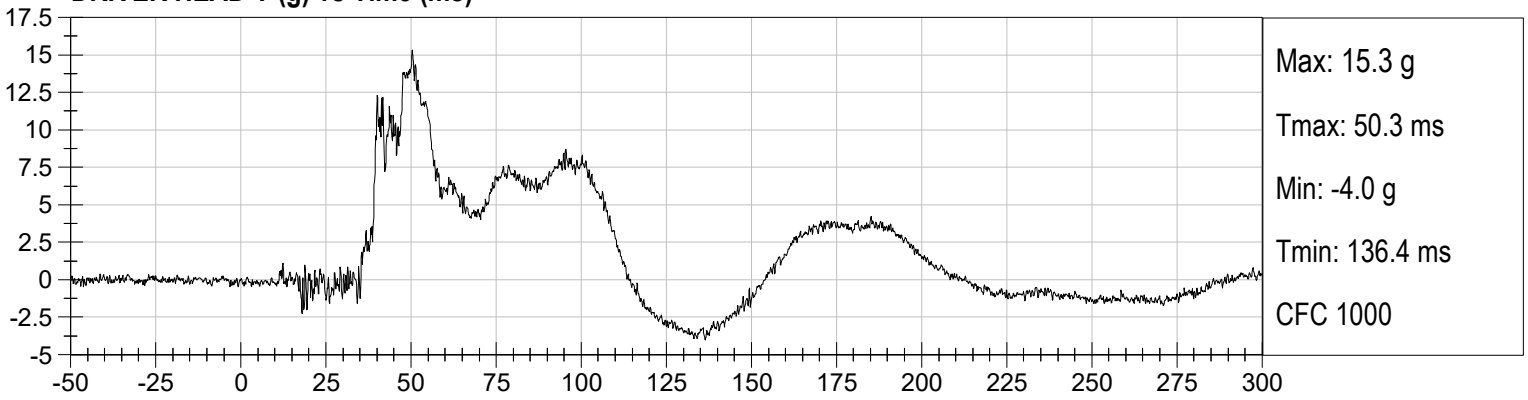
Left MDB Contact Switch

Right MDB Contact Switch

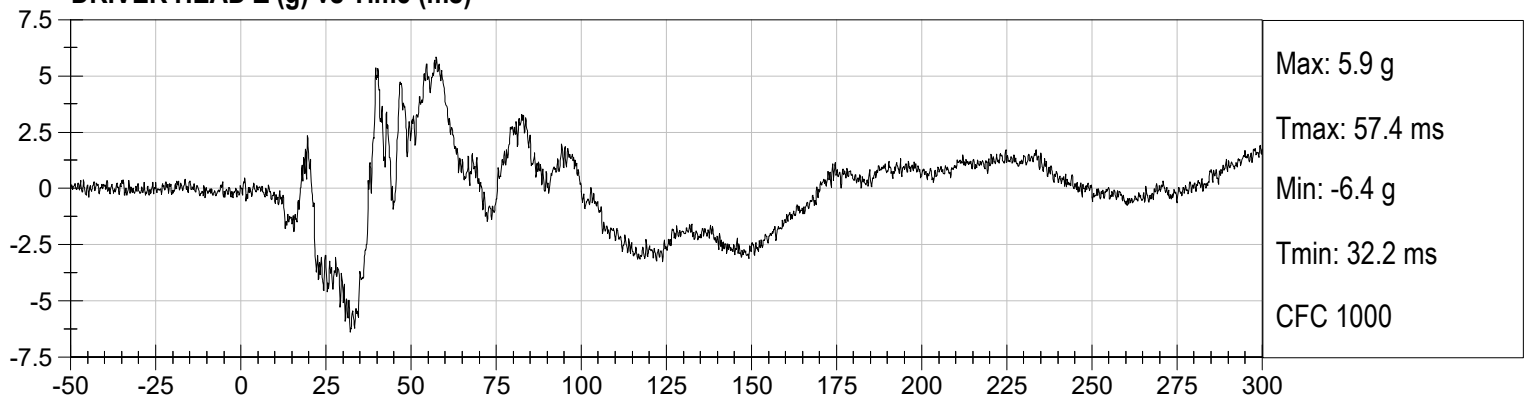
## DRIVER HEAD X (g) vs Time (ms)



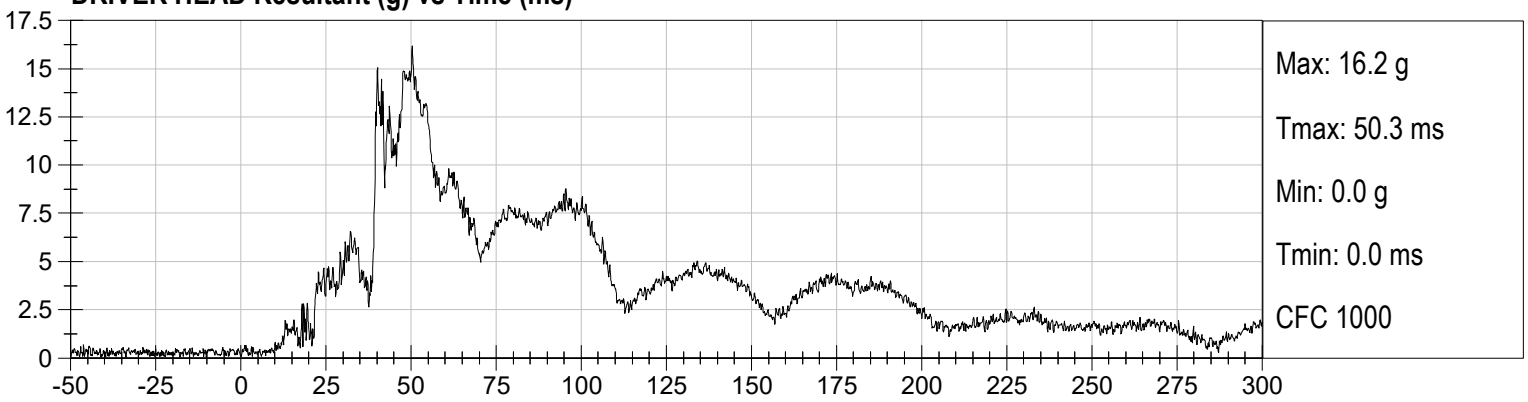

## DRIVER HEAD Y (g) vs Time (ms)



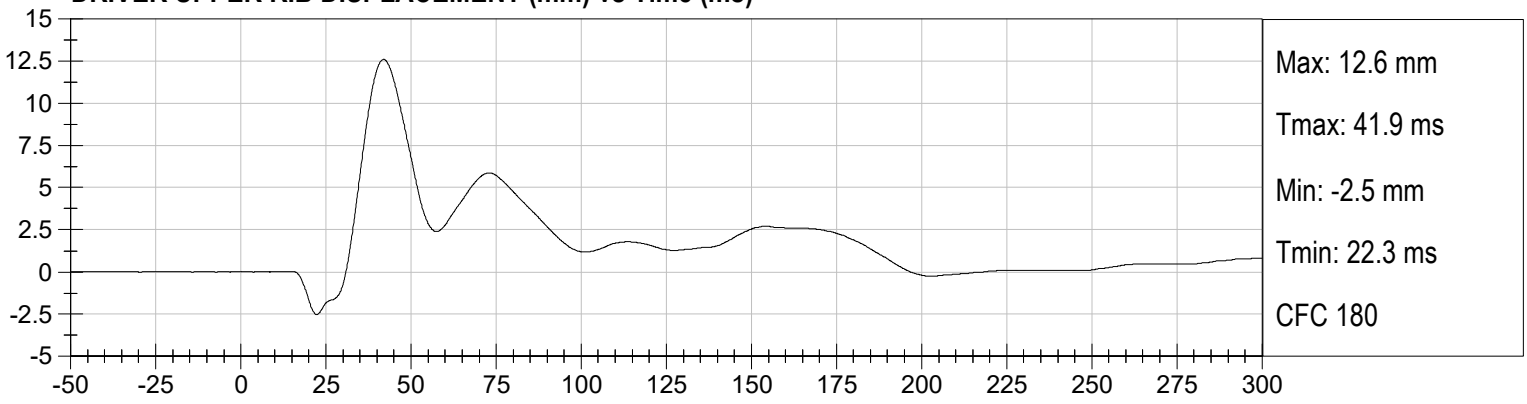

## DRIVER HEAD Z (g) vs Time (ms)



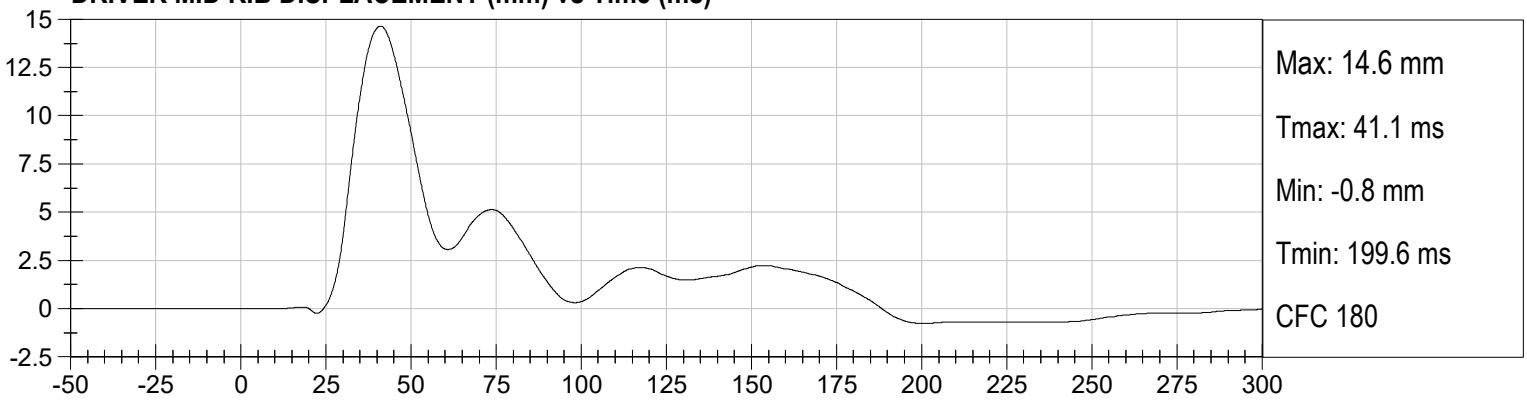

## DRIVER HEAD Resultant (g) vs Time (ms)



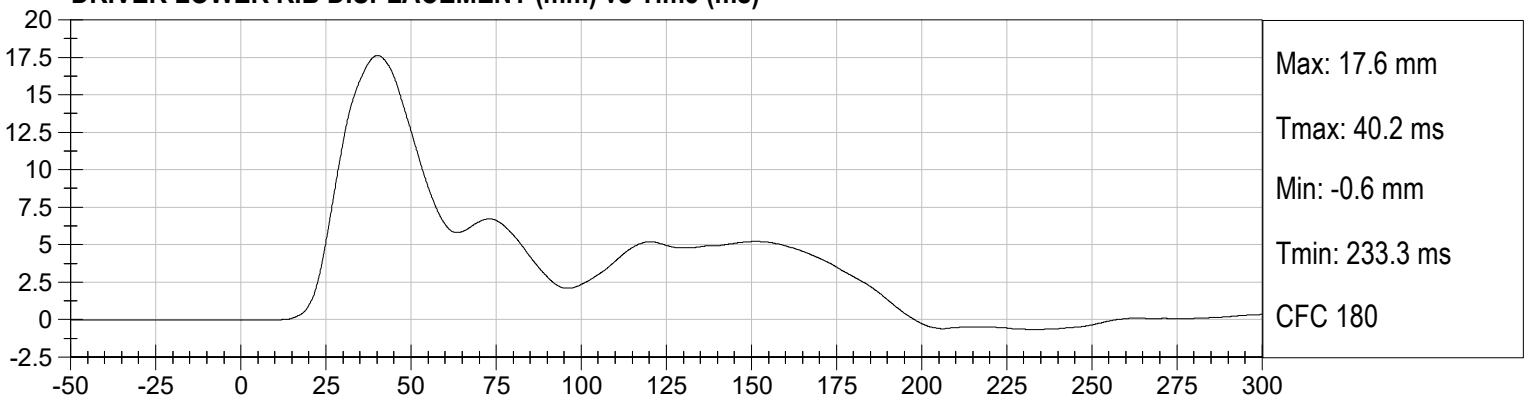
## DRIVER UPPER RIB DISPLACEMENT (mm) vs Time (ms)



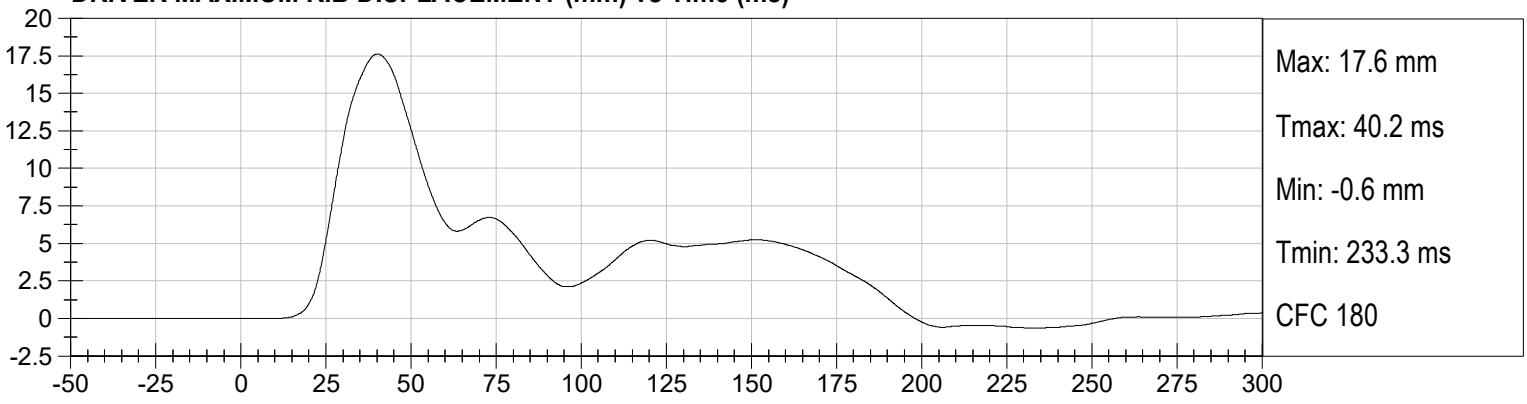

## DRIVER MID RIB DISPLACEMENT (mm) vs Time (ms)




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

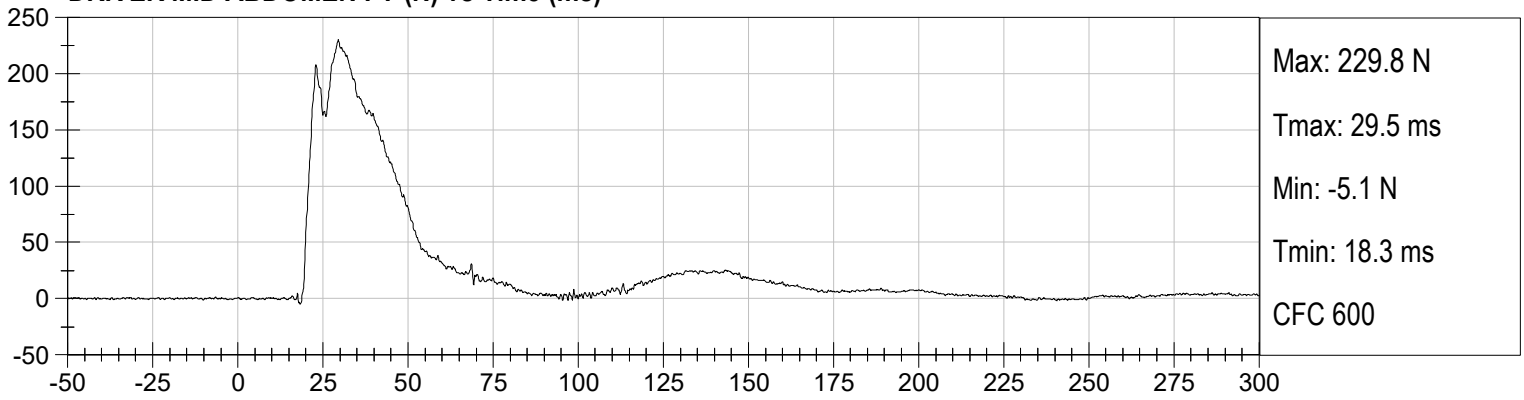



## DRIVER MAXIMUM RIB DISPLACEMENT (mm) vs Time (ms)

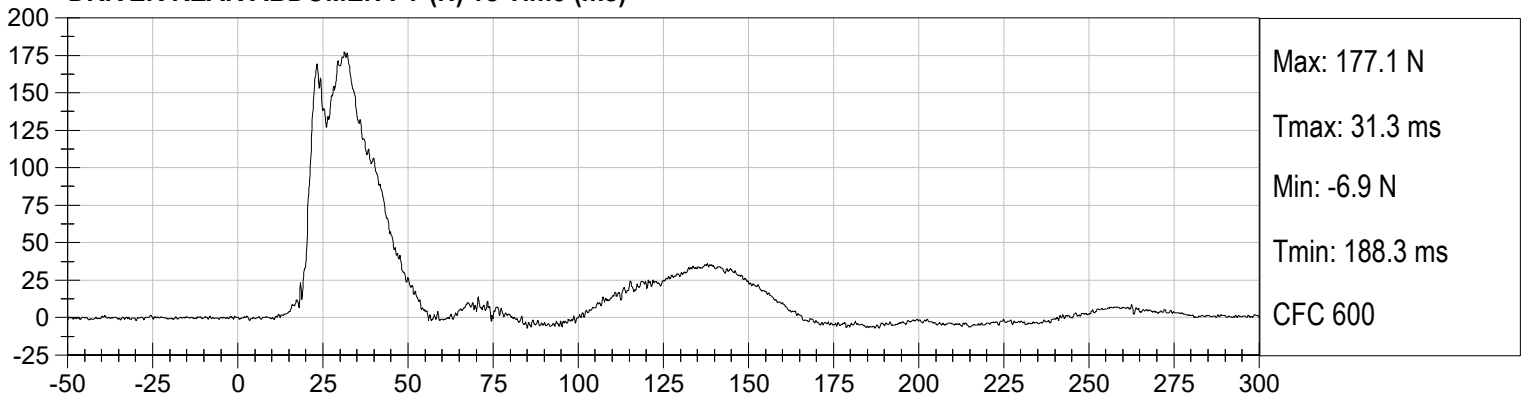


## DRIVER FRONT ABDOMEN FY (N) vs Time (ms)

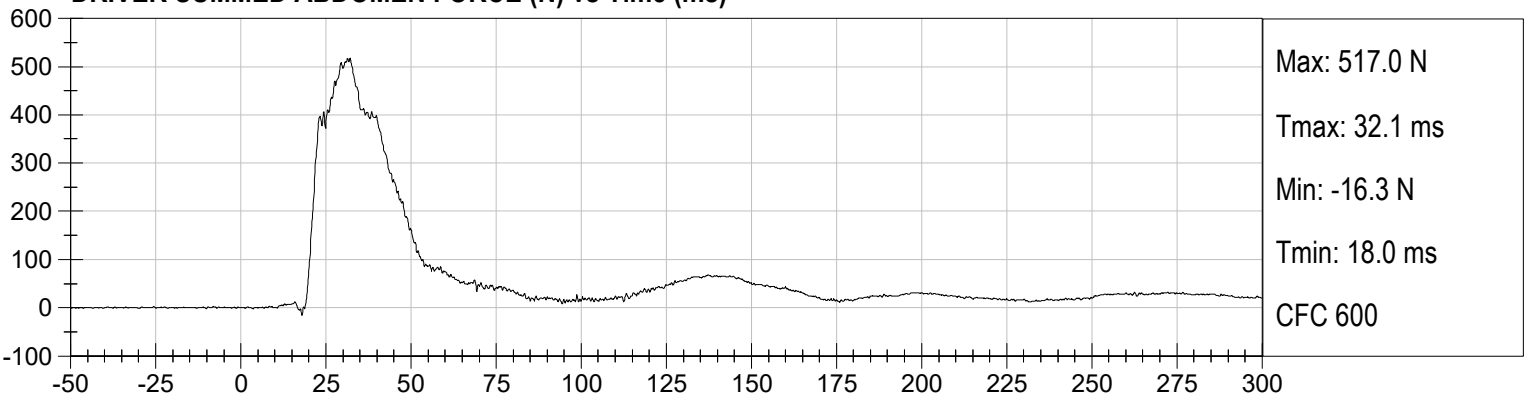

## DRIVER MID ABDOMEN FY (N) vs Time (ms)



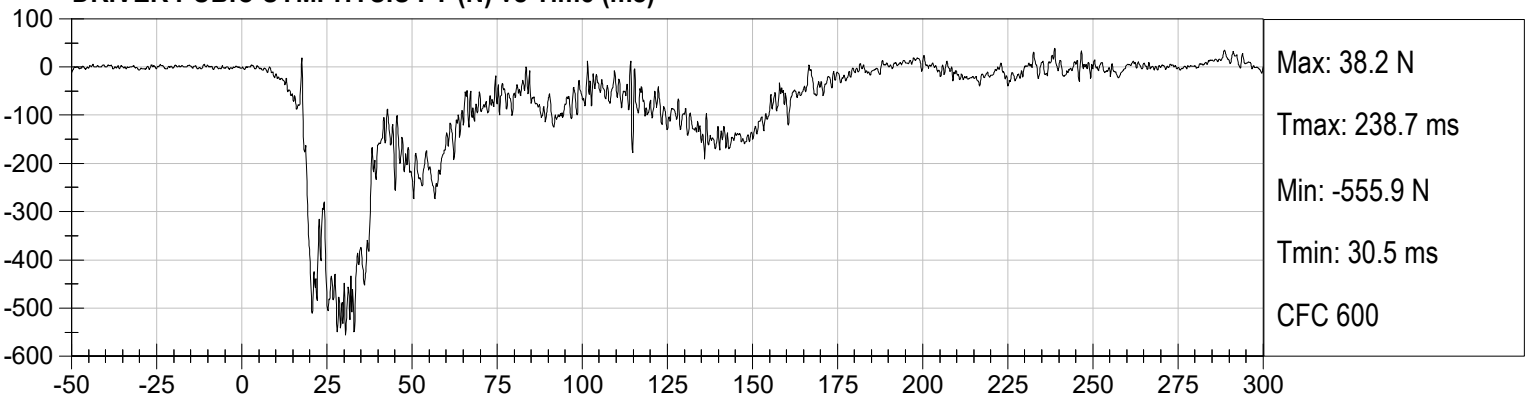

## DRIVER REAR ABDOMEN FY (N) vs Time (ms)



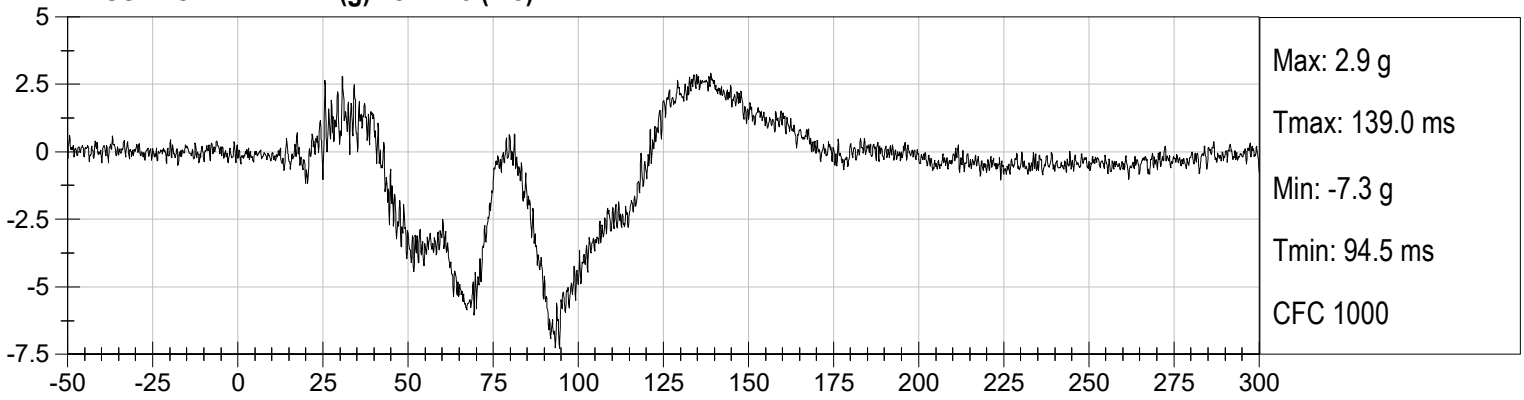

## DRIVER SUMMED ABDOMEN FORCE (N) vs Time (ms)



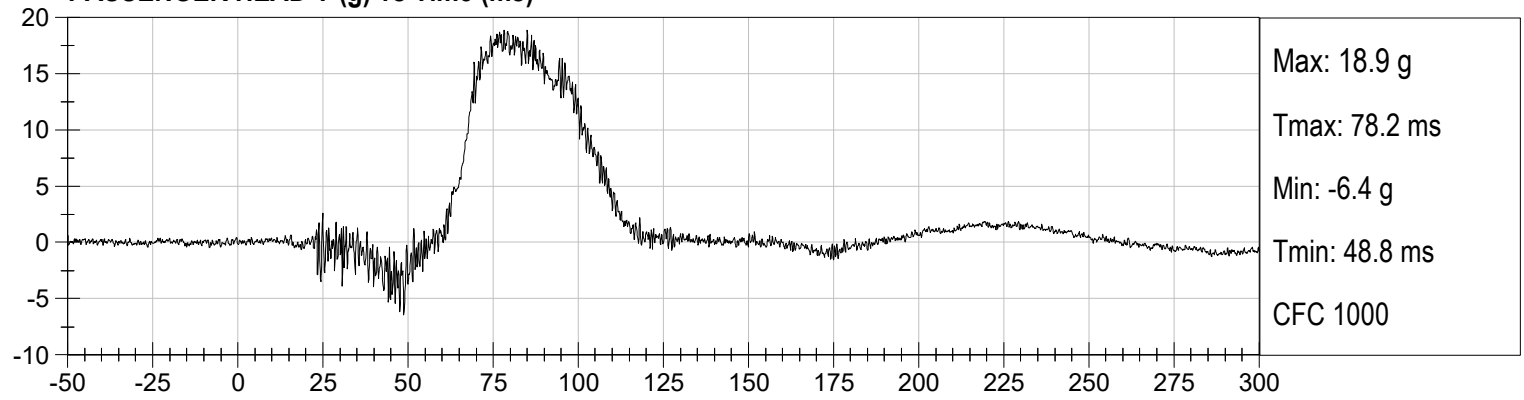
**DRIVER PUBIC SYMPHYSIS FY (N) vs Time (ms)**



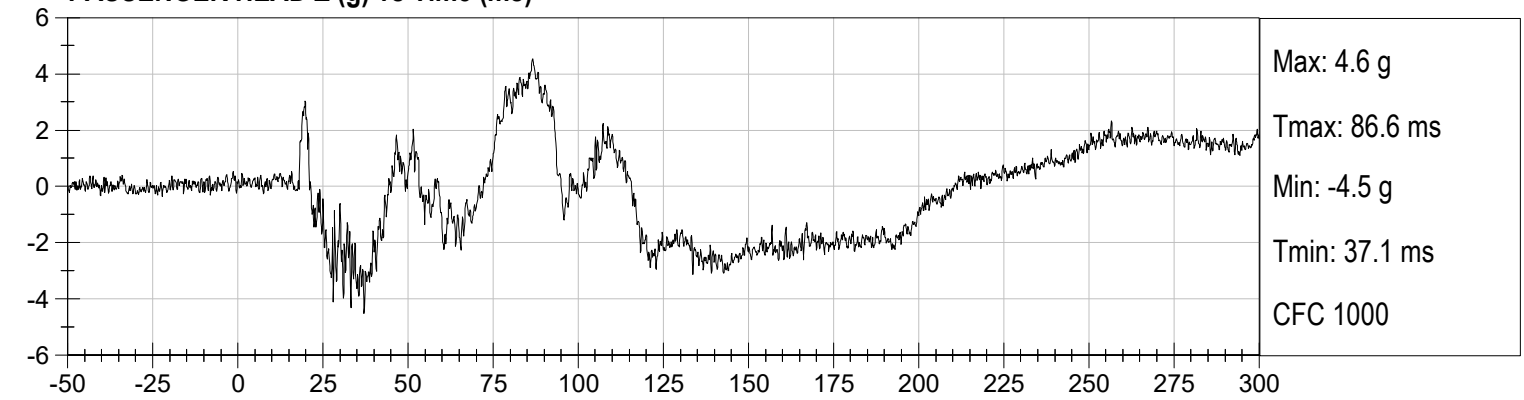
## PASSENGER HEAD X (g) vs Time (ms)



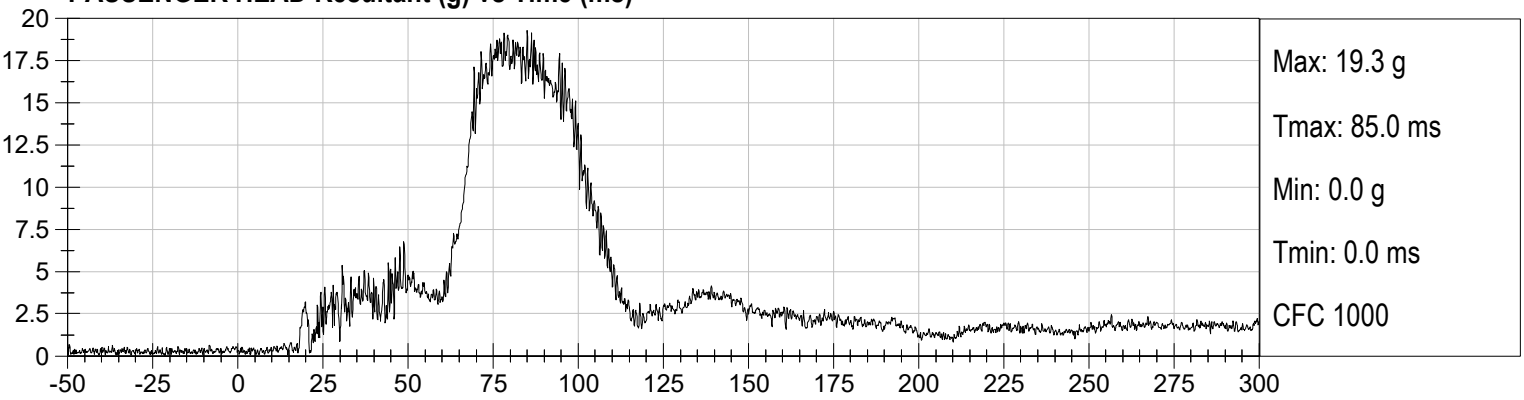

## PASSENGER HEAD Y (g) vs Time (ms)



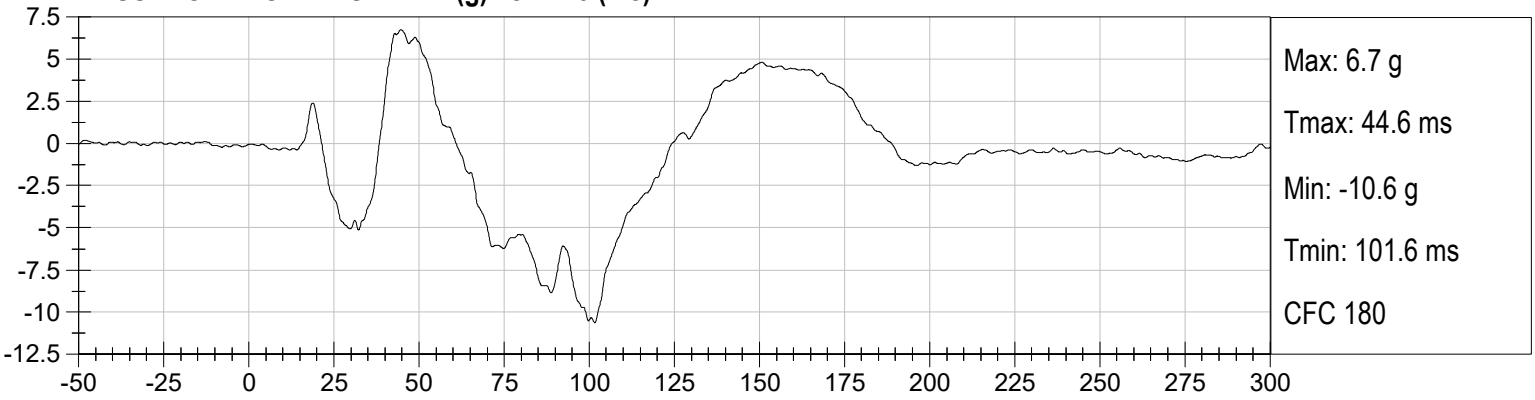

## PASSENGER HEAD Z (g) vs Time (ms)




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

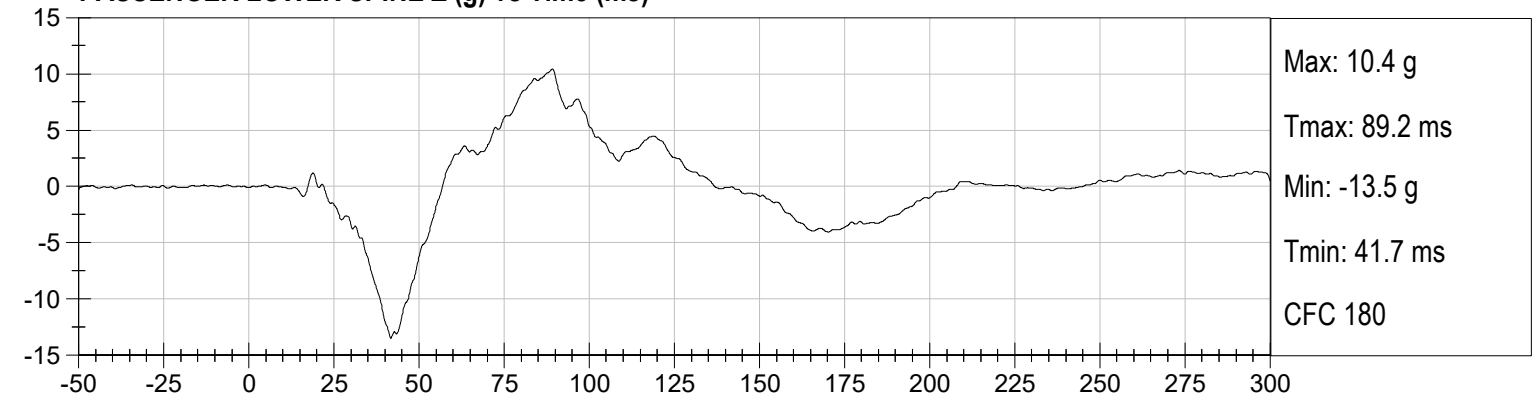


## PASSENGER LOWER SPINE X (g) vs Time (ms)




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

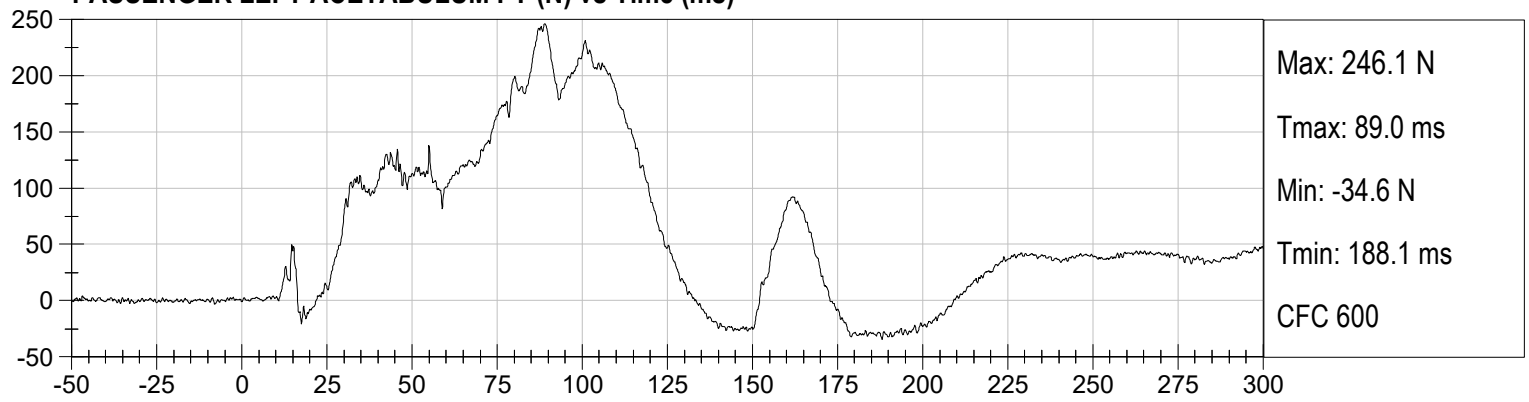

## PASSENGER LOWER SPINE Z (g) vs Time (ms)



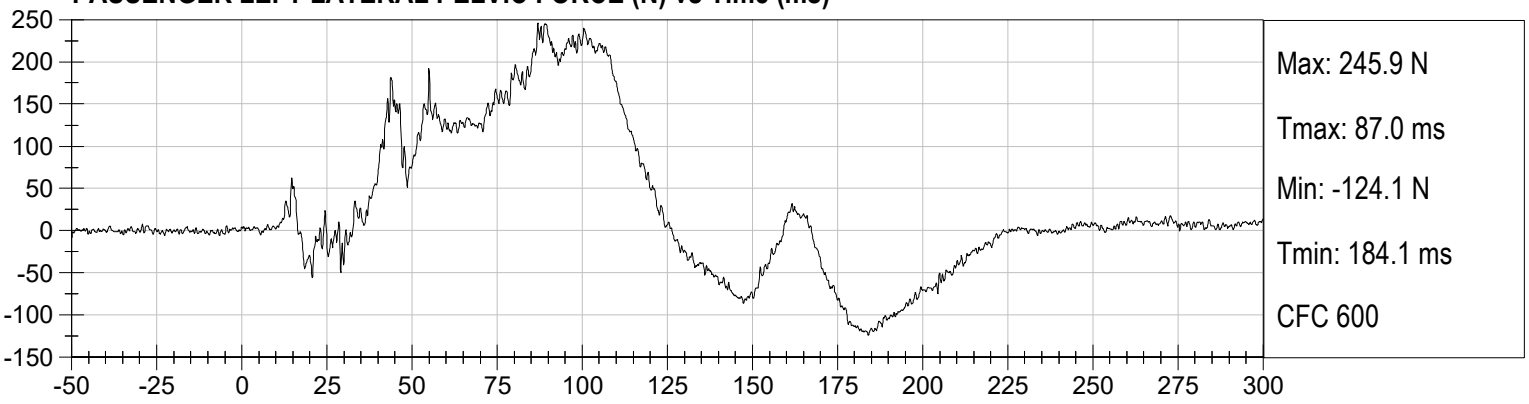

## PASSENGER LOWER SPINE Resultant (g) vs Time (ms)

## 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: 032**

| 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:** 032 **Test ID:** D191681

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.6 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 42 | Pass |
| Peak Resultant Acceleration | G's | 125 to 155 | 144 | Pass |
| Peak Longitudinal Acceleration | G's | <= +/- 15.0 | 8.1 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 15% of peak | Yes | Pass |
| | | Overall Test Results | | Pass |

Danielle Redenbaugh
Laboratory Technician

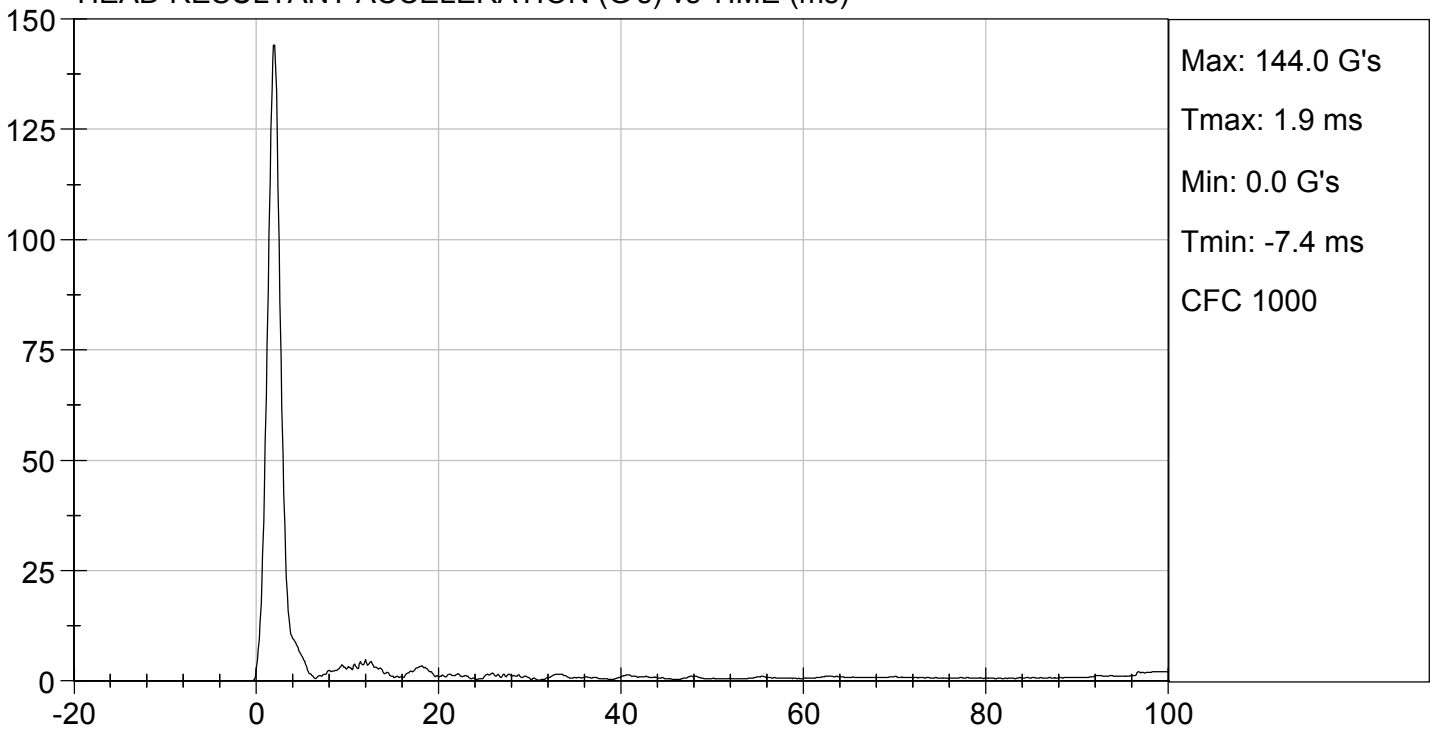
05/30/2019
Test Date

Approved By

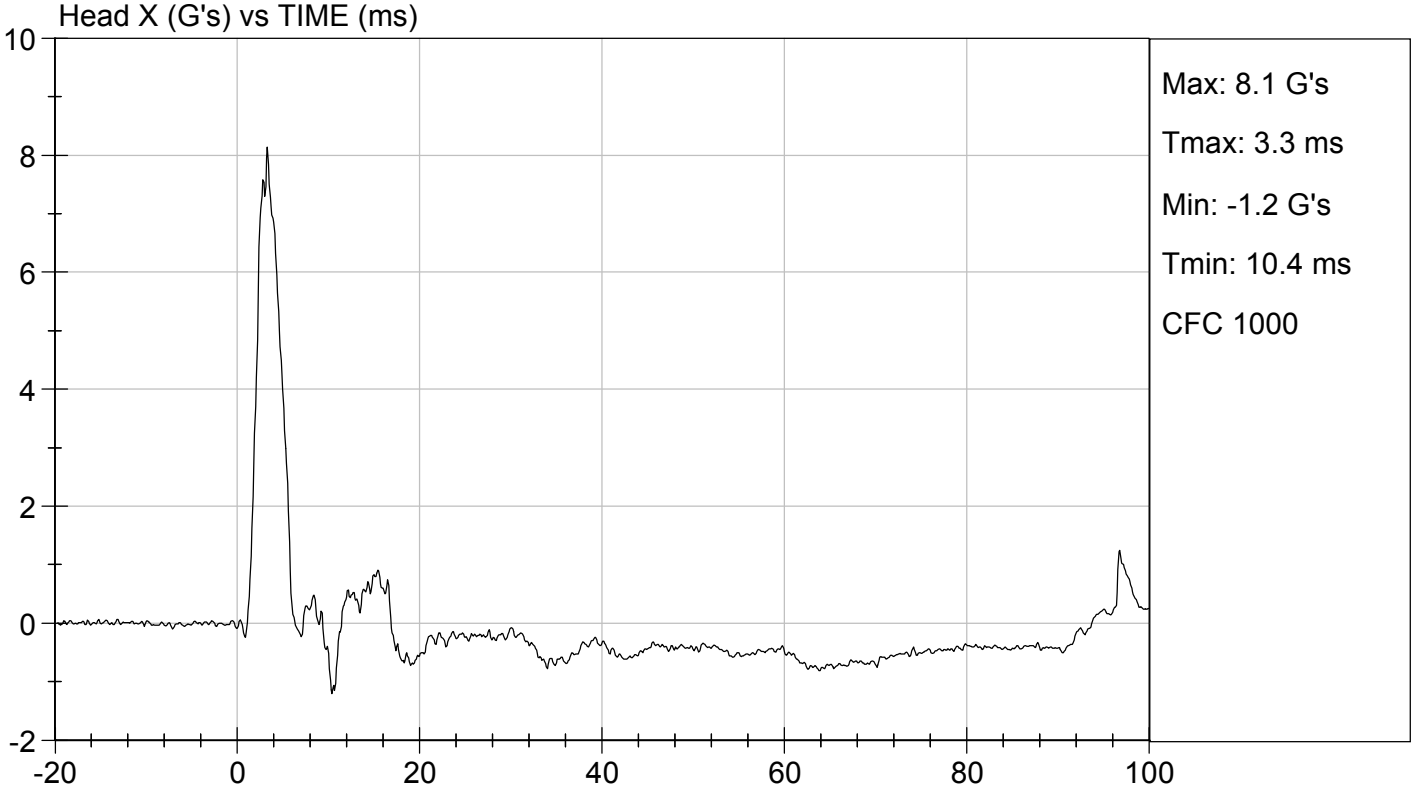
TEST DESC: HEAD DROP

TEST DATE: 05/30/2019
TEST #: D191681

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



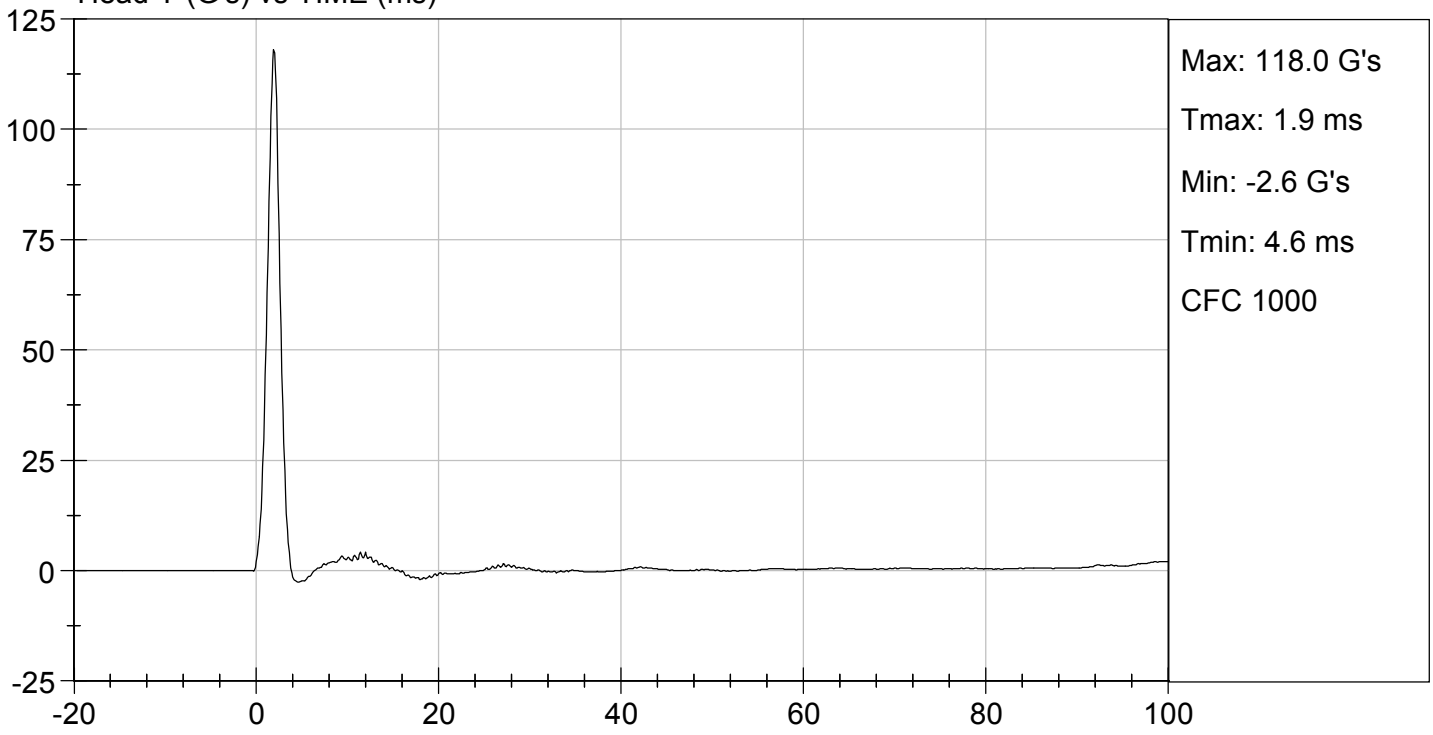

Head X (G's) vs TIME (ms)



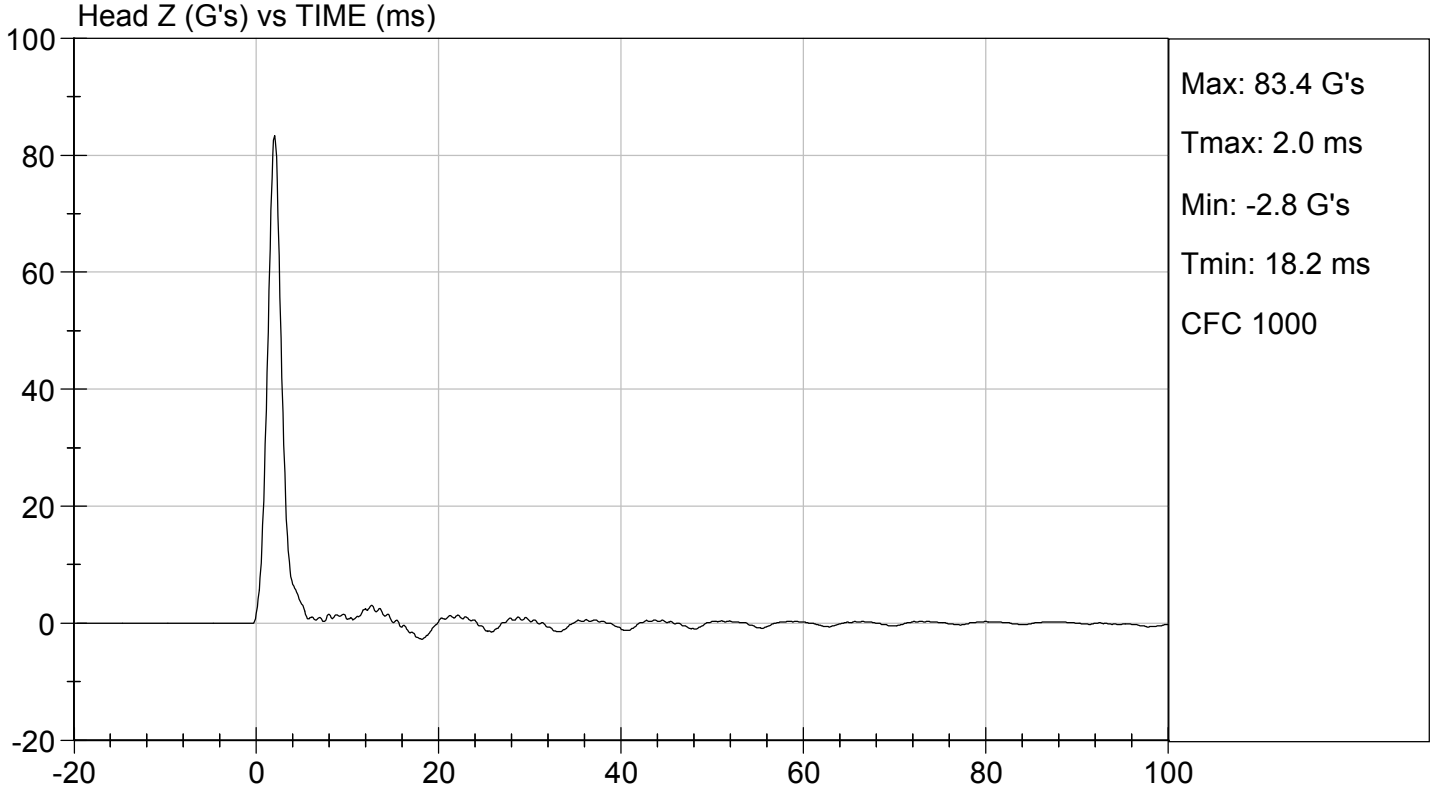
TEST DESC: HEAD DROP

TEST DATE: 05/30/2019
TEST #: D191681

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




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



**MGA RESEARCH CORPORATION**

**NECK PENDULUM TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D191682

| 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 | 48 | Pass |
| Pendulum Speed | | m/s | 3.30 to 3.50 | 3.44 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | 0.01 | Pass |
| | 3 ms | m/s | -0.25 to -0.375 | -0.34 | Pass |
| | 14 ms | m/s | -3.20 to -3.70 | -3.55 | Pass |
| | 17 ms | m/s | >= -3.70 | -3.32 | Pass |
| Maximum Flexion Angle | | deg | 49.0 to 59.0 | 50.2 | Pass |
| Time of Maximum Flexion Angle | | ms | 54.0 to 66.0 | 55.7 | Pass |
| Head Rotation Decay Time to 0 Degree | | ms | 53.0 to 88.0 | 61.5 | Pass |
| | | | Overall Results | | Pass |

Danielle Redenbaugh
Laboratory Technician

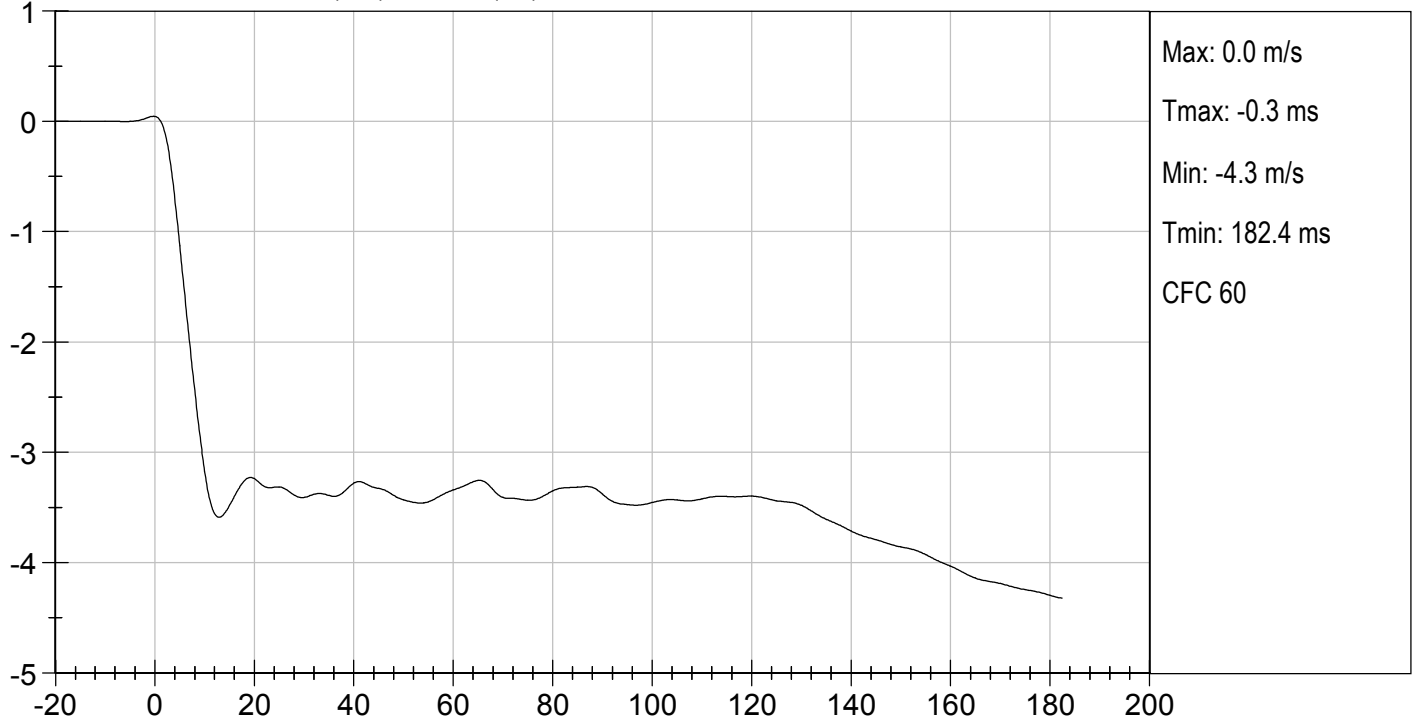
05/30/2019
Test Date

Approved By

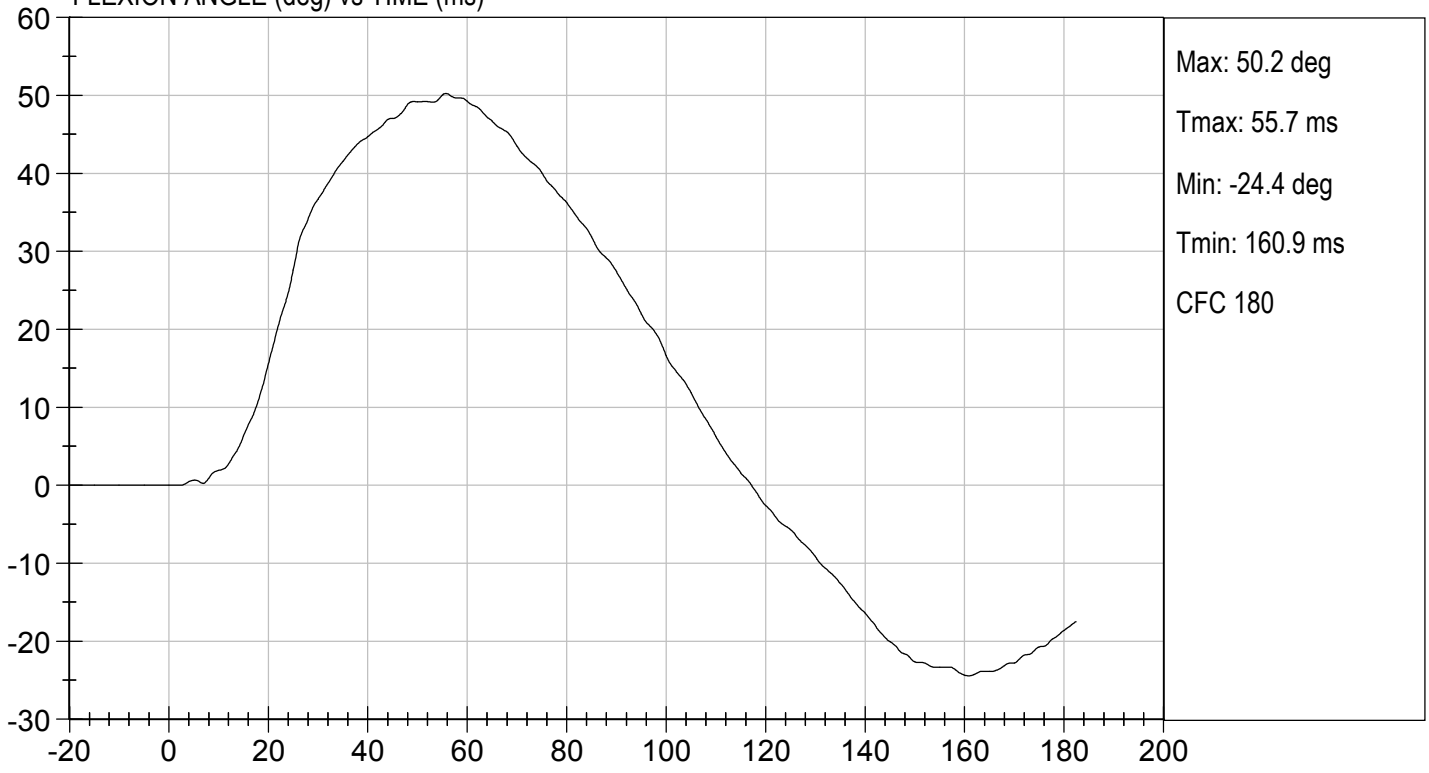
TEST DESC: NECK BENDING
VELOCITY: 11.30 ft/s, 3.44 m/s

TEST DATE: 05/30/2019
TEST #: D191682

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



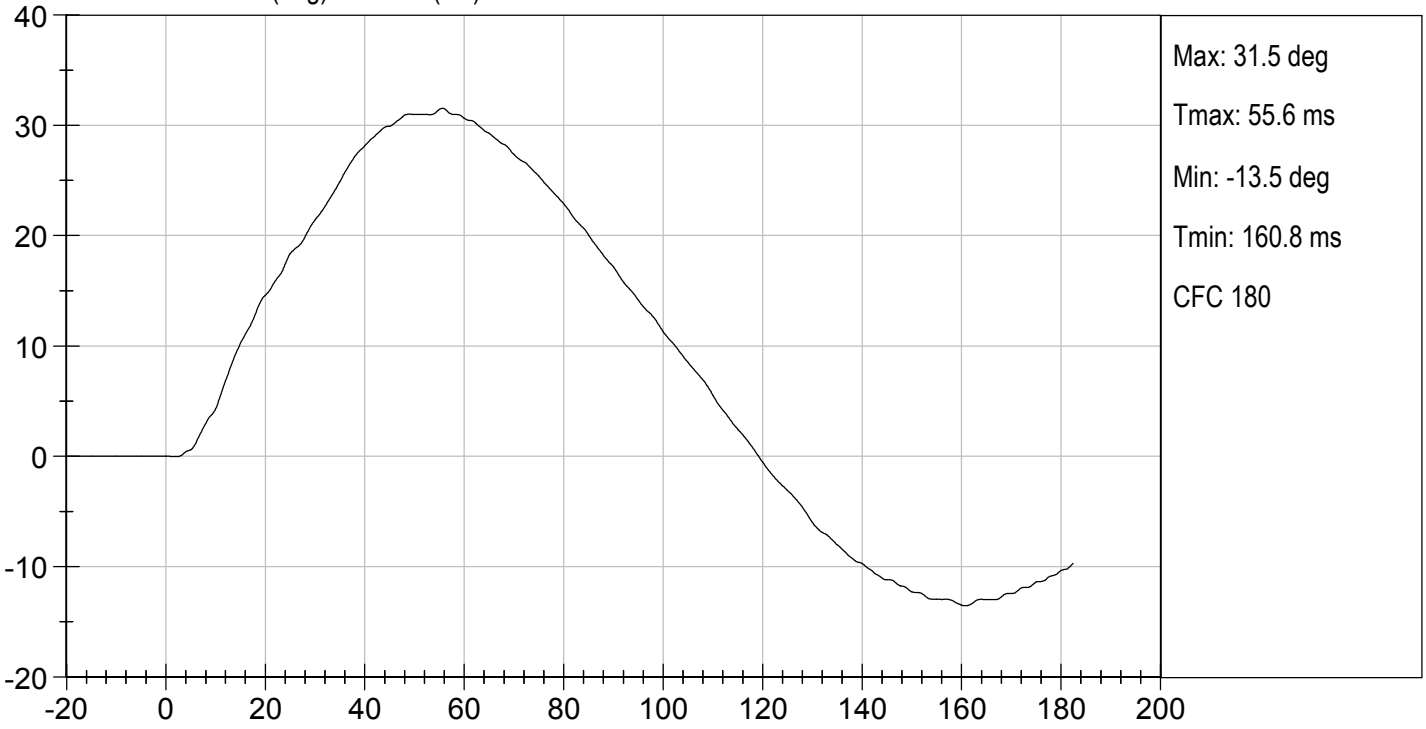

FLEXION ANGLE (deg) vs TIME (ms)



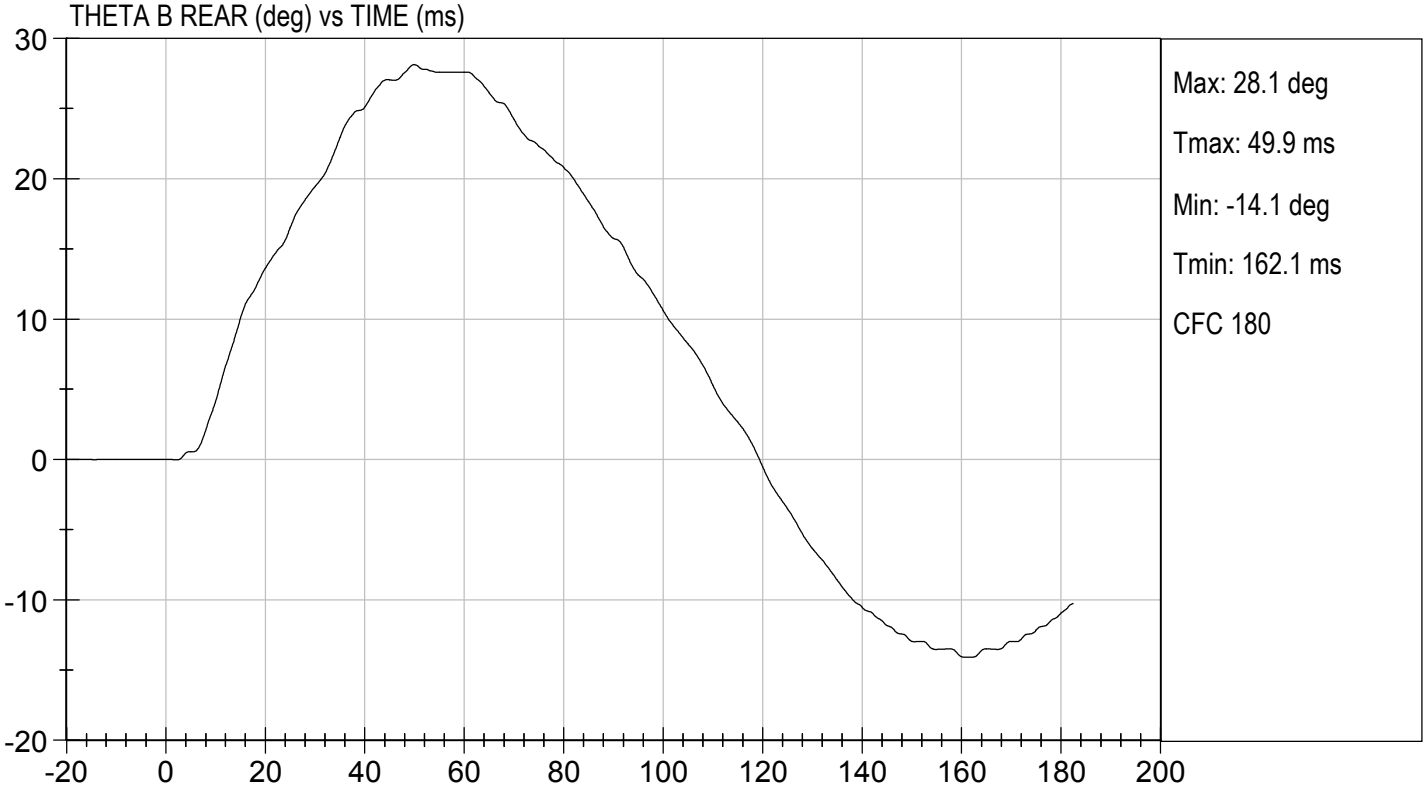
TEST DESC: NECK BENDING
VELOCITY: 11.30 ft/s, 3.44 m/s

TEST DATE: 05/30/2019
TEST #: D191682

THETA A FRONT (deg) vs TIME (ms)

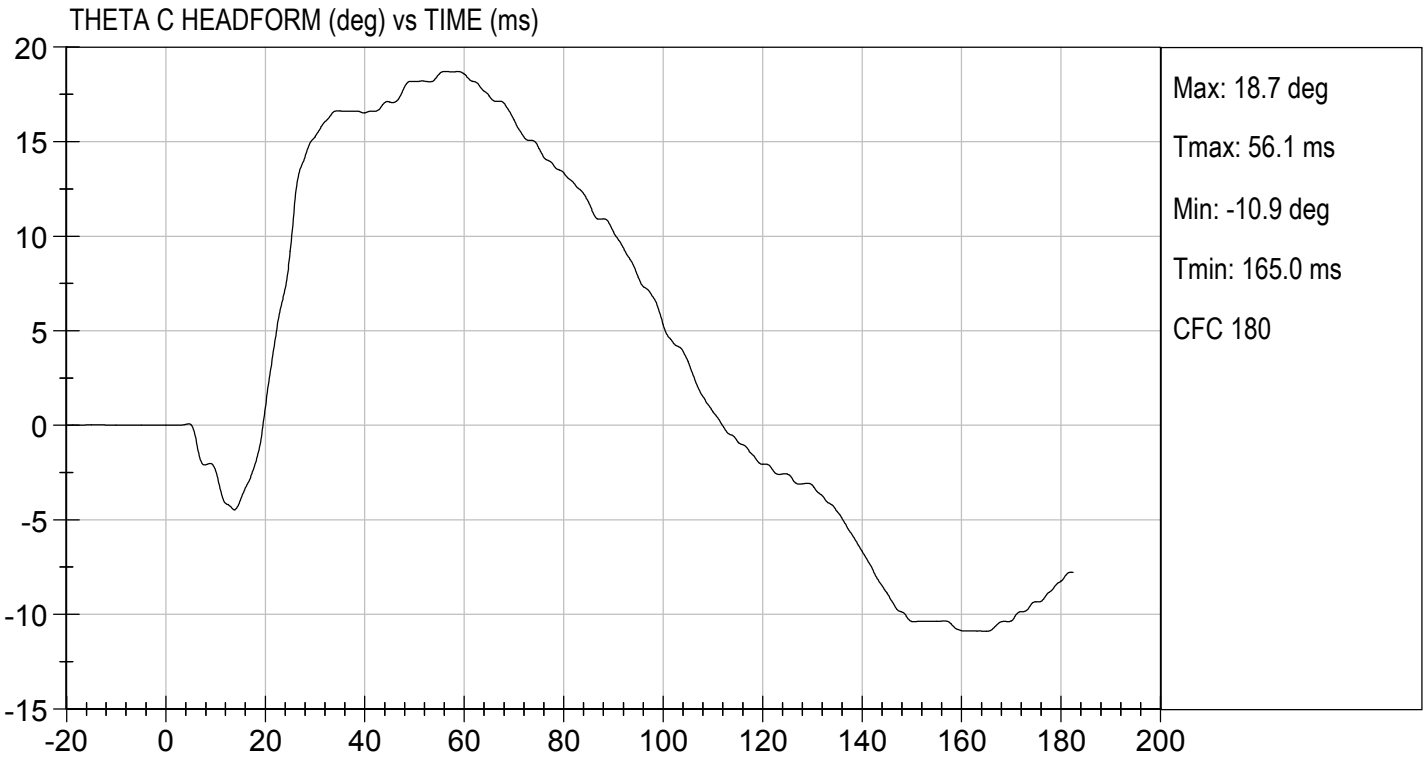



THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.30 ft/s, 3.44 m/s

TEST DATE: 05/30/2019
TEST #: D191682



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D191683

| 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 | 51 | Pass |
| Pendulum Speed | m/s | 4.20 to 4.40 | 4.27 | Pass |
| Peak Impactor Acceleration | G's | 7.5 to 10.5 | 8.2 | Pass |
| | | Overall Test Results | | Pass |

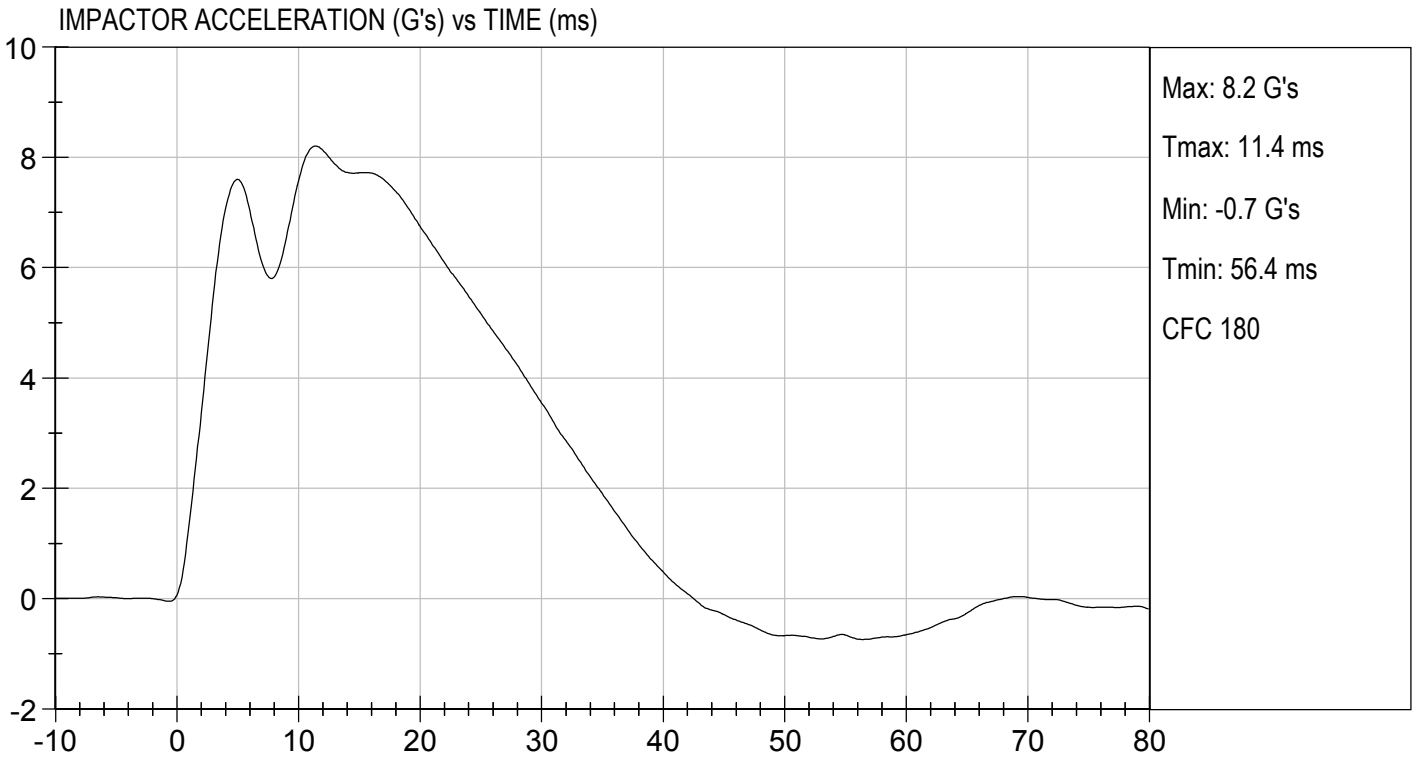
Jacob D Taylor
Laboratory Technician

05/31/2019
Test Date

Approved By

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

TEST DATE: 05/31/2019
TEST #: D191683



**MGA RESEARCH CORPORATION**

**UPPER RIB TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D19AX4

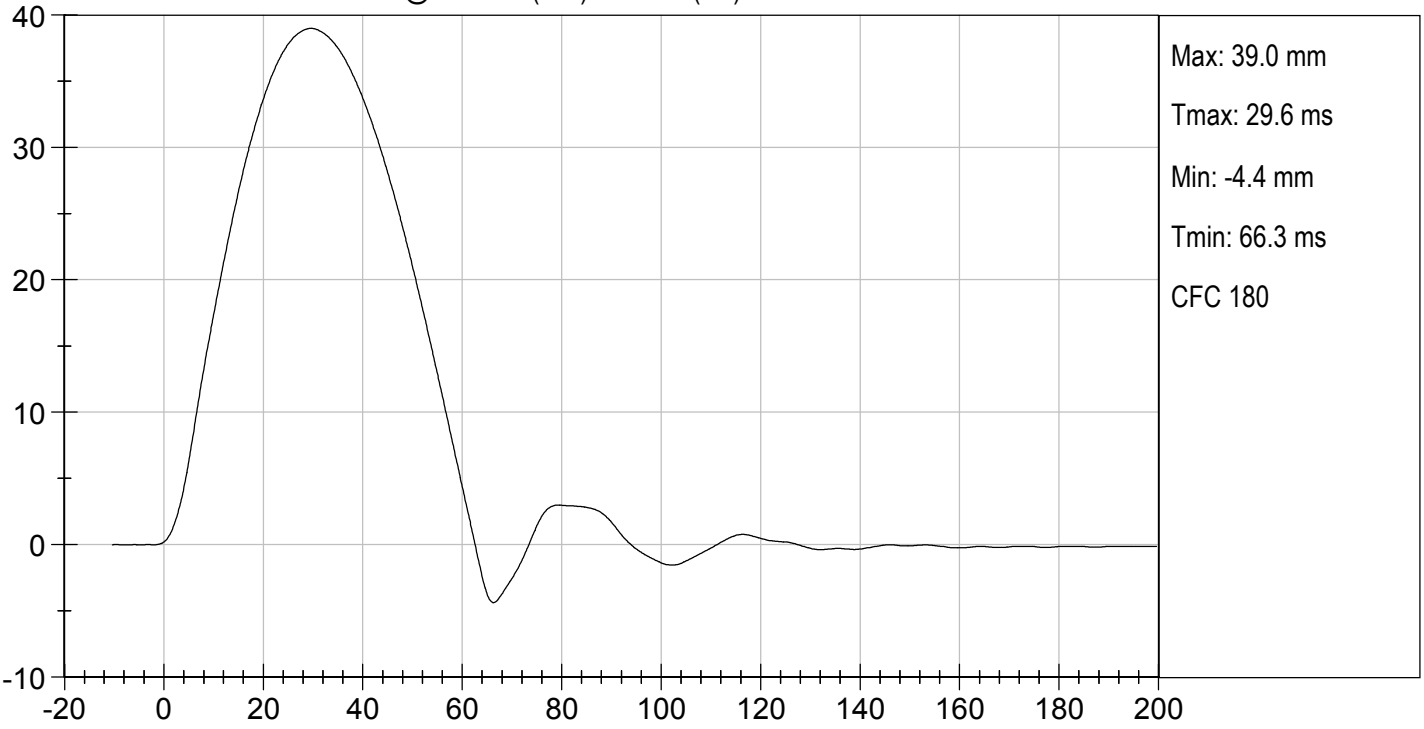
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 20.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 39.0 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 49.8 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

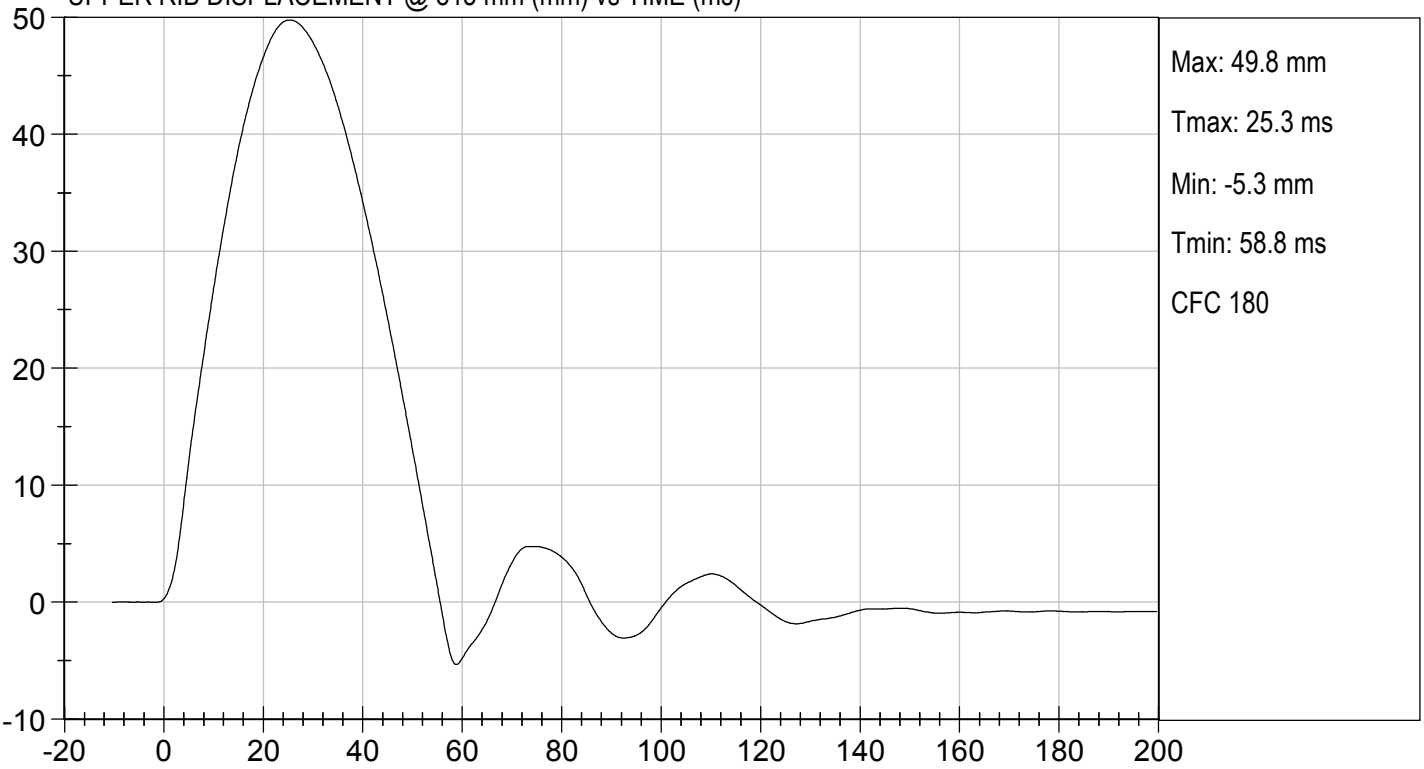
07/10/2019
Test Date

Approved By

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




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



**MGA RESEARCH CORPORATION**

**MID RIB TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D19AX5

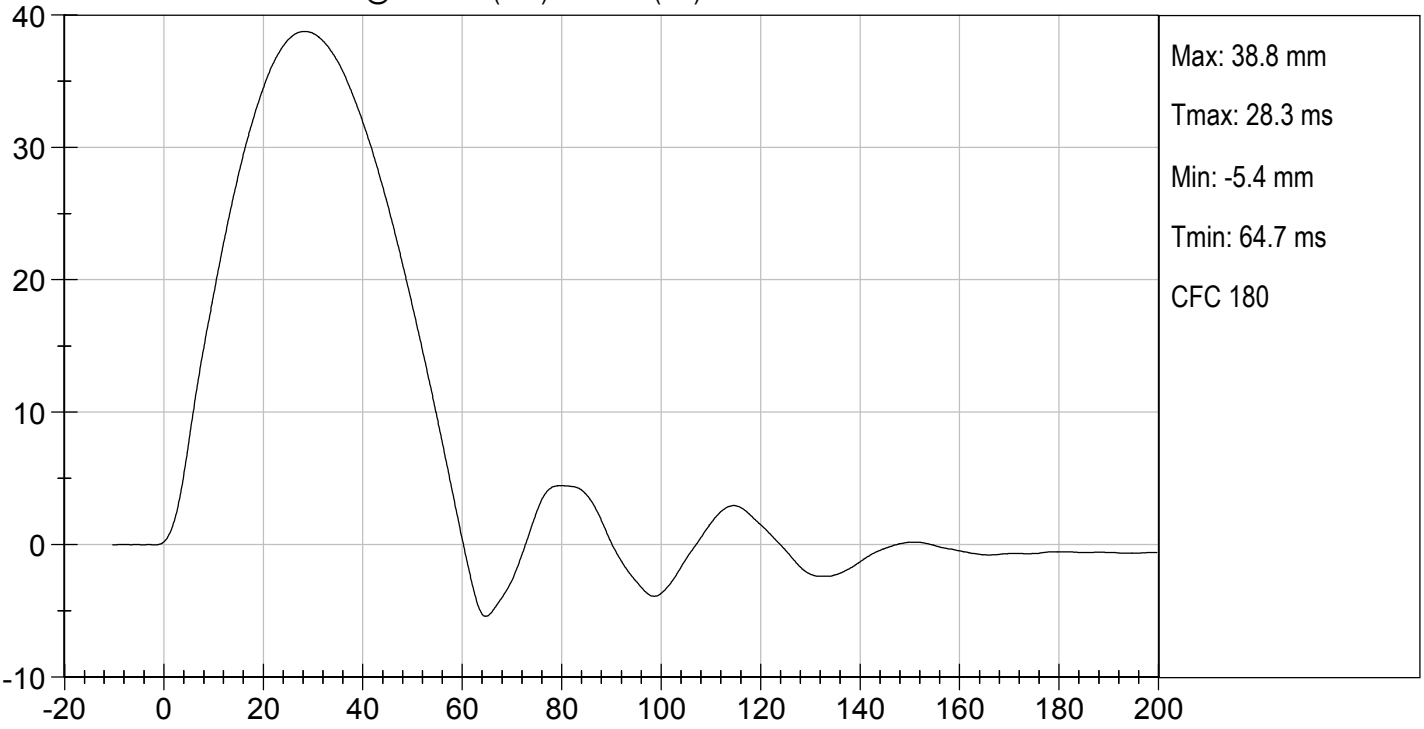
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 20.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 38.8 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 47.6 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

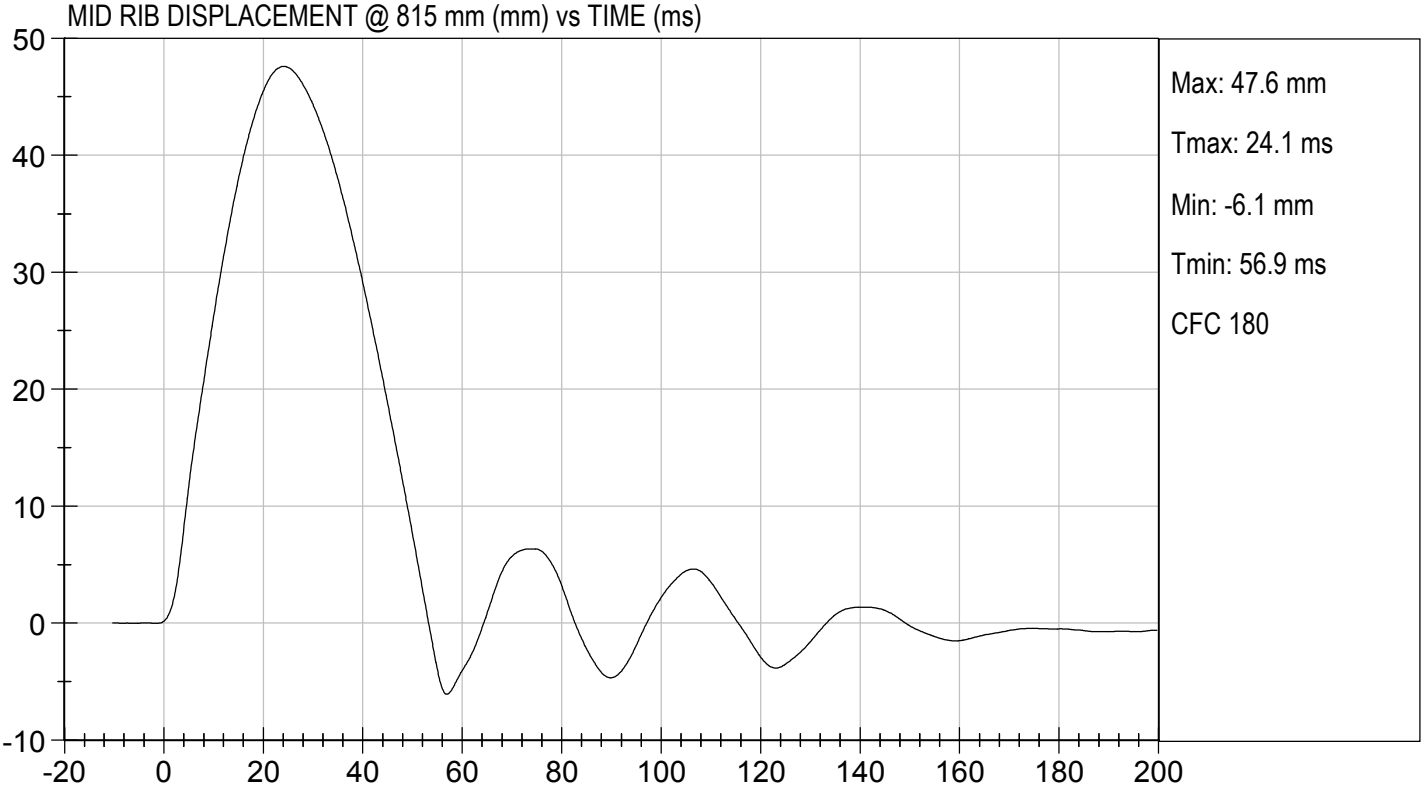
07/10/2019
Test Date

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:** 032 **Test I.D:** D19AX6

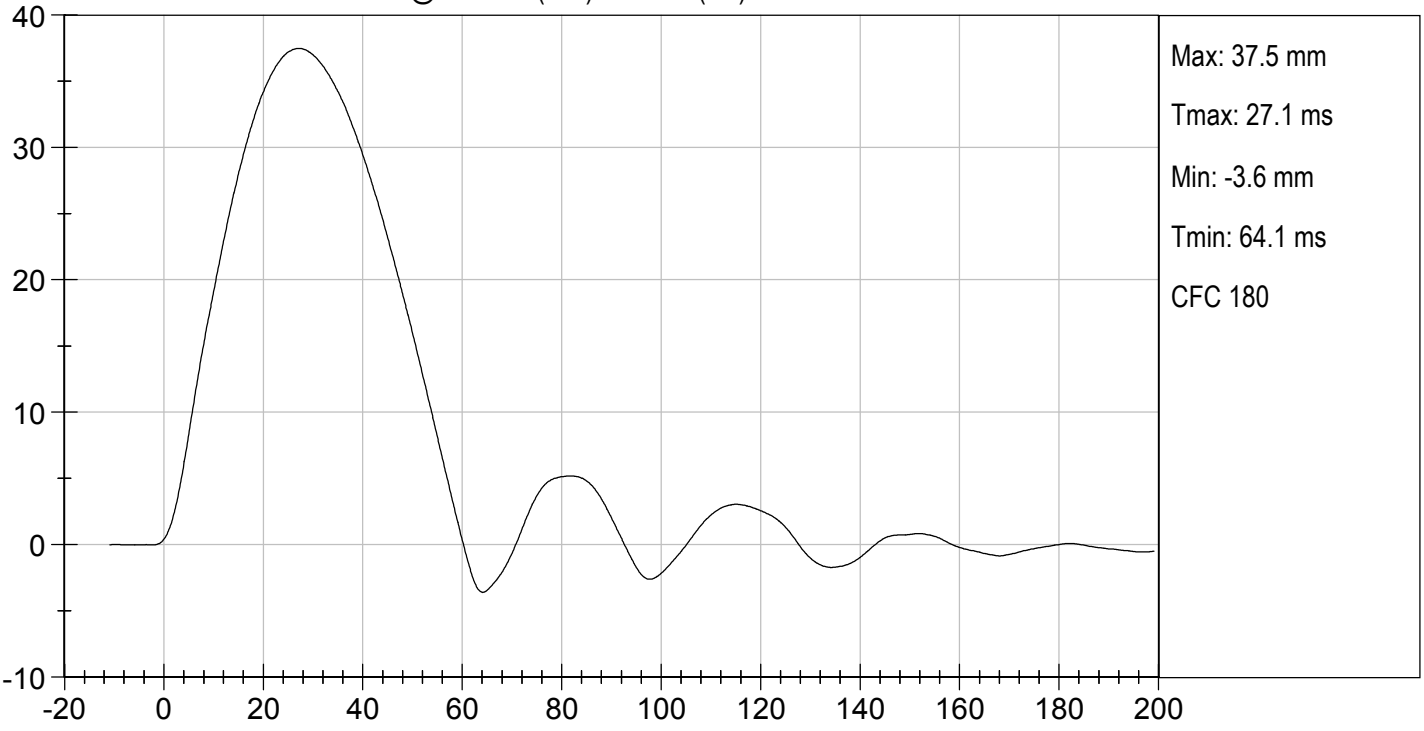
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 20.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 37.5 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 48.1 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

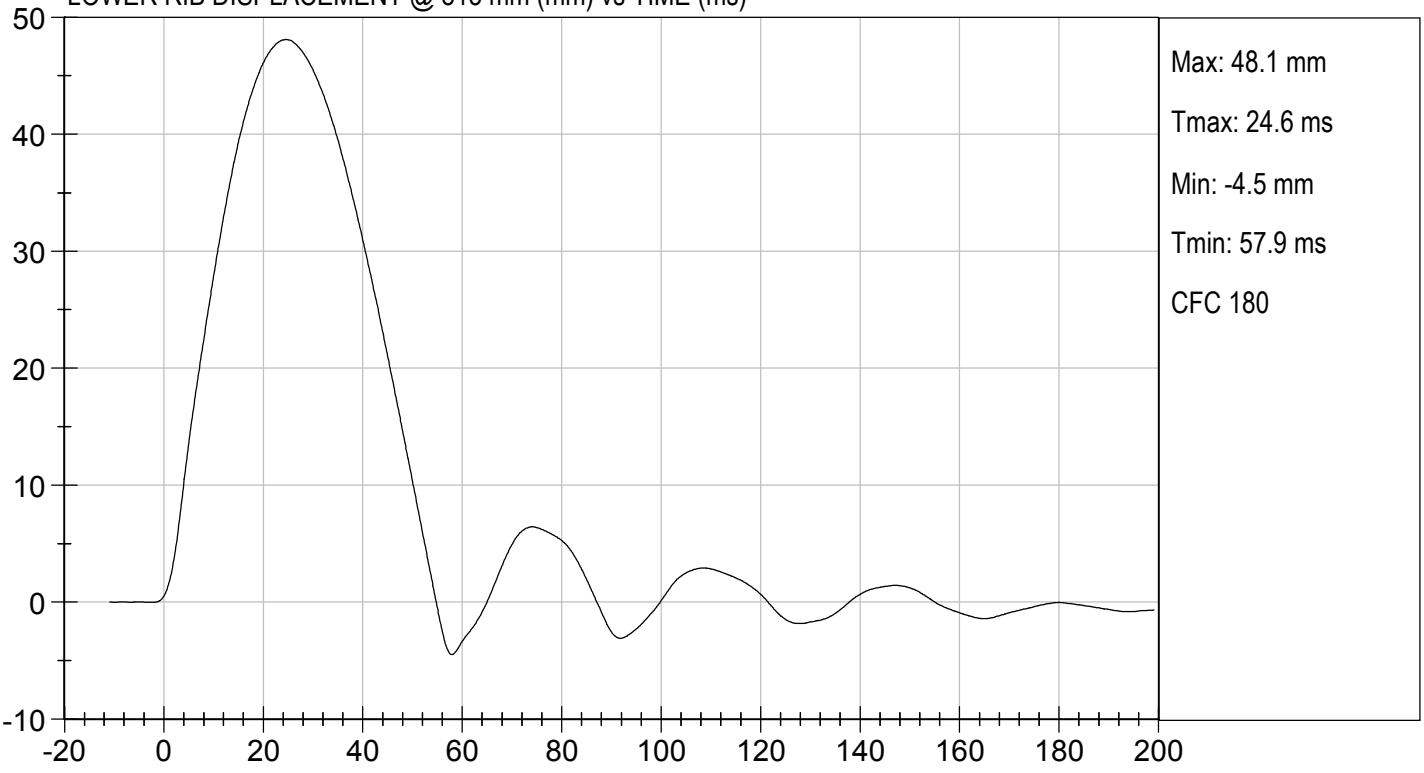
07/10/2019
Test Date

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:** 032 **Test I.D:** D191687

| 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 | 51 | Pass |
| Probe Speed | m/s | 3.90 to 4.10 | 4.10 | Pass |
| Maximum Impactor Force | N | 4000 to 4800 | 4180 | Pass |
| Time of Maximum Impactor Force | ms | 10.6 to 13.0 | 11.6 | Pass |
| Maximum Total Abdomen Force | N | 2200 to 2700 | 2303 | Pass |
| Time of Maximum Abdomen Force | ms | 10.0 to 12.3 | 11.8 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

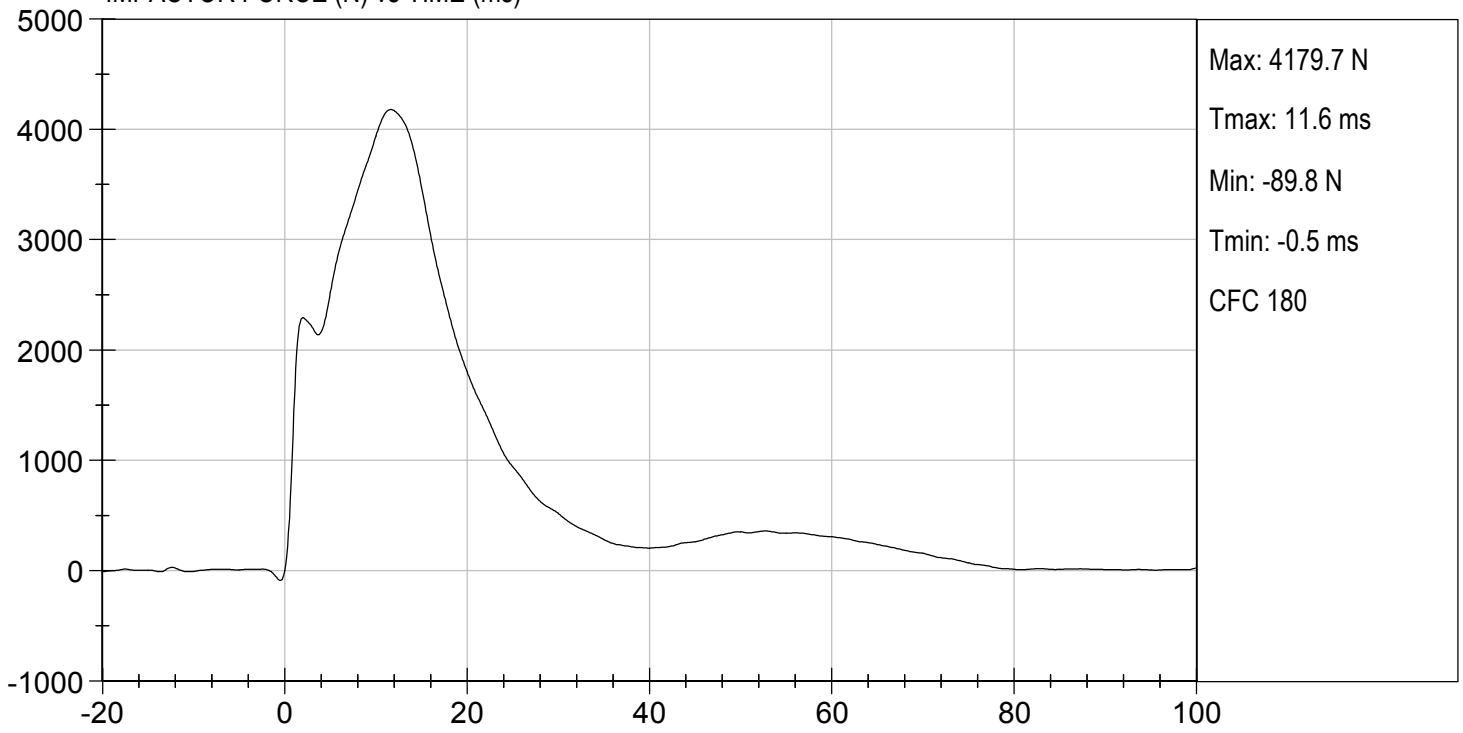
05/31/2019
Test Date

Approved By

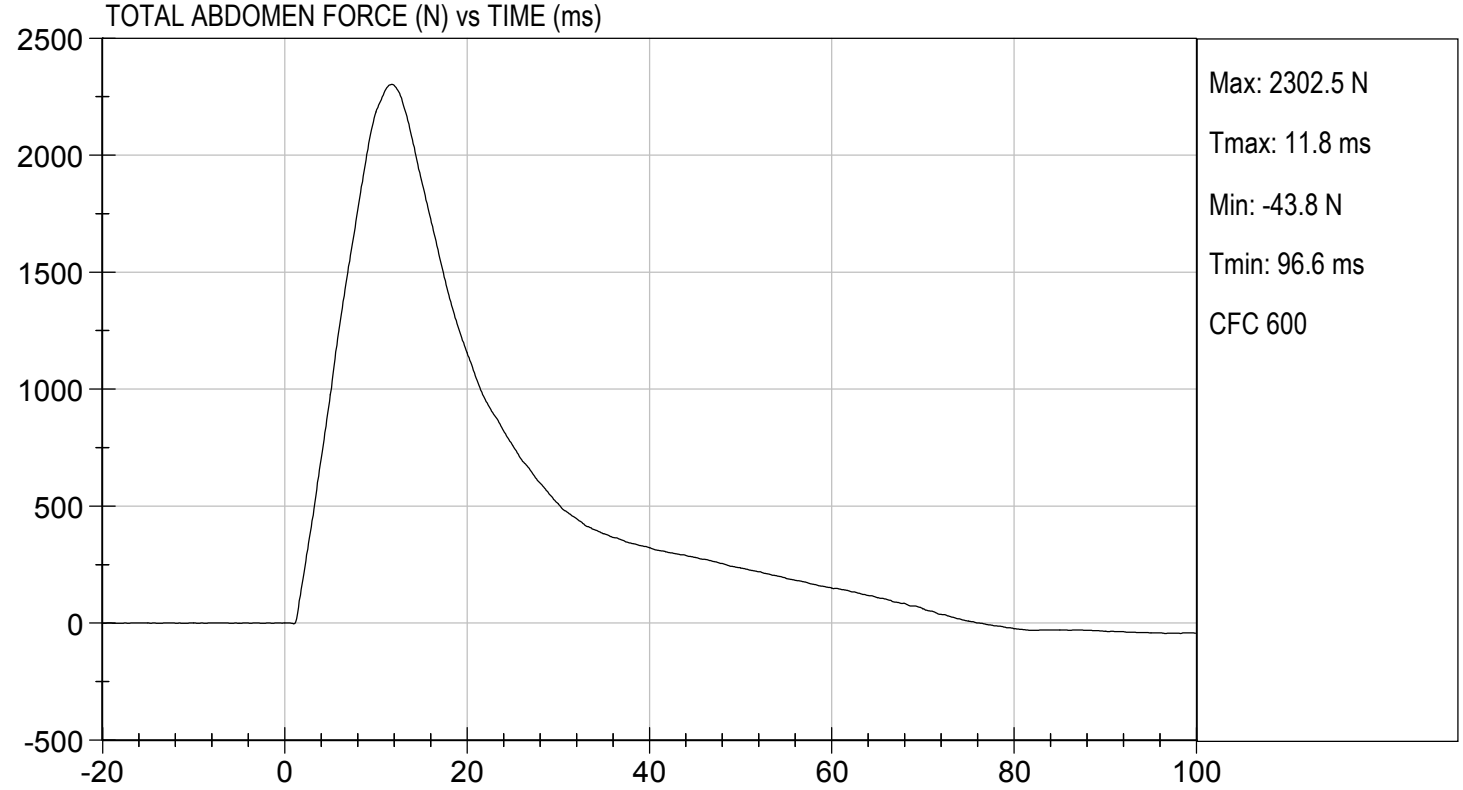
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 05/31/2019
TEST #: D191687

IMPACTOR FORCE (N) vs TIME (ms)



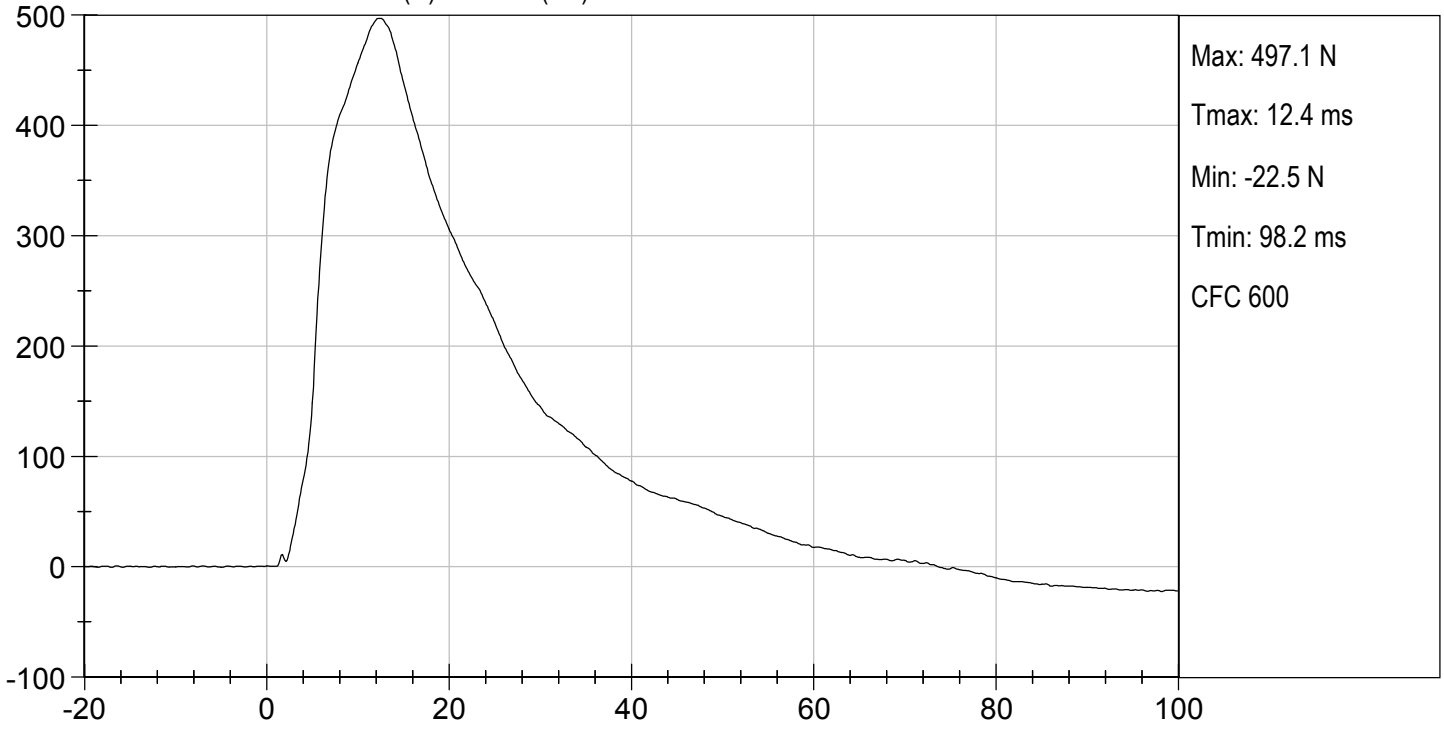

TOTAL ABDOMEN FORCE (N) vs TIME (ms)



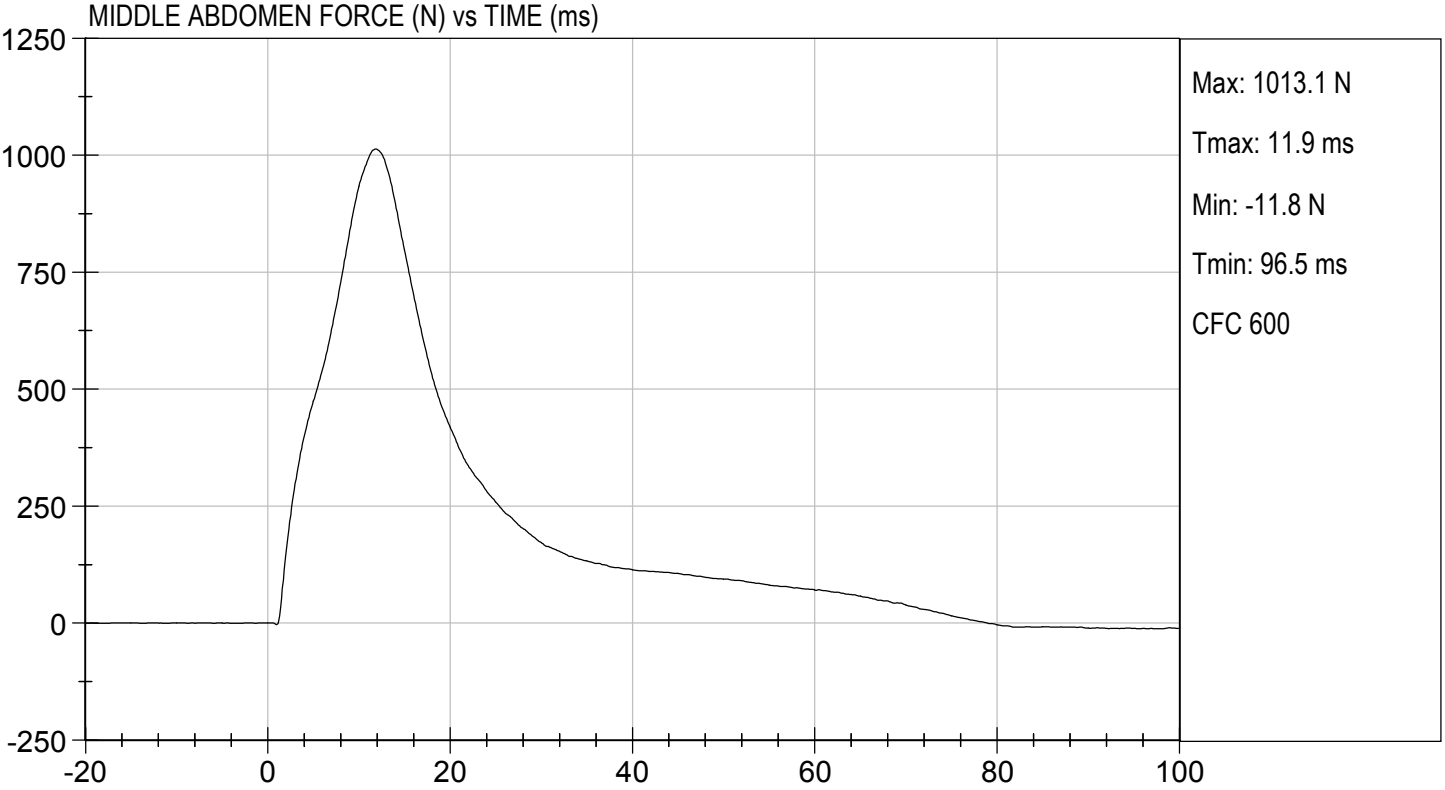
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 05/31/2019
TEST #: D191687

FRONT ABDOMEN FORCE (N) vs TIME (ms)



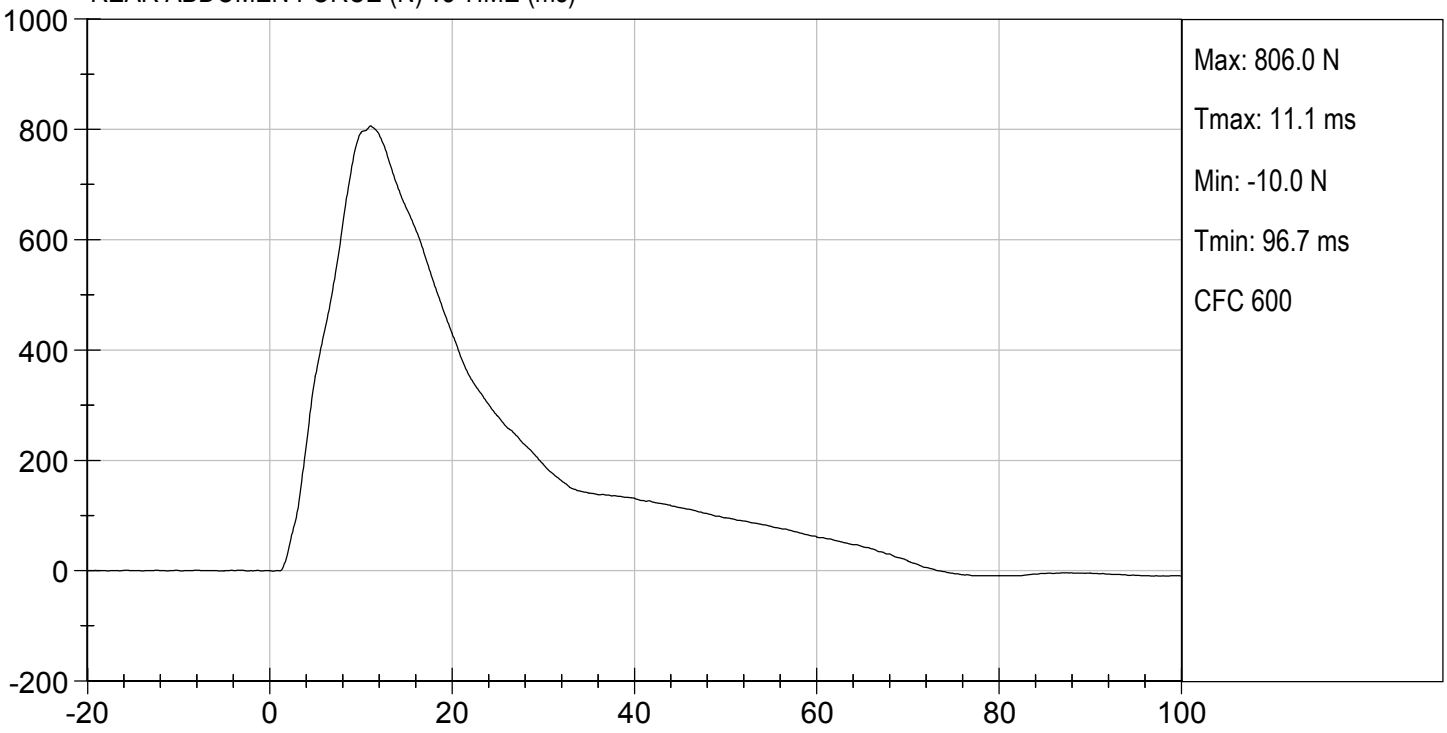

MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.44 ft/s, 4.10 m/s

TEST DATE: 05/31/2019
TEST #: D191687

REAR ABDOMEN FORCE (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**LUMBAR SPINE TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D191688

| 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 | 48 | Pass |
| Pendulum Speed | | m/s | 5.95 to 6.15 | 6.05 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | -0.01 | Pass |
| | 3.7 ms | m/s | -0.425 to -0.24 | -0.411 | Pass |
| | 27 ms | m/s | -6.50 to -5.80 | -5.93 | Pass |
| | 30 ms | m/s | >= -6.50 | -5.80 | Pass |
| Maximum Flexion Angle | | deg | 45.0 to 55.0 | 47.6 | Pass |
| Time of Maximum Flexion Angle | | ms | 39.0 to 53.0 | 43.0 | Pass |
| Headform Rotation Decay to Initial Position | | ms | 37 to 57 | 40 | Pass |
| | | | Overall Results | | Pass |

Laboratory Technician

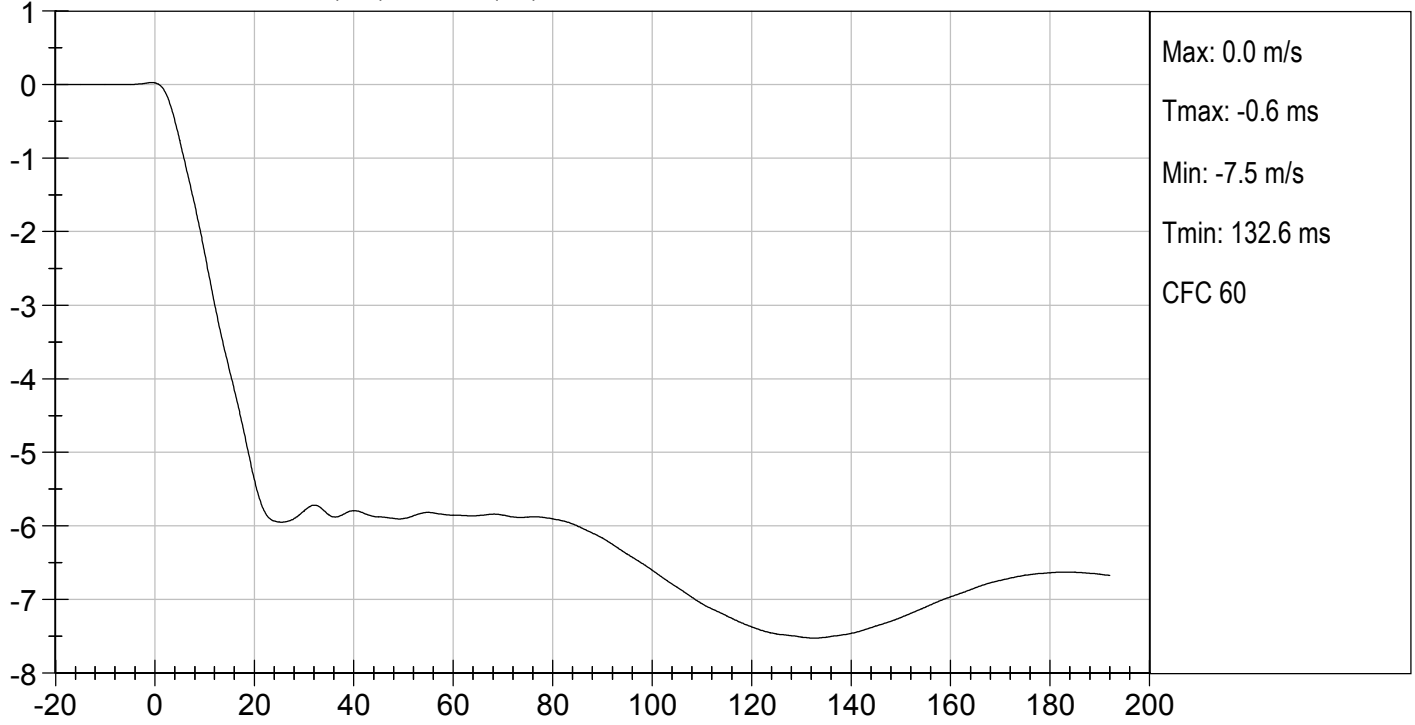
05/29/2019
Test Date

Approved By

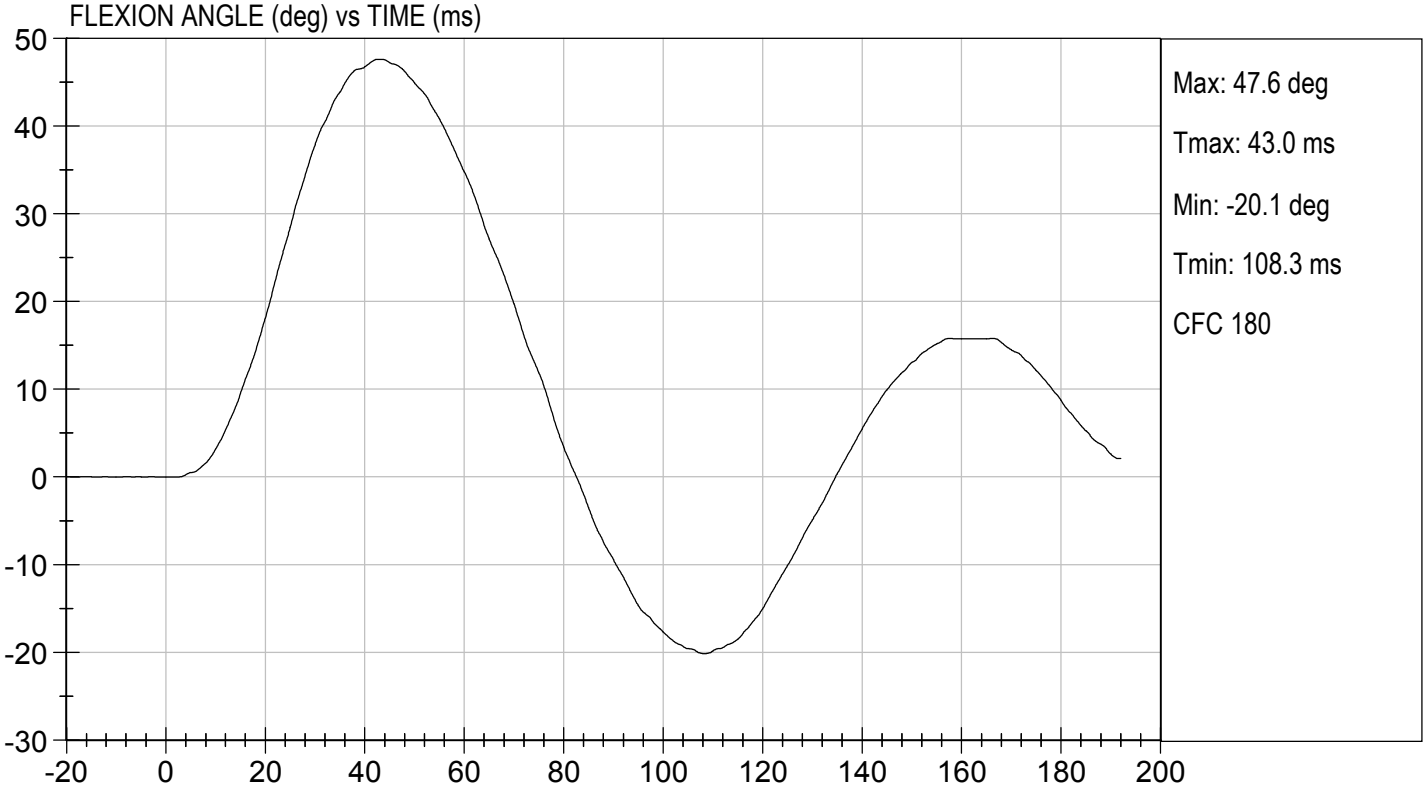
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 05/29/2019
TEST #: D191688

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



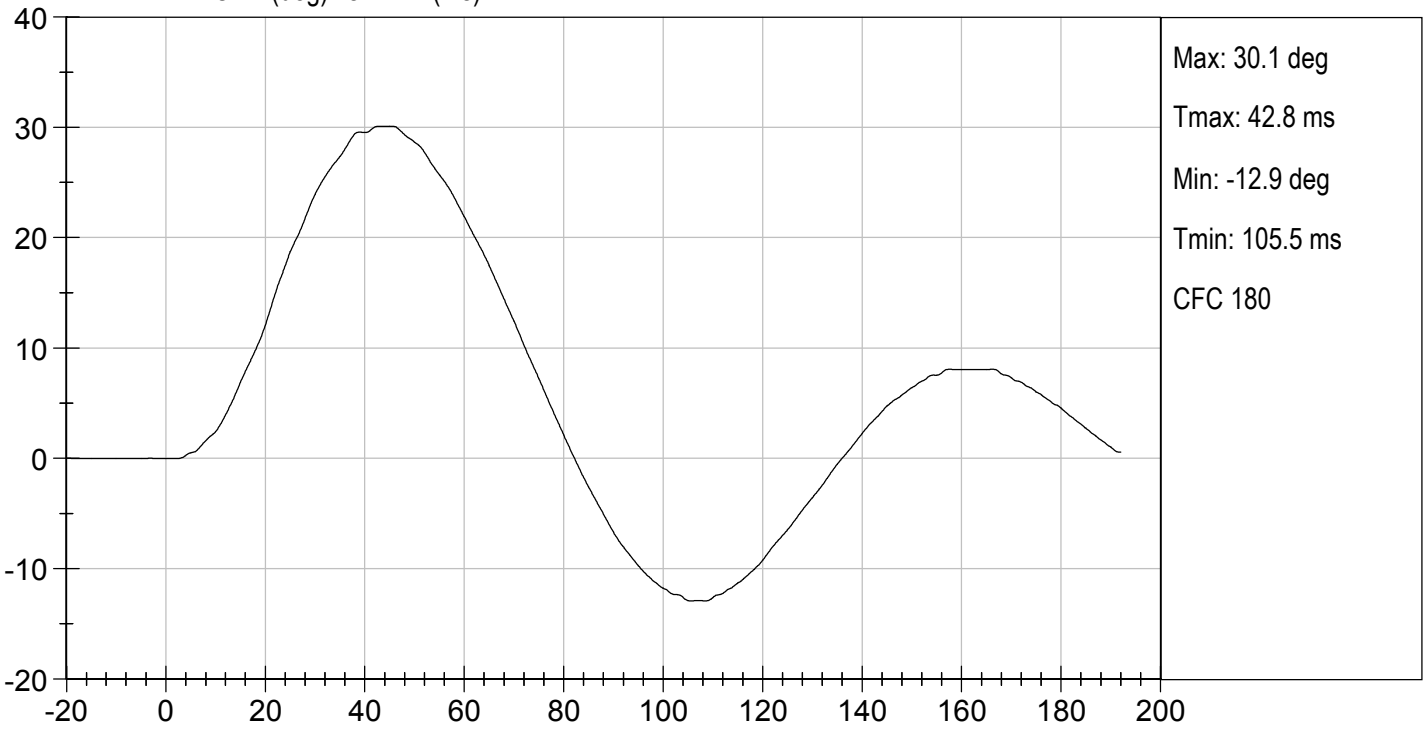

FLEXION ANGLE (deg) vs TIME (ms)



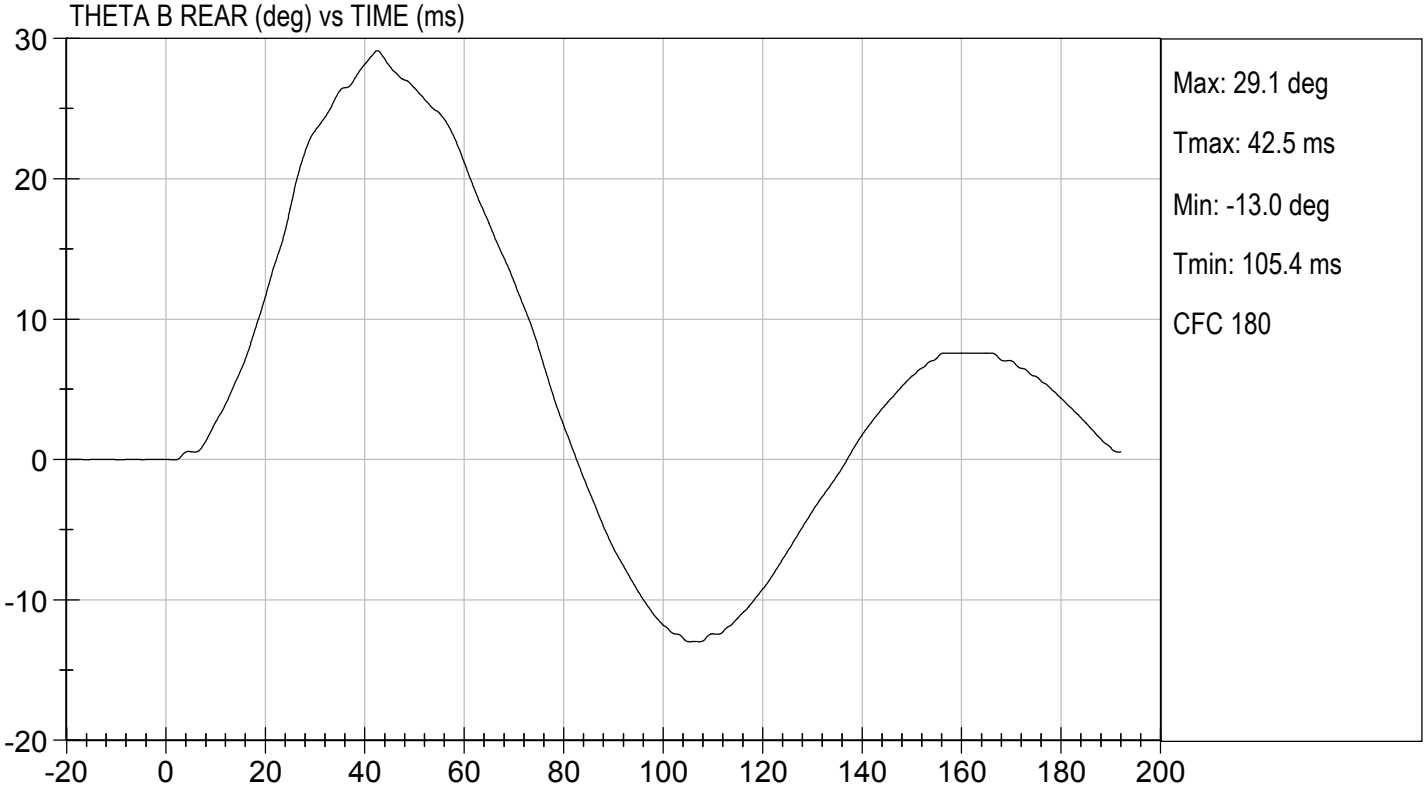
TEST DESC: LUMBAR BENDING
VELOCITY: 19.84 ft/s, 6.05 m/s

TEST DATE: 05/29/2019
TEST #: D191688

THETA A FRONT (deg) vs TIME (ms)

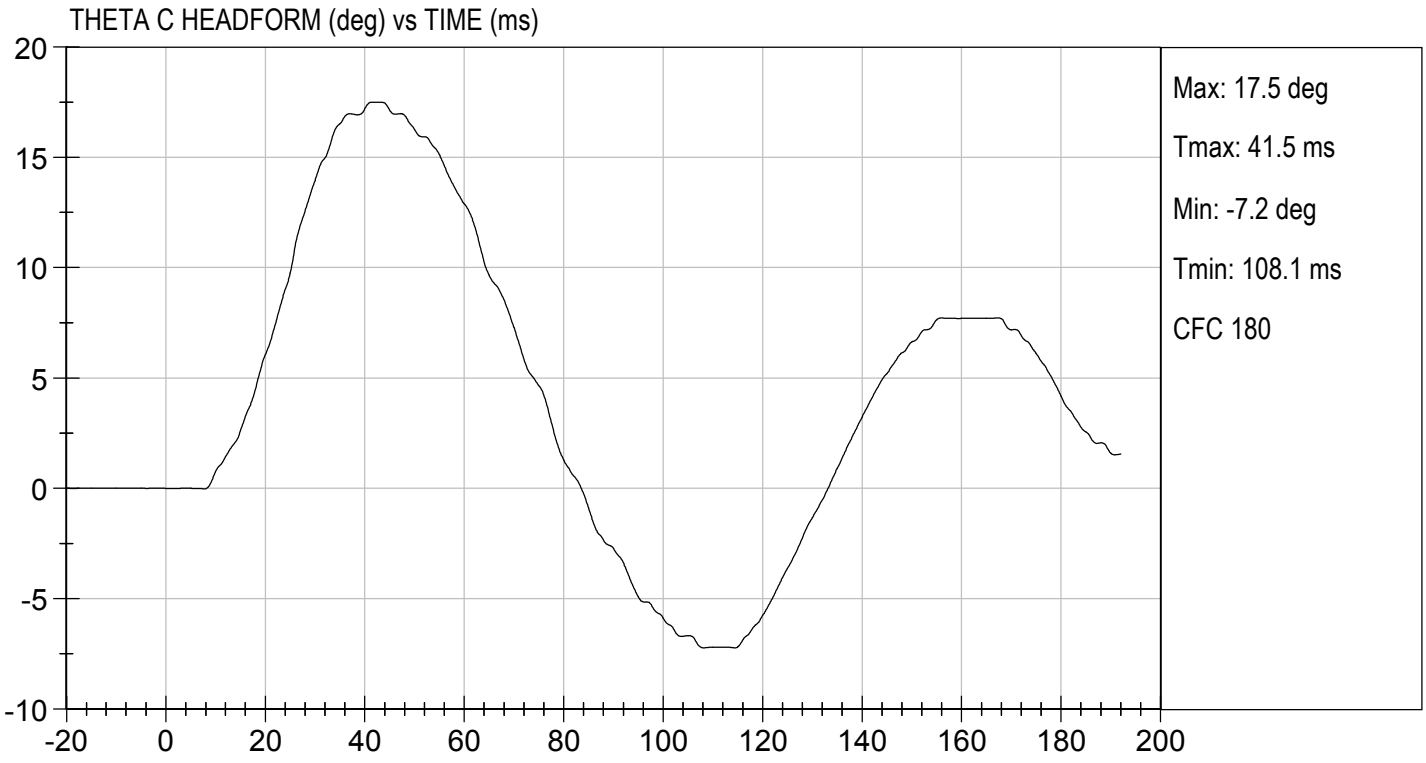



THETA B REAR (deg) vs TIME (ms)



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

TEST DATE: 05/29/2019
TEST #: D191688



**MGA RESEARCH CORPORATION**

**PELVIS TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D191689

| 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 | 51 | Pass |
| Probe Speed | m/s | 4.20 to 4.40 | 4.39 | Pass |
| Maximum Impactor Force | N | 4700 to 5400 | 5076 | Pass |
| Time of Maximum Impactor Force | ms | 11.8 to 16.1 | 12.6 | Pass |
| Maximum Pubic Force | N | 1230 to 1590 | 1297 | Pass |
| Time of Maximum Pubic Force | ms | 12.2 to 17.0 | 12.2 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

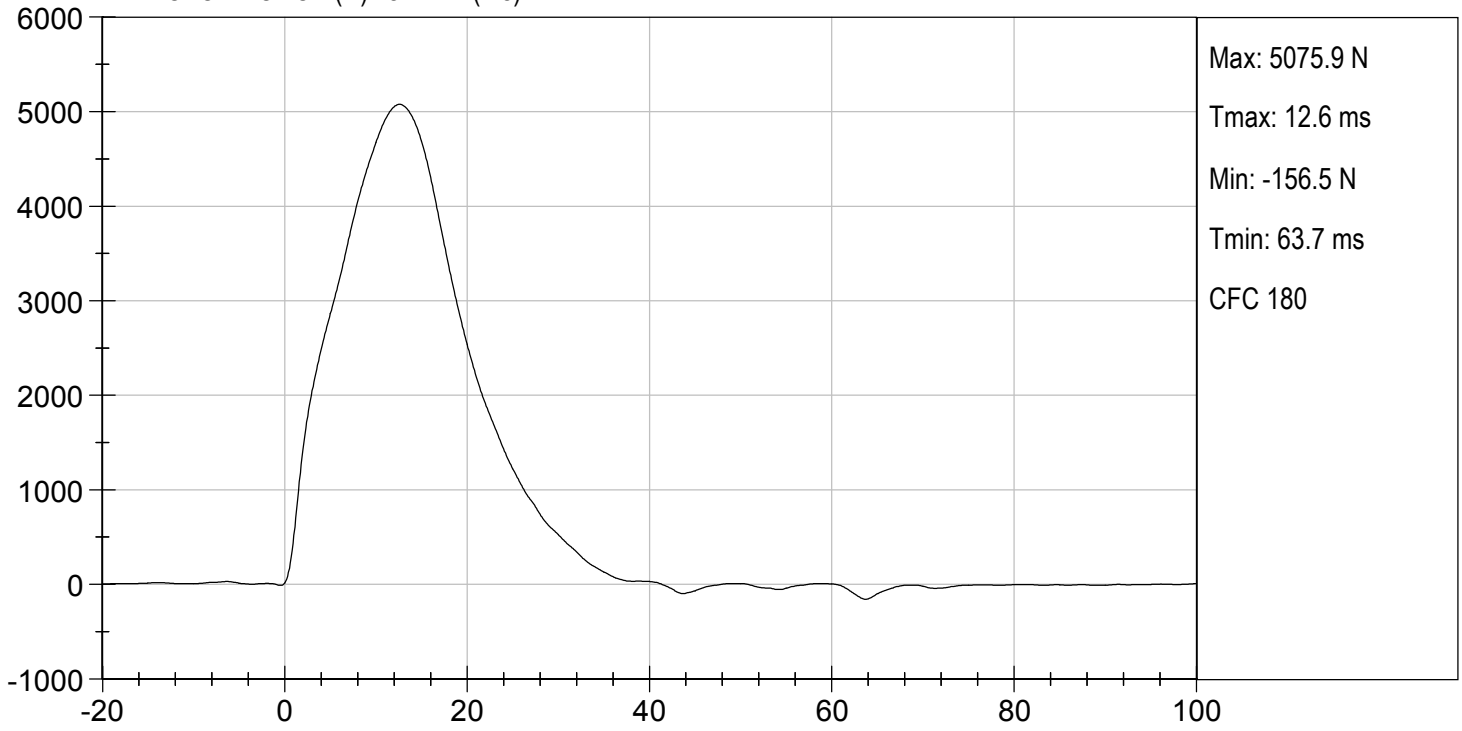
05/31/2019
Test Date

Approved By

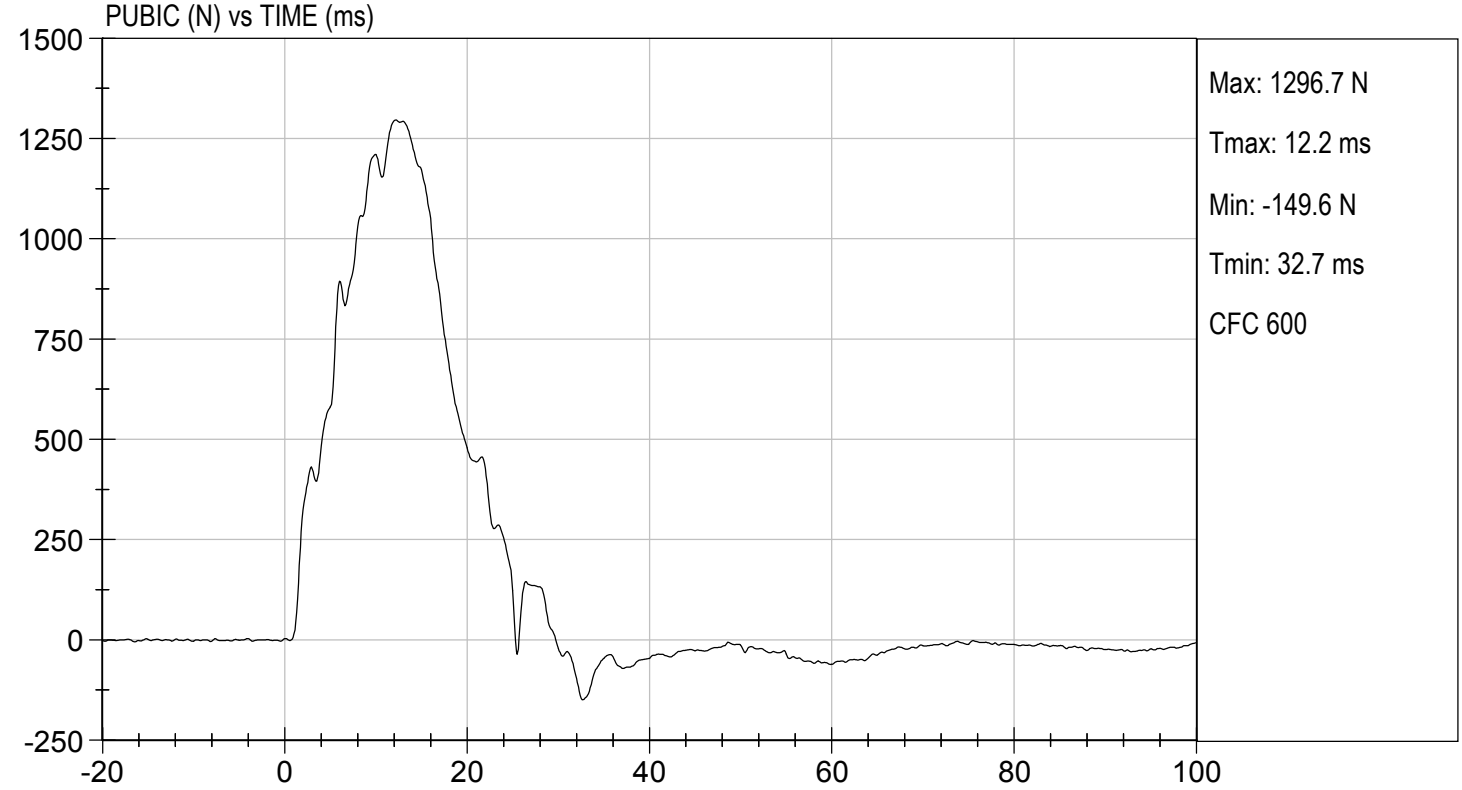
TEST DESC: PELVIS IMPACT
VELOCITY: 14.40 ft/s, 4.39 m/s

TEST DATE: 05/31/2019
TEST #: D191689

IMPACTOR FORCE (N) vs TIME (ms)




PUBIC (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**THORAX IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D19AX0

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 20.9 | Pass |
| Humidity | % | 10 to 70 | 45 | Pass |
| Probe Speed | m/s | 5.40 to 5.60 | 5.52 | Pass |
| Maximum Impactor Force (after 6 ms) | N | 5100 to 6200 | 5430 | Pass |
| Upper Rib Displacement | mm | 34.0 to 41.0 | 40.1 | Pass |
| Middle Rib Displacement | mm | 37.0 to 45.0 | 41.8 | Pass |
| Lower Rib Displacement | mm | 37.0 to 44.0 | 42.5 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

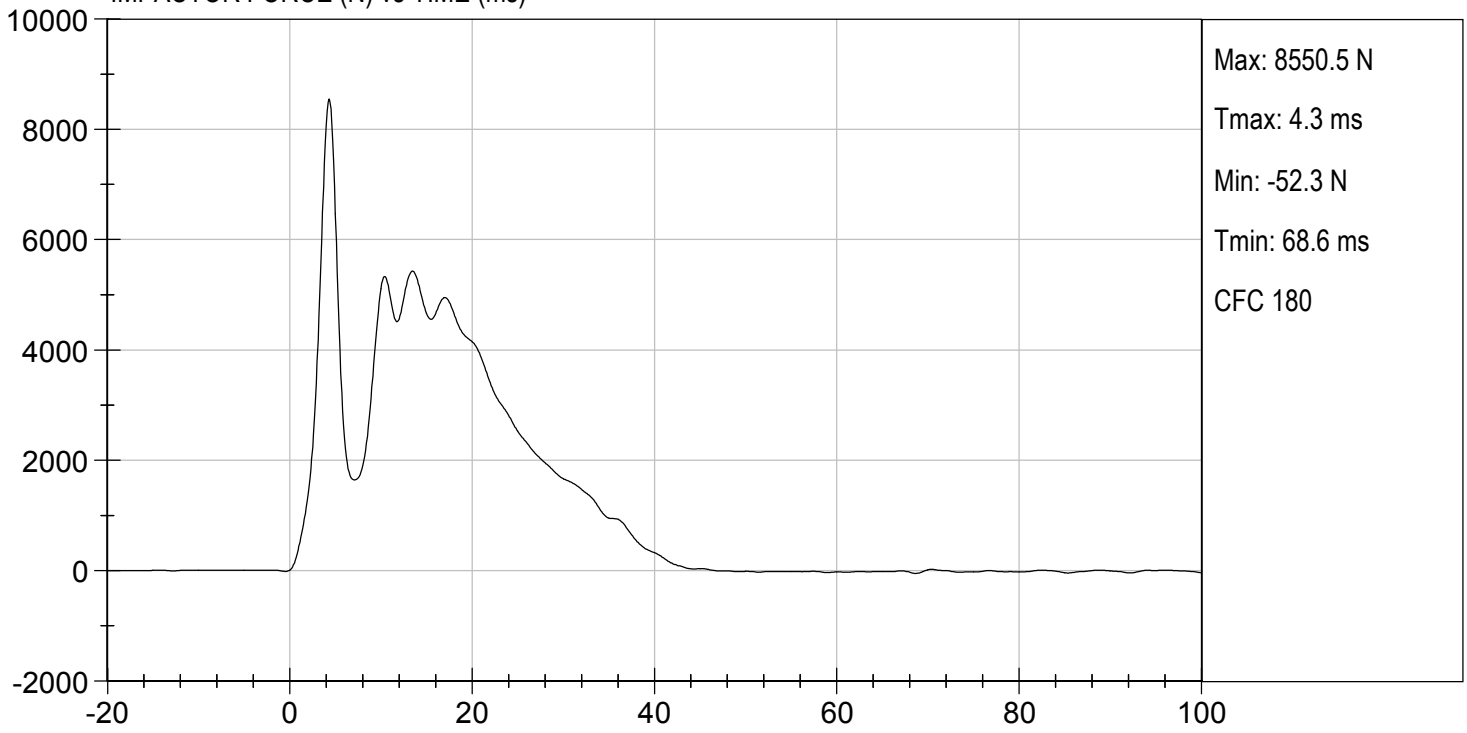
07/10/2019
Test Date

Approved By

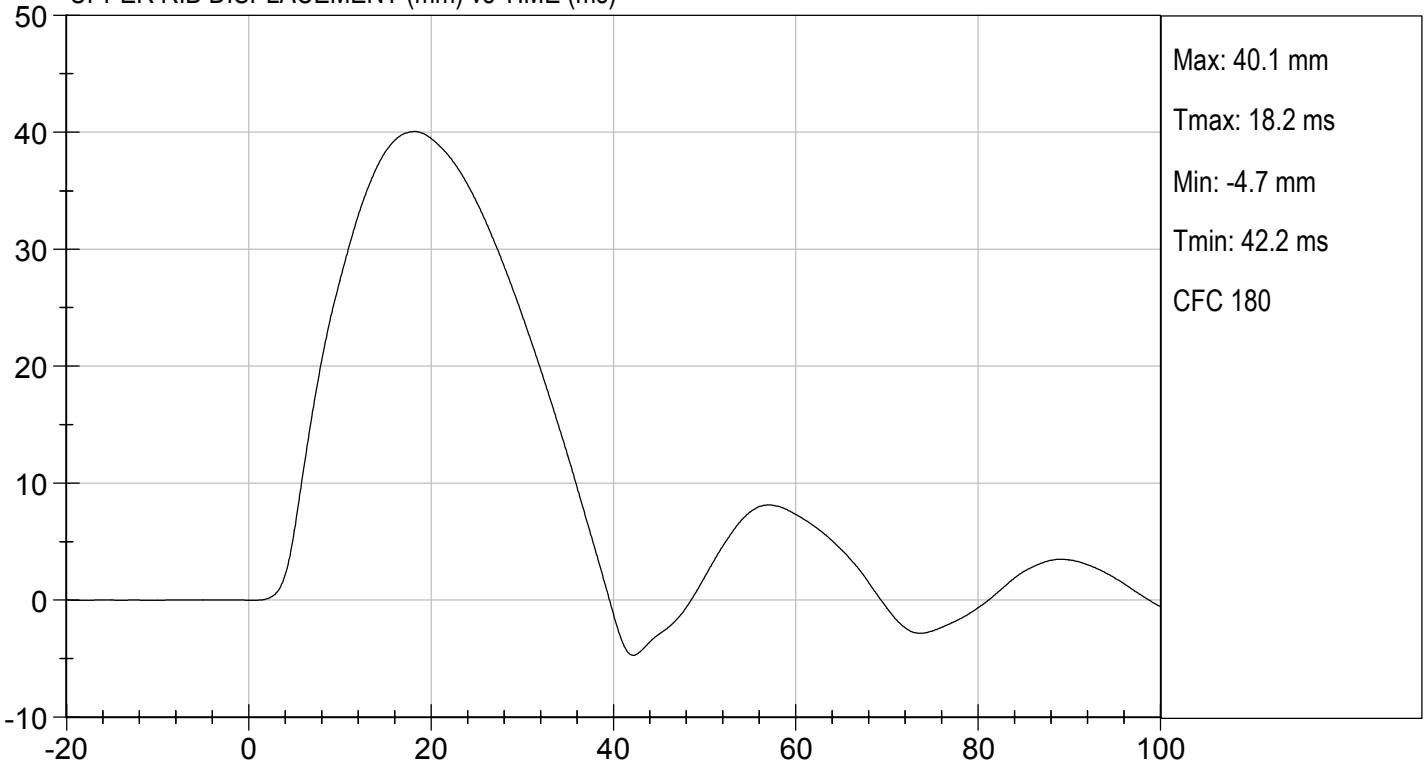
TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 07/10/2019
TEST #: D19AX0

IMPACTOR FORCE (N) vs TIME (ms)



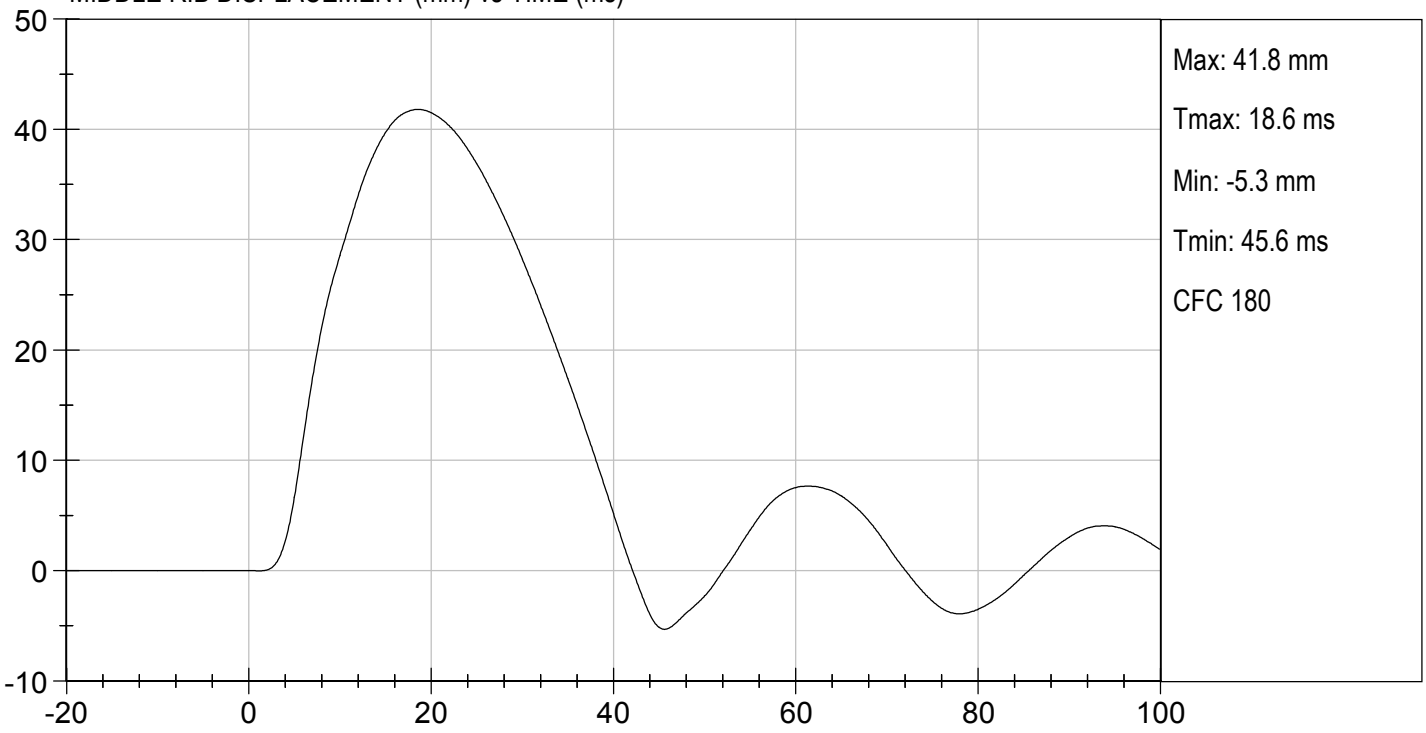

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



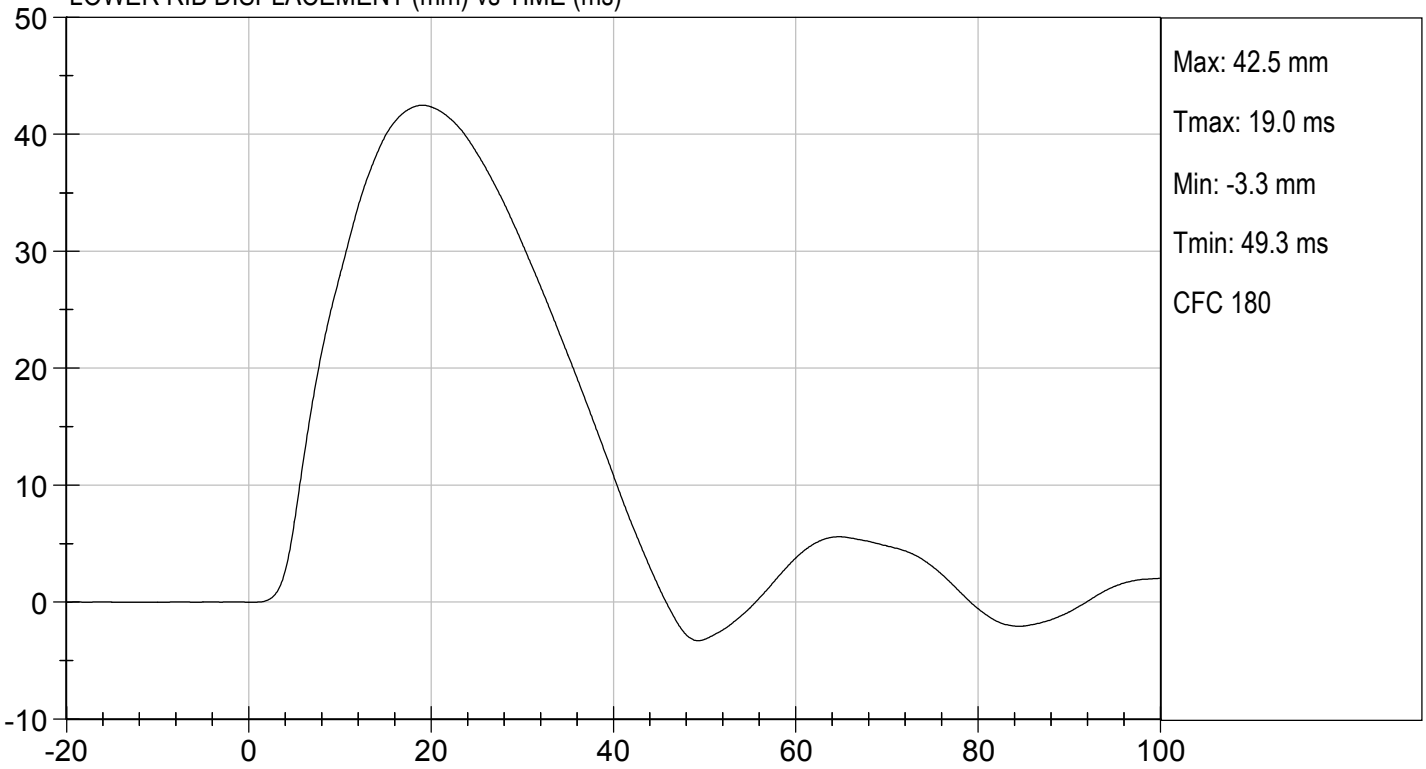
TEST DESC: THORAX IMPACT
VELOCITY: 18.12 ft/s, 5.52 m/s

TEST DATE: 07/10/2019
TEST #: D19AX0

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: 032**

| 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:** 032 **Test ID:** D192201

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Peak Resultant Acceleration | G's | 125 to 155 | 137 | Pass |
| Peak Longitudinal Acceleration | G's | <= +/- 15.0 | 7.2 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 15% of peak | Yes | Pass |
| | | Overall Test Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

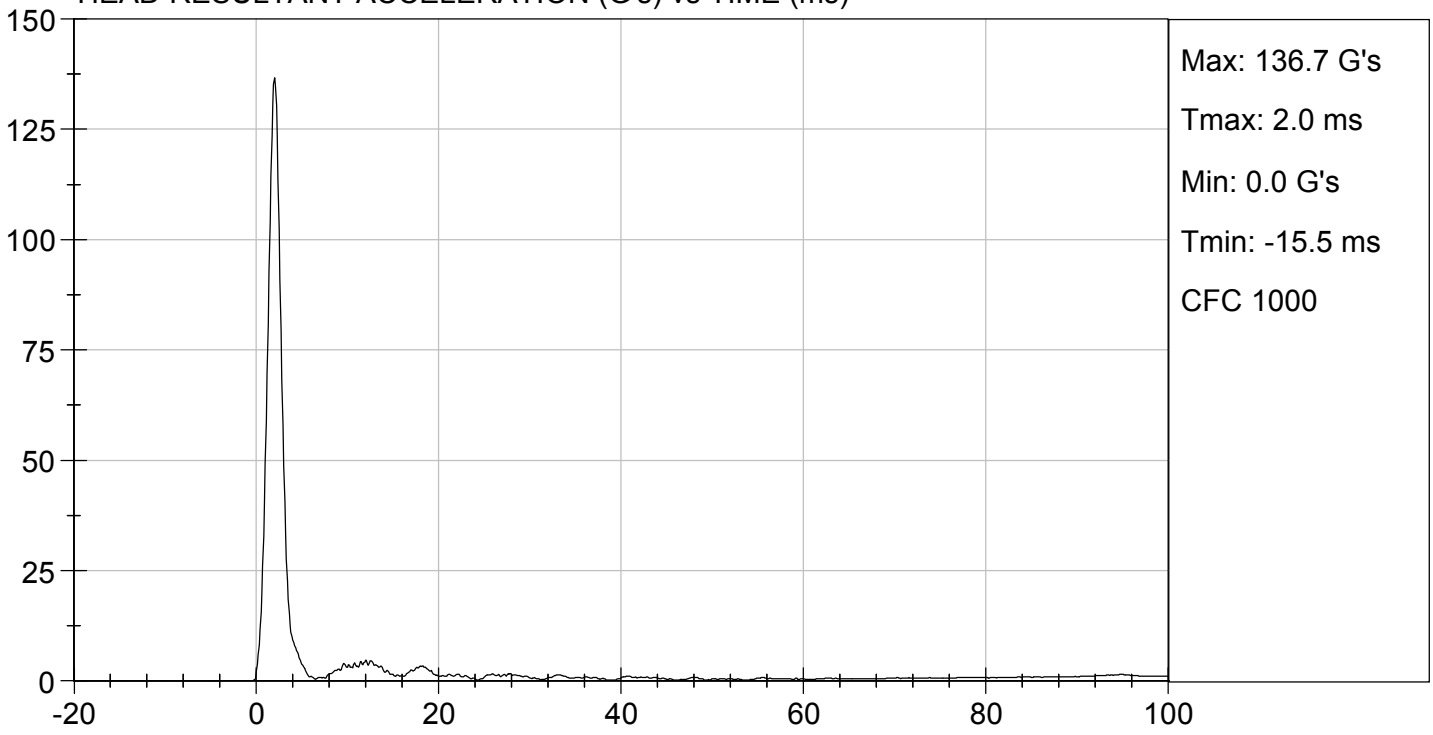
07/18/2019
Test Date

Approved By

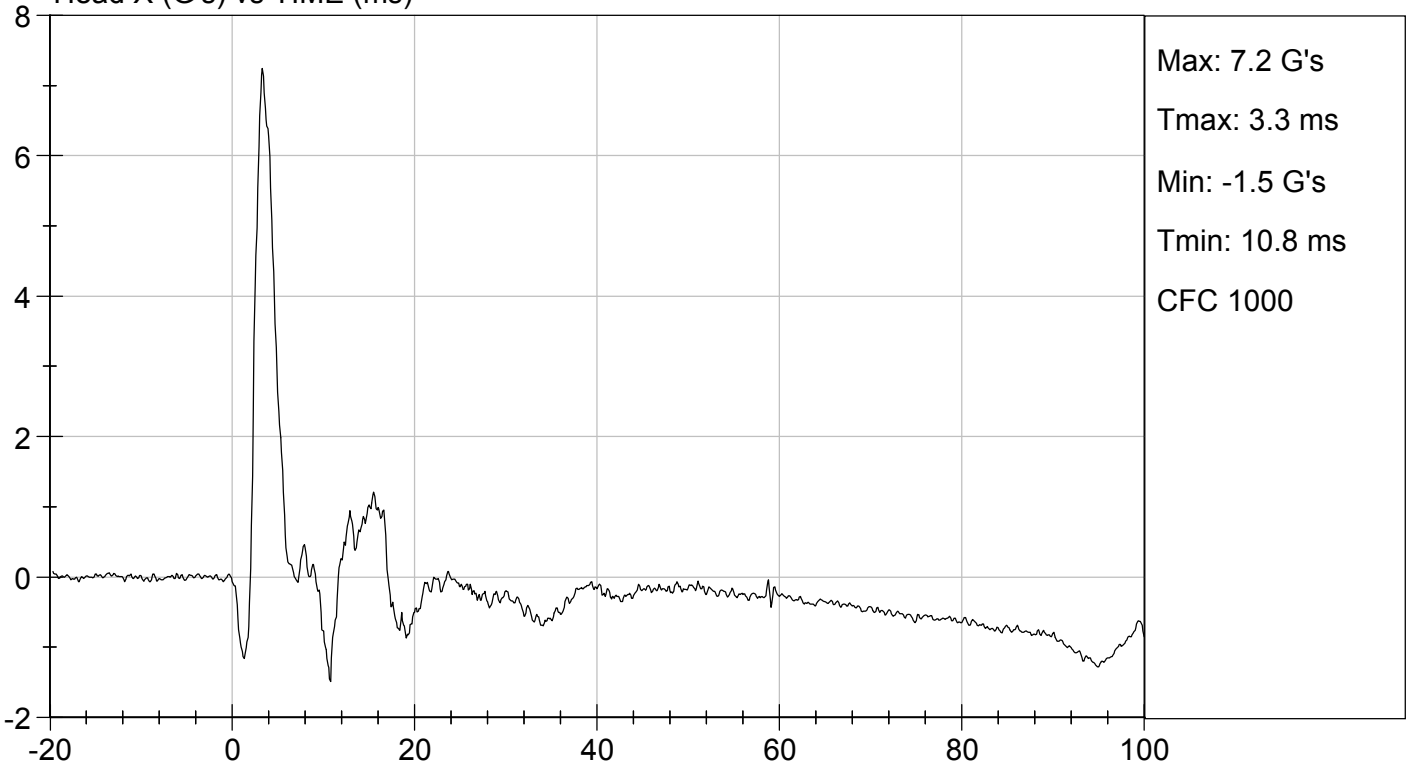
TEST DESC: HEAD DROP

TEST DATE: 07/18/2019
TEST #: D192201

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

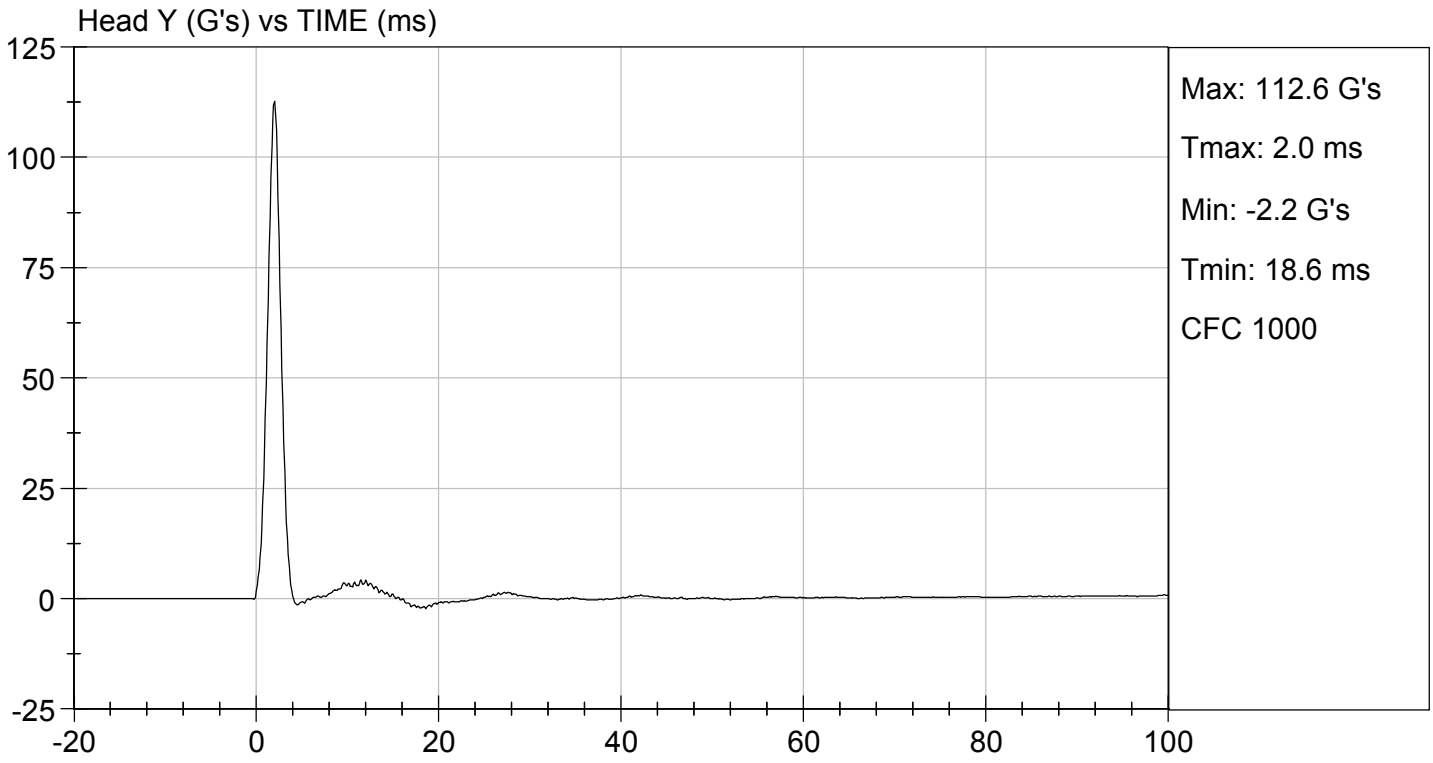


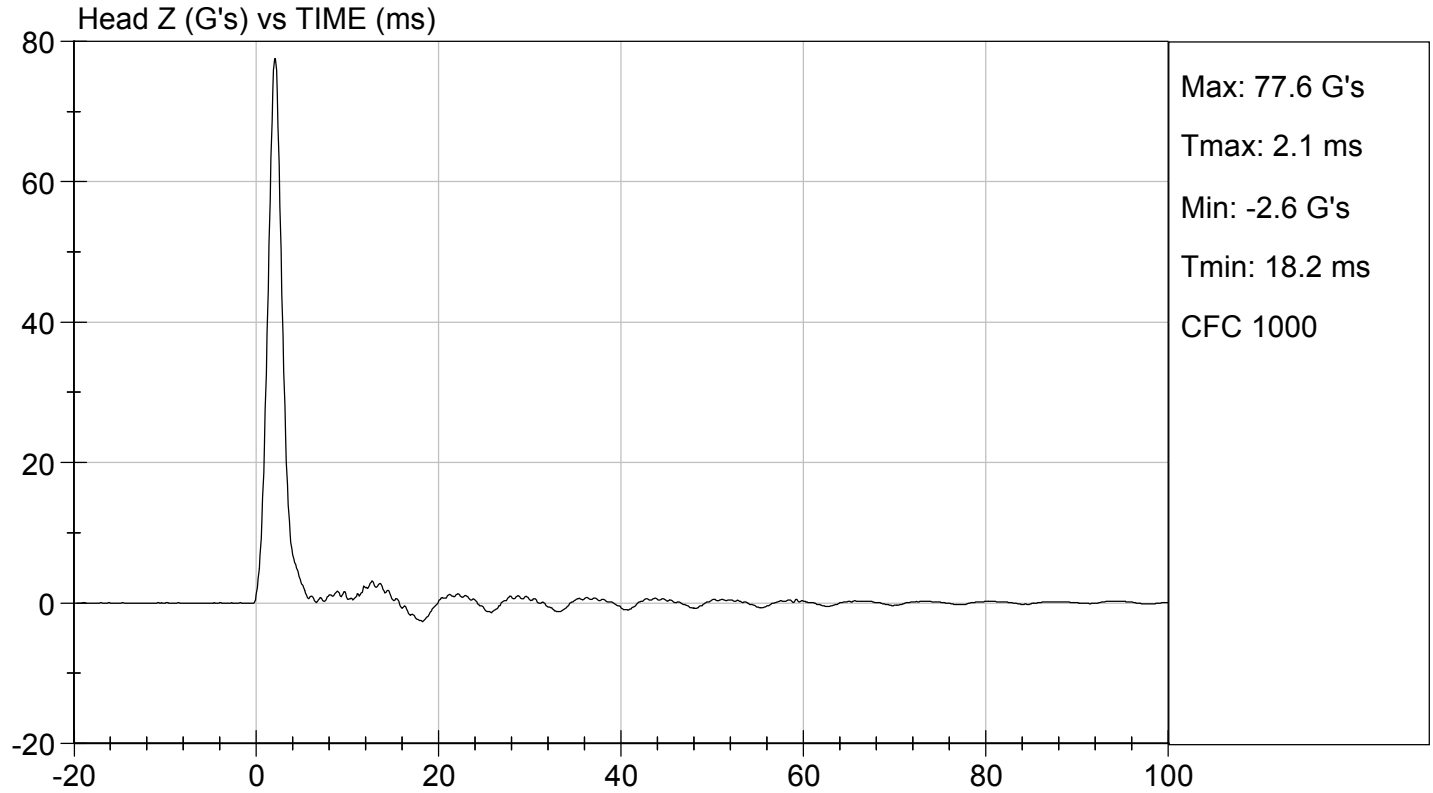

Head X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 07/18/2019
TEST #: D192201



**MGA RESEARCH CORPORATION**

**NECK PENDULUM TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D192202

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 45 | Pass |
| Pendulum Speed | | m/s | 3.30 to 3.50 | 3.43 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | 0.00 | Pass |
| | 3 ms | m/s | -0.25 to -0.375 | -0.35 | Pass |
| | 14 ms | m/s | -3.20 to -3.70 | -3.58 | Pass |
| | 17 ms | m/s | >= -3.70 | -3.38 | Pass |
| Maximum Flexion Angle | | deg | 49.0 to 59.0 | 50.7 | Pass |
| Time of Maximum Flexion Angle | | ms | 54.0 to 66.0 | 55.1 | Pass |
| Head Rotation Decay Time to 0 Degree | | ms | 53.0 to 88.0 | 59.3 | Pass |
| | | | Overall Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

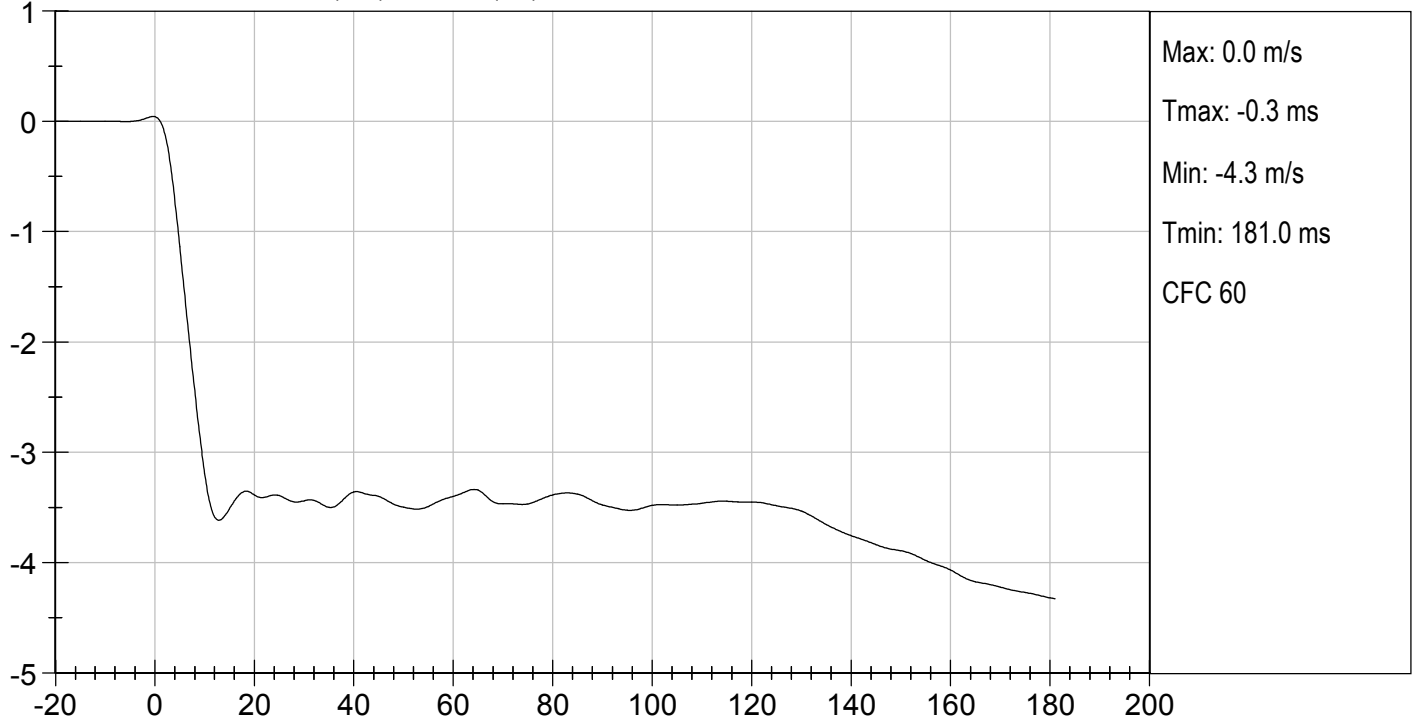
07/18/2019
Test Date

Approved By

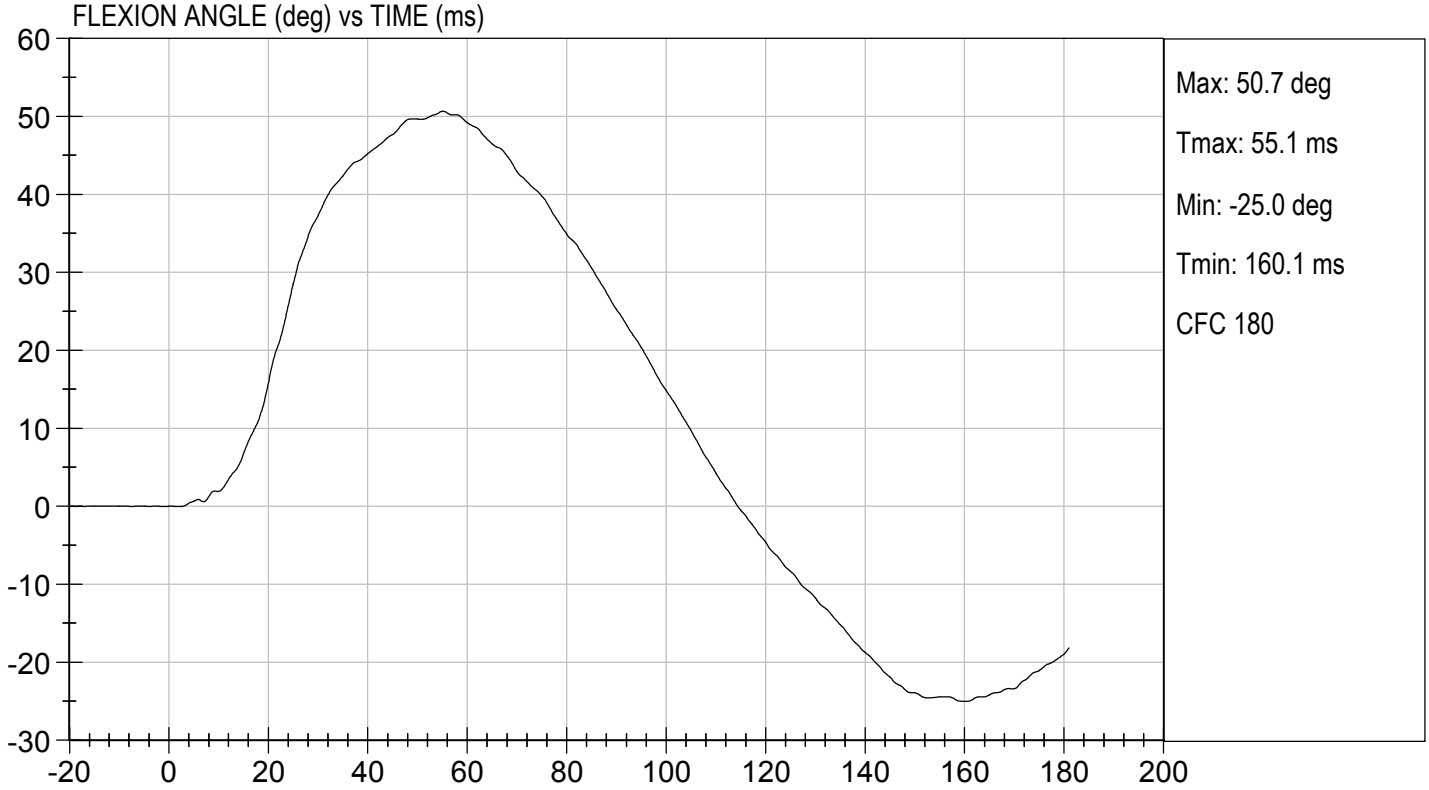
TEST DESC: NECK BENDING
VELOCITY: 11.26 ft/s, 3.43 m/s

TEST DATE: 07/18/2019
TEST #: D192202

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



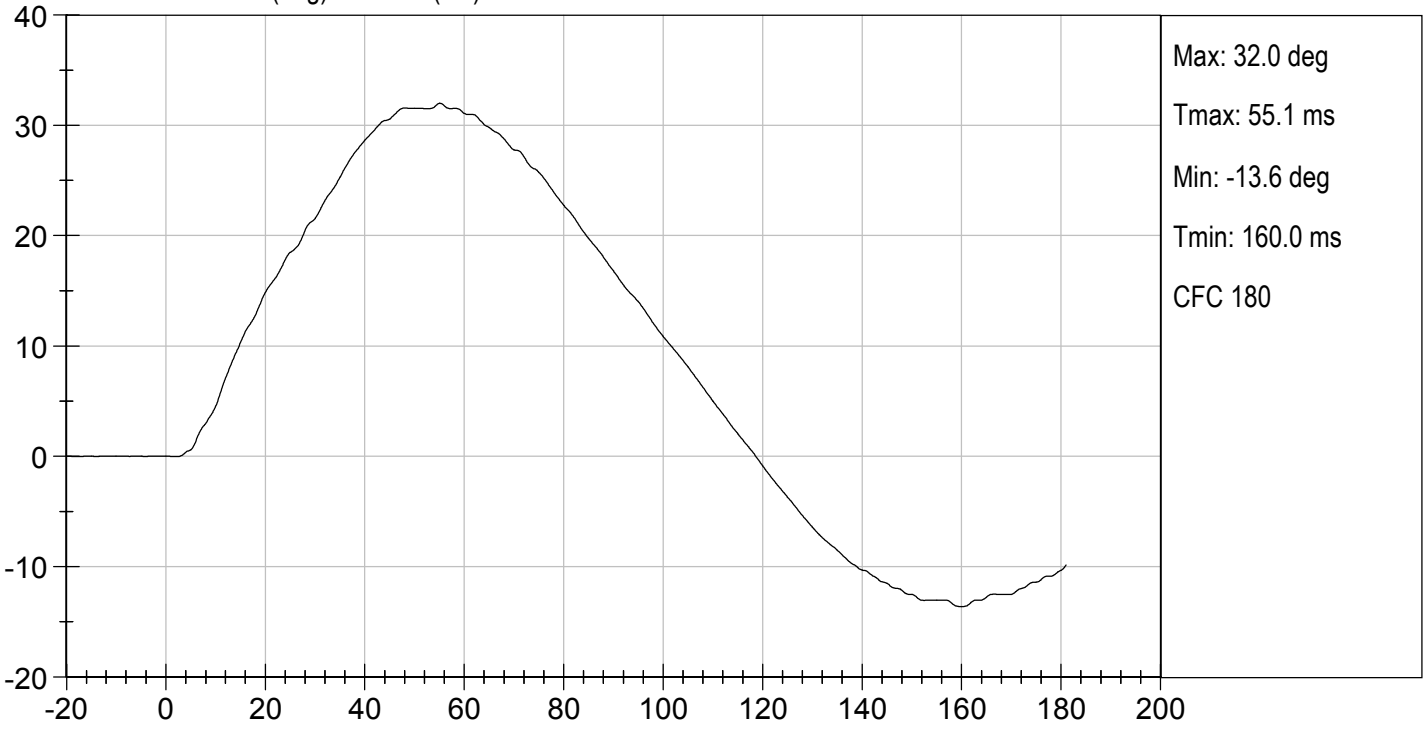

FLEXION ANGLE (deg) vs TIME (ms)



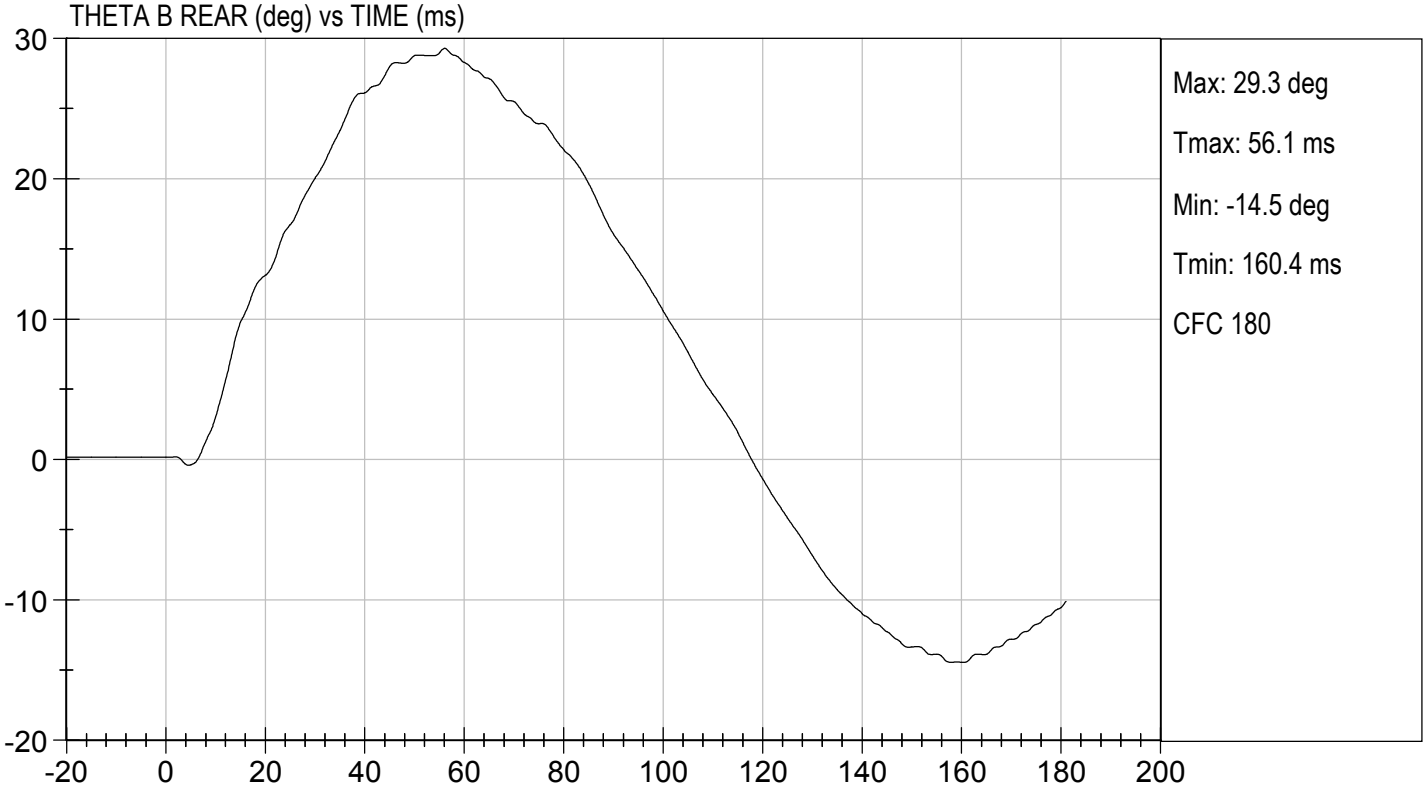
TEST DESC: NECK BENDING
VELOCITY: 11.26 ft/s, 3.43 m/s

TEST DATE: 07/18/2019
TEST #: D192202

THETA A FRONT (deg) vs TIME (ms)

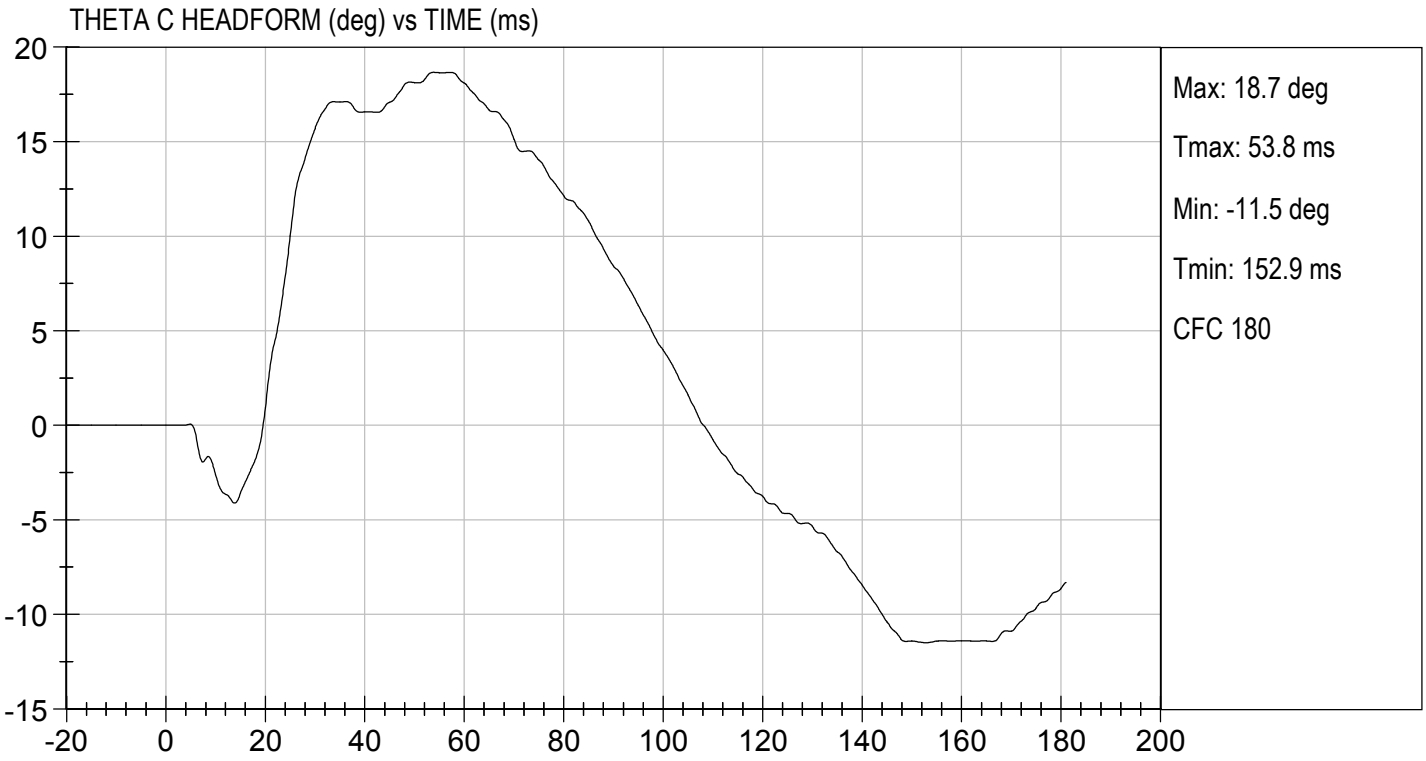



THETA B REAR (deg) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 11.26 ft/s, 3.43 m/s

TEST DATE: 07/18/2019
TEST #: D192202



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D192203

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Pendulum Speed | m/s | 4.20 to 4.40 | 4.2 | Pass |
| Peak Impactor Acceleration | G's | 7.5 to 10.5 | 8.0 | Pass |
| | | Overall Test Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

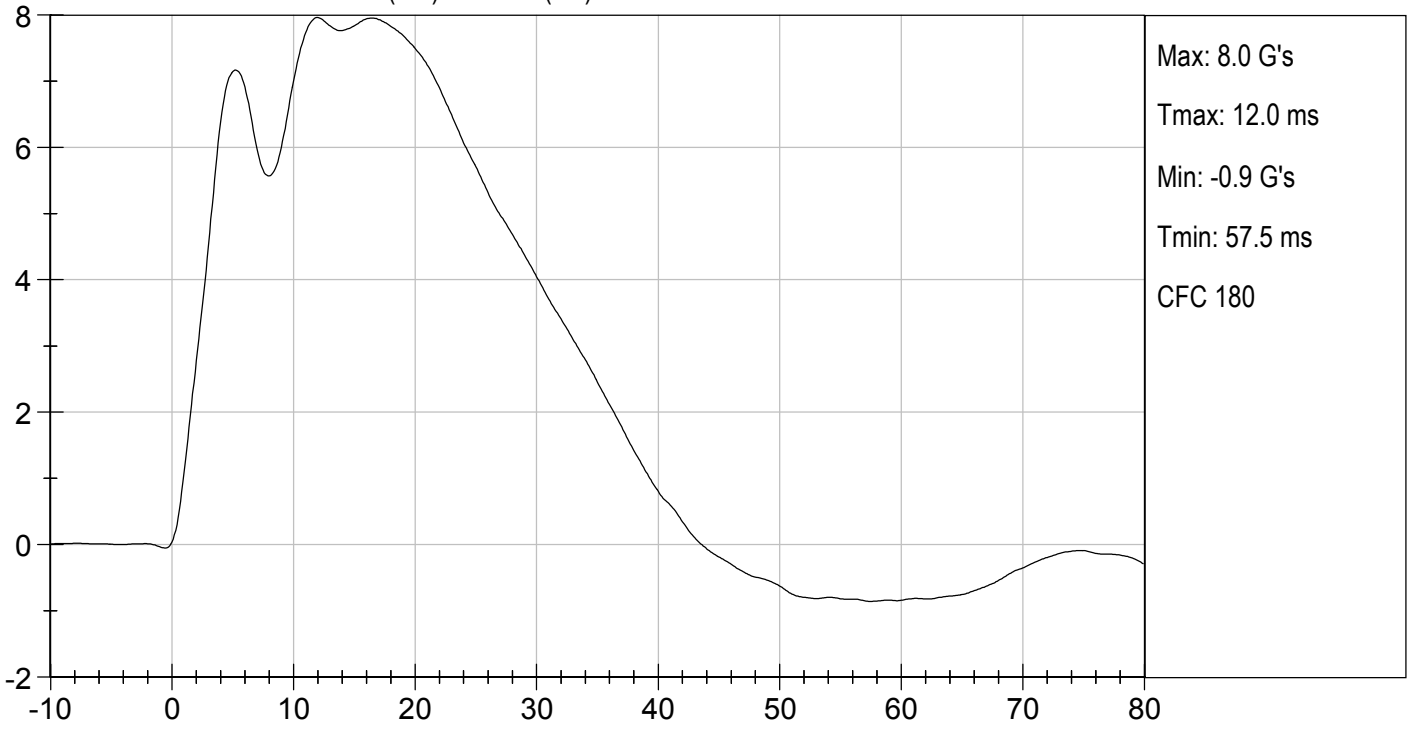
07/18/2019
Test Date

Approved By

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

TEST DATE: 07/18/2019
TEST #: D192203

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



**MGA RESEARCH CORPORATION**

**UPPER RIB TEST**

**ES-2re DUMMY**

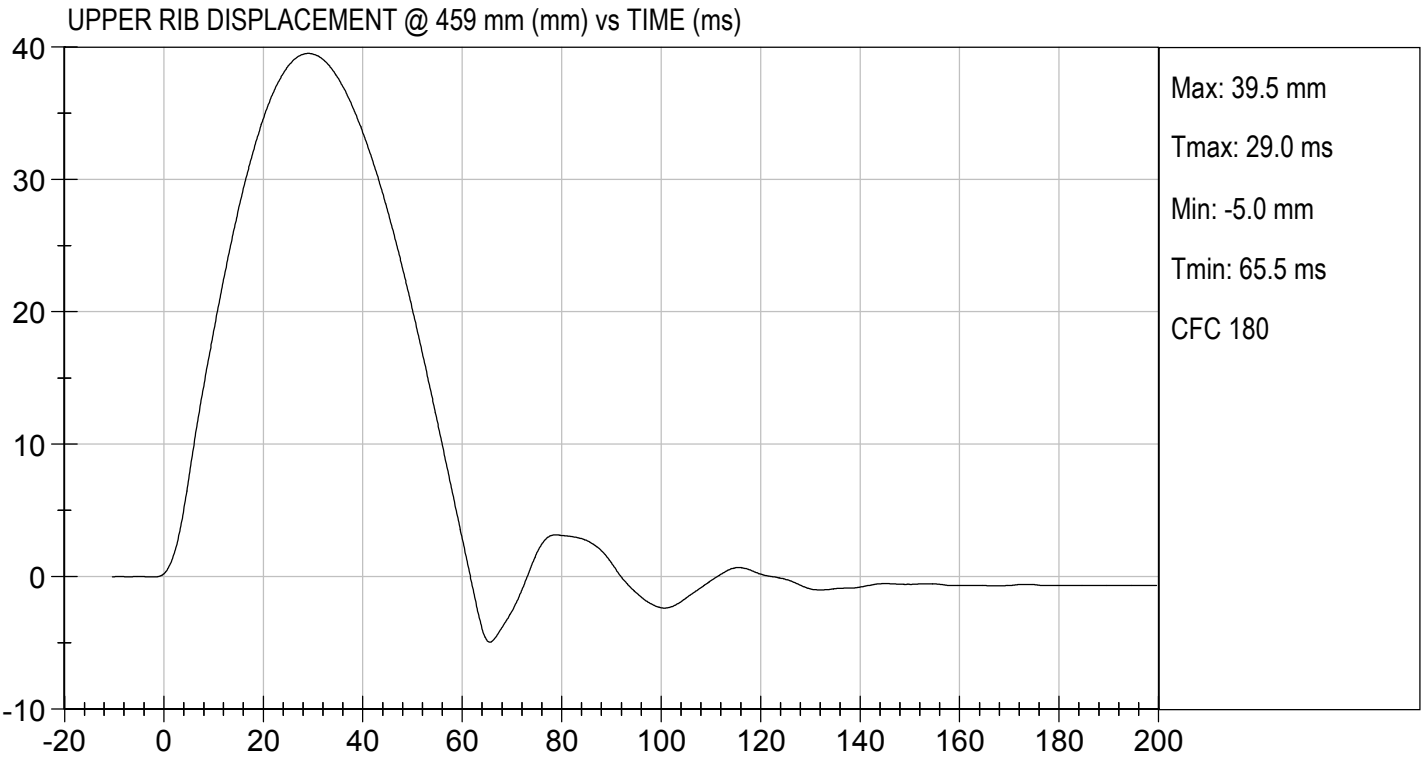
**ATD Serial No:** 032 **Test I.D:** D192204

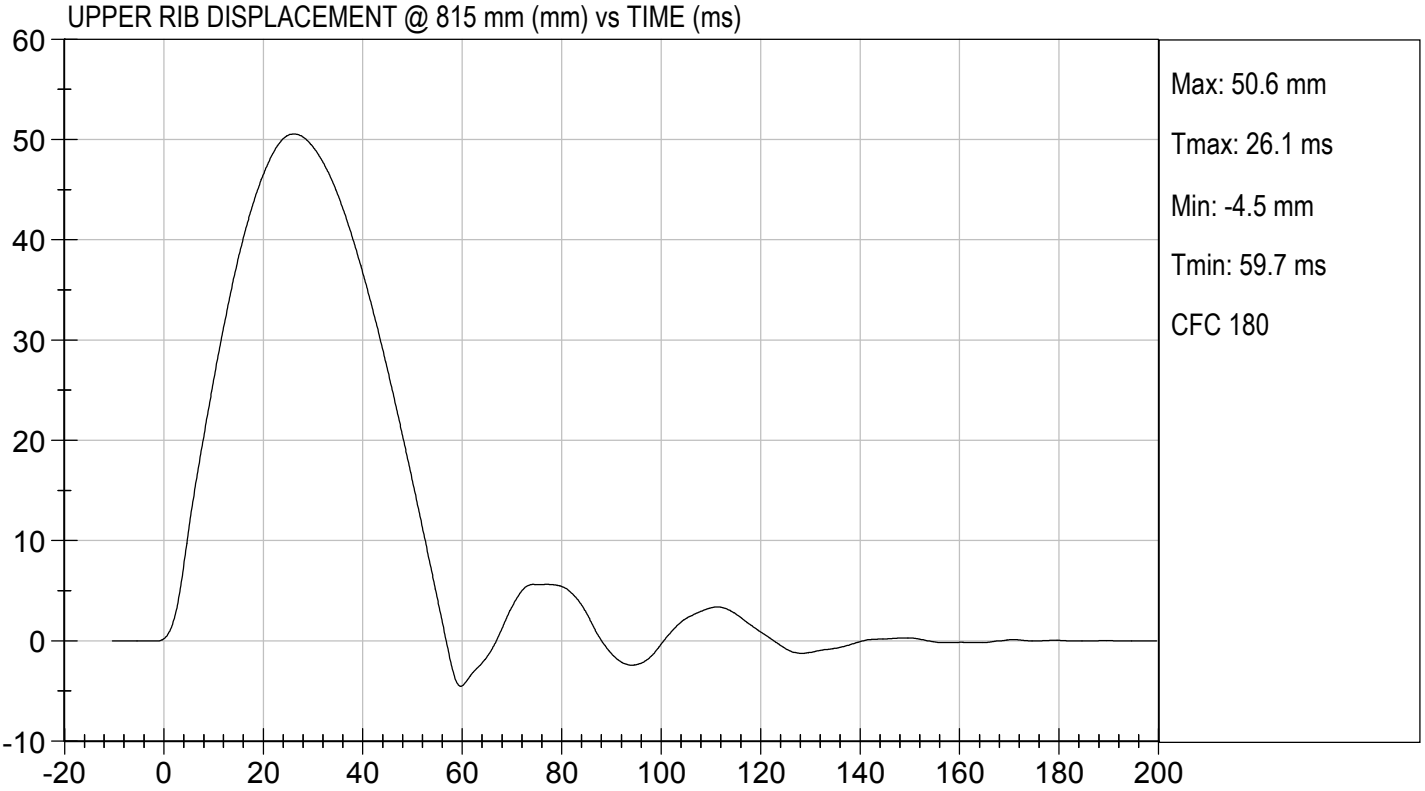
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 39.5 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 50.6 | Pass |
| | | Overall Test Results | | Pass |

Danielle Redenbaugh
Laboratory Technician

07/18/2019
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: 39.5 mm
Tmax: 29.0 ms
Min: -5.0 mm
Tmin: 65.5 ms
CFC 180


UPPER RIB DISPLACEMENT @ 815 mm (mm) vs TIME (ms)
60
50
40
30
20
10
0
-10
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 50.6 mm
Tmax: 26.1 ms
Min: -4.5 mm
Tmin: 59.7 ms
CFC 180

**MGA RESEARCH CORPORATION**

**MID RIB TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D192205

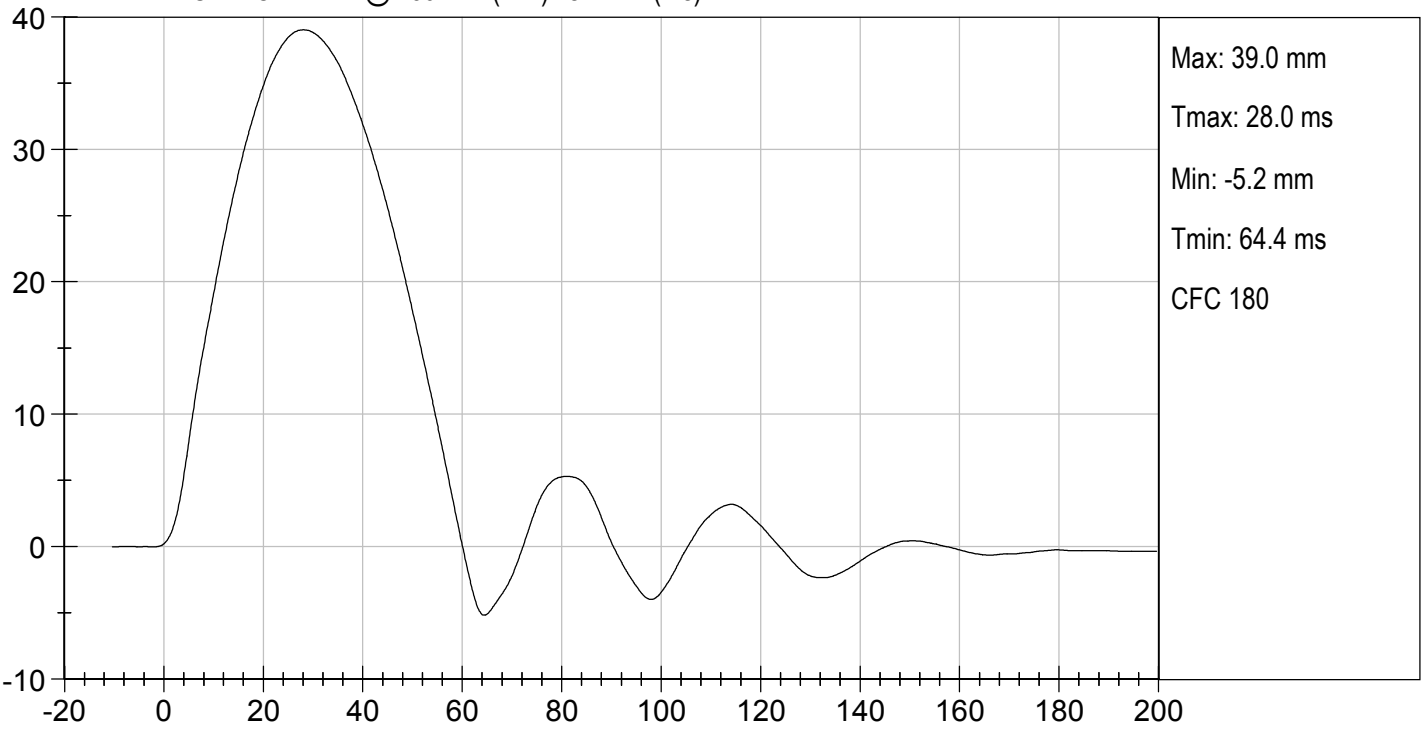
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 39.0 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 47.1 | Pass |
| | | Overall Test Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

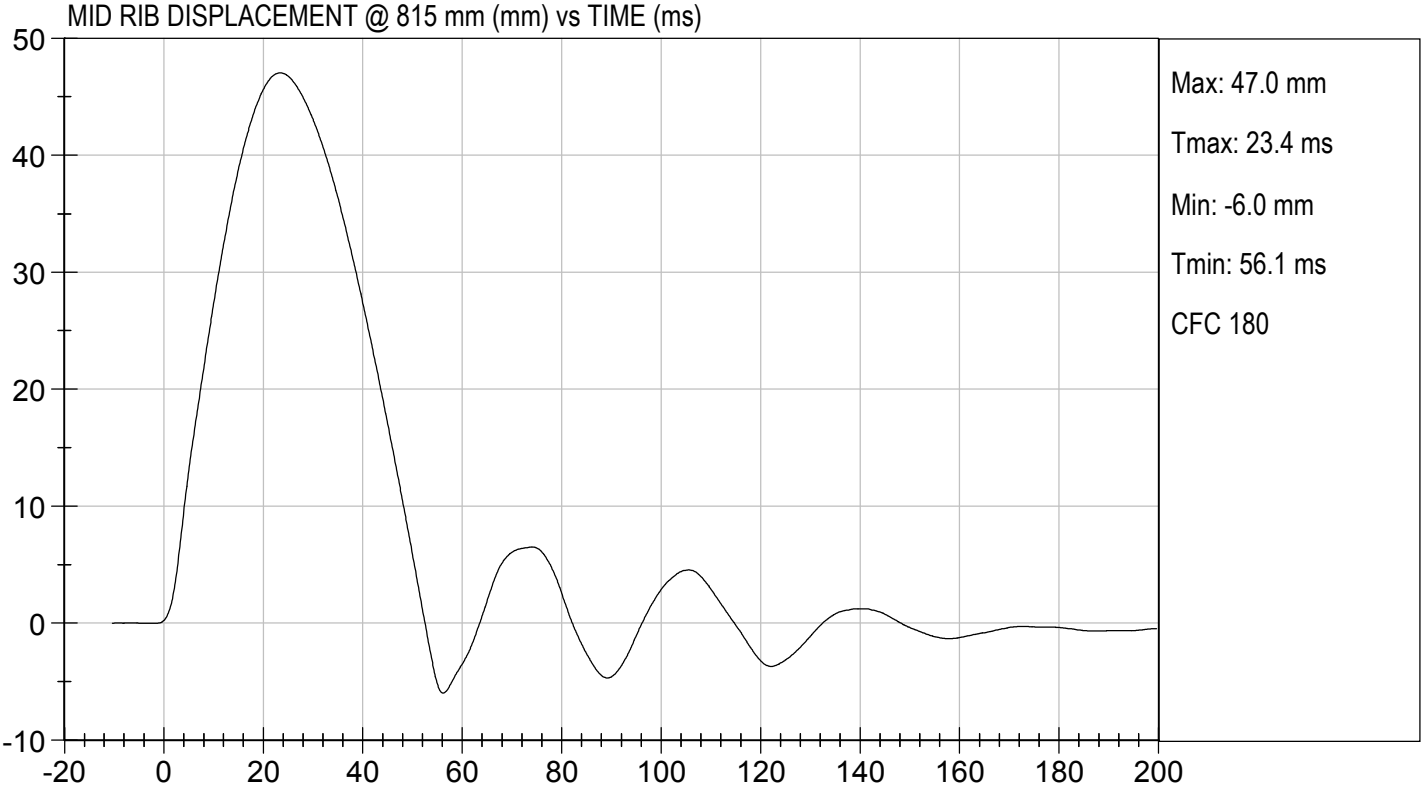
07/18/2019
Test Date

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**

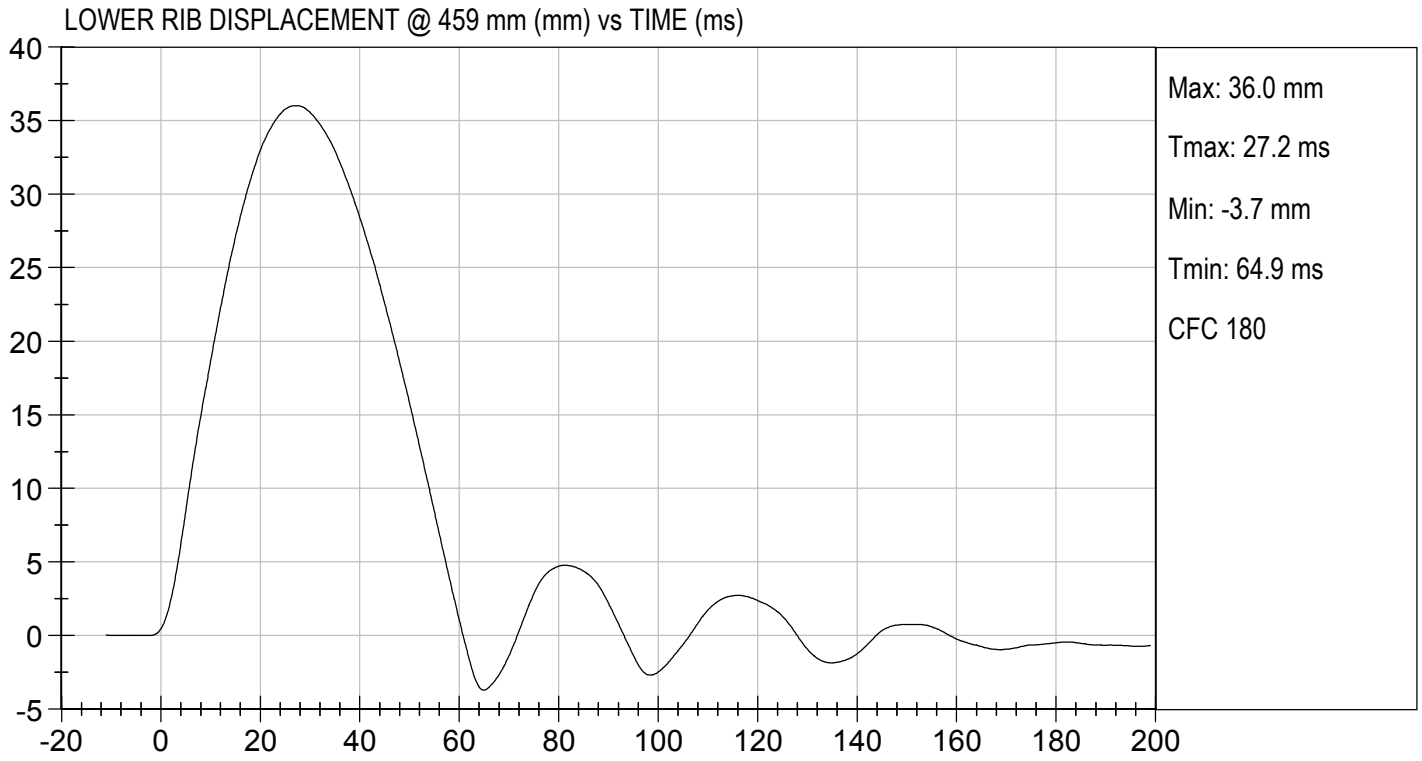
**ATD Serial No:** 032 **Test I.D:** D192206

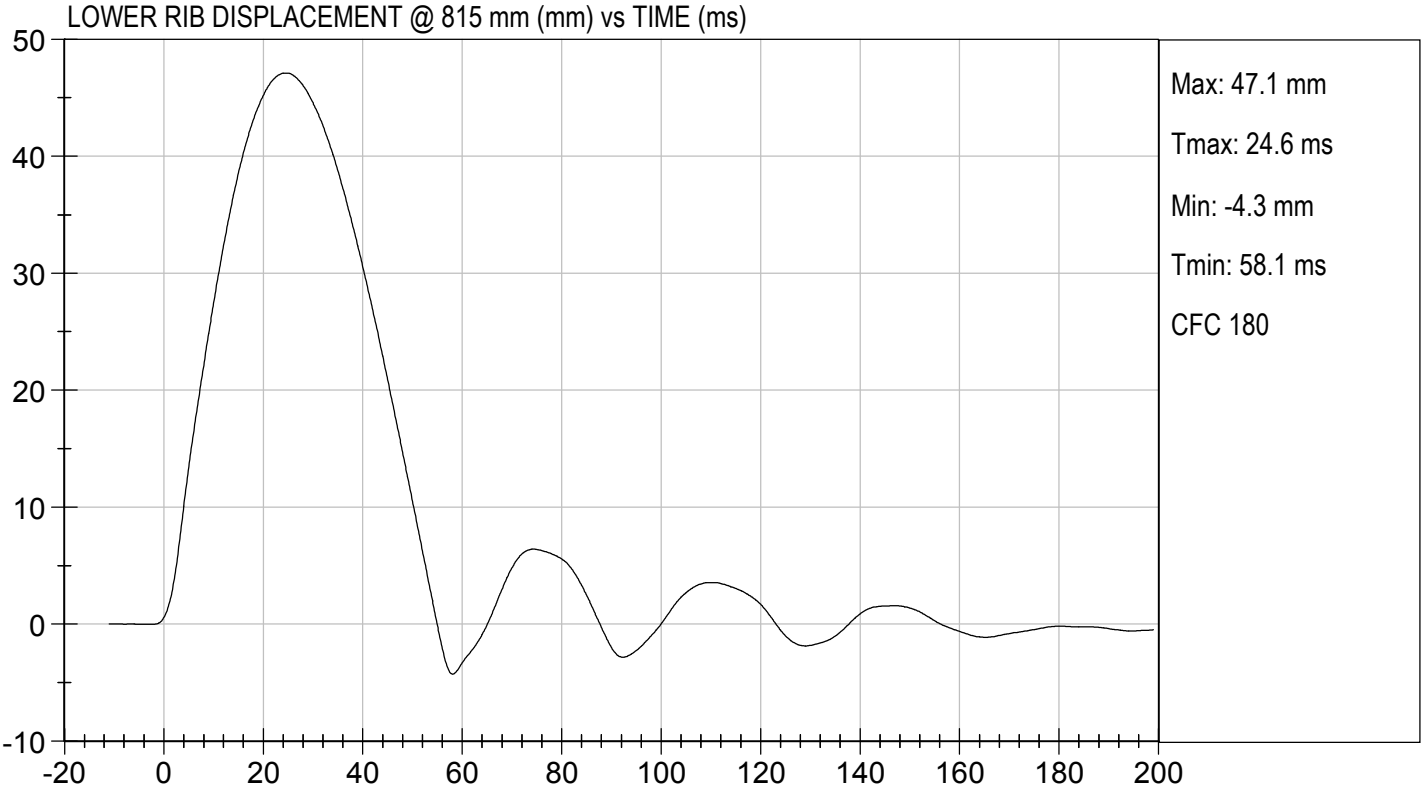
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Displacement at 459 mm | mm | 36.0 to 40.0 | 36.0 | Pass |
| Displacement at 815 mm | mm | 46.0 to 51.0 | 47.1 | Pass |
| | | Overall Test Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

07/18/2019
Test Date

Approved By


LOWER RIB DISPLACEMENT @ 459 mm (mm) vs TIME (ms)
40
35
30
25
20
15
10
5
0
-5
-20
0
20
40
60
80
100
120
140
160
180
200
Max: 36.0 mm
Tmax: 27.2 ms
Min: -3.7 mm
Tmin: 64.9 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: 47.1 mm
Tmax: 24.6 ms
Min: -4.3 mm
Tmin: 58.1 ms
CFC 180

**MGA RESEARCH CORPORATION**

**ABDOMEN TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D192207

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Probe Speed | m/s | 3.90 to 4.10 | 4.05 | Pass |
| Maximum Impactor Force | N | 4000 to 4800 | 4525 | Pass |
| Time of Maximum Impactor Force | ms | 10.6 to 13.0 | 12.2 | Pass |
| Maximum Total Abdomen Force | N | 2200 to 2700 | 2321 | Pass |
| Time of Maximum Abdomen Force | ms | 10.0 to 12.3 | 11.9 | Pass |
| | | Overall Test Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

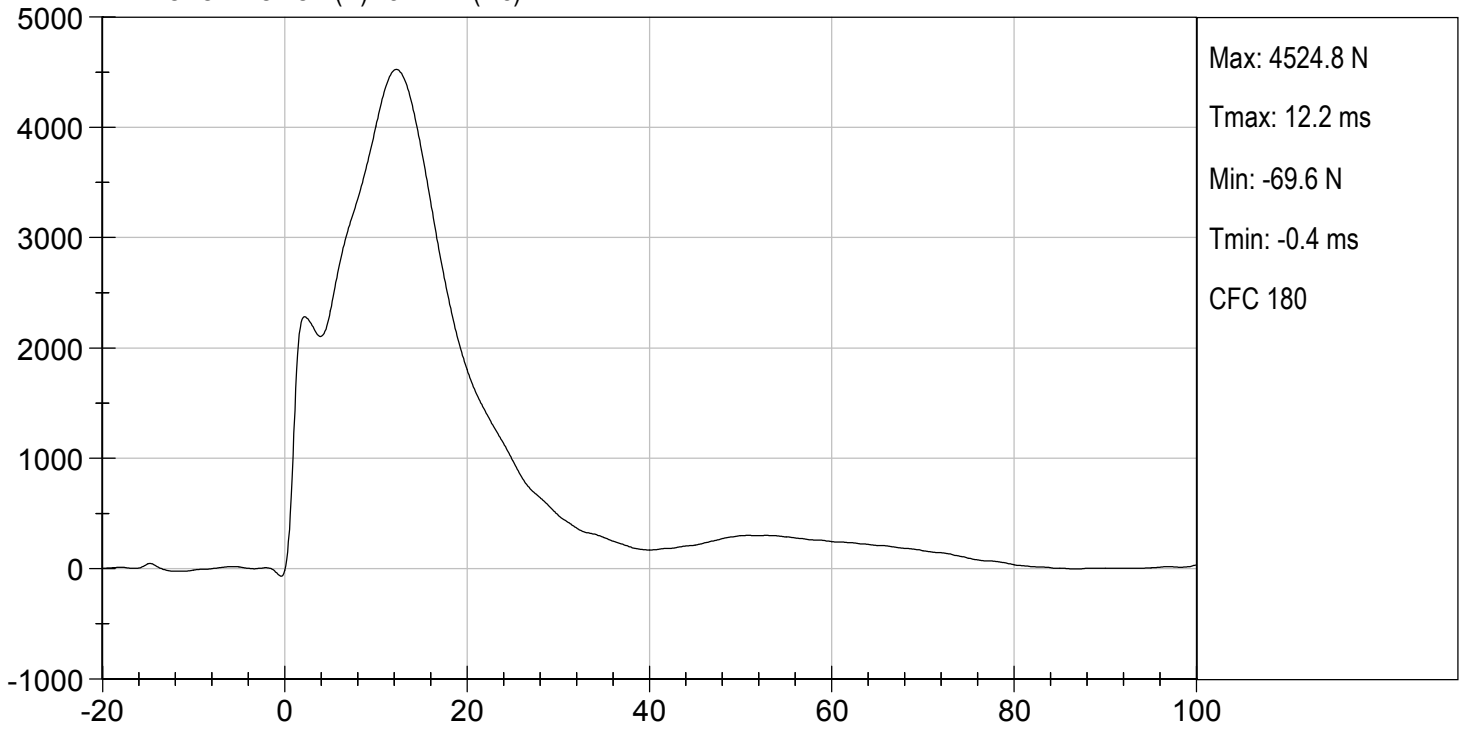
07/18/2019
Test Date

Approved By

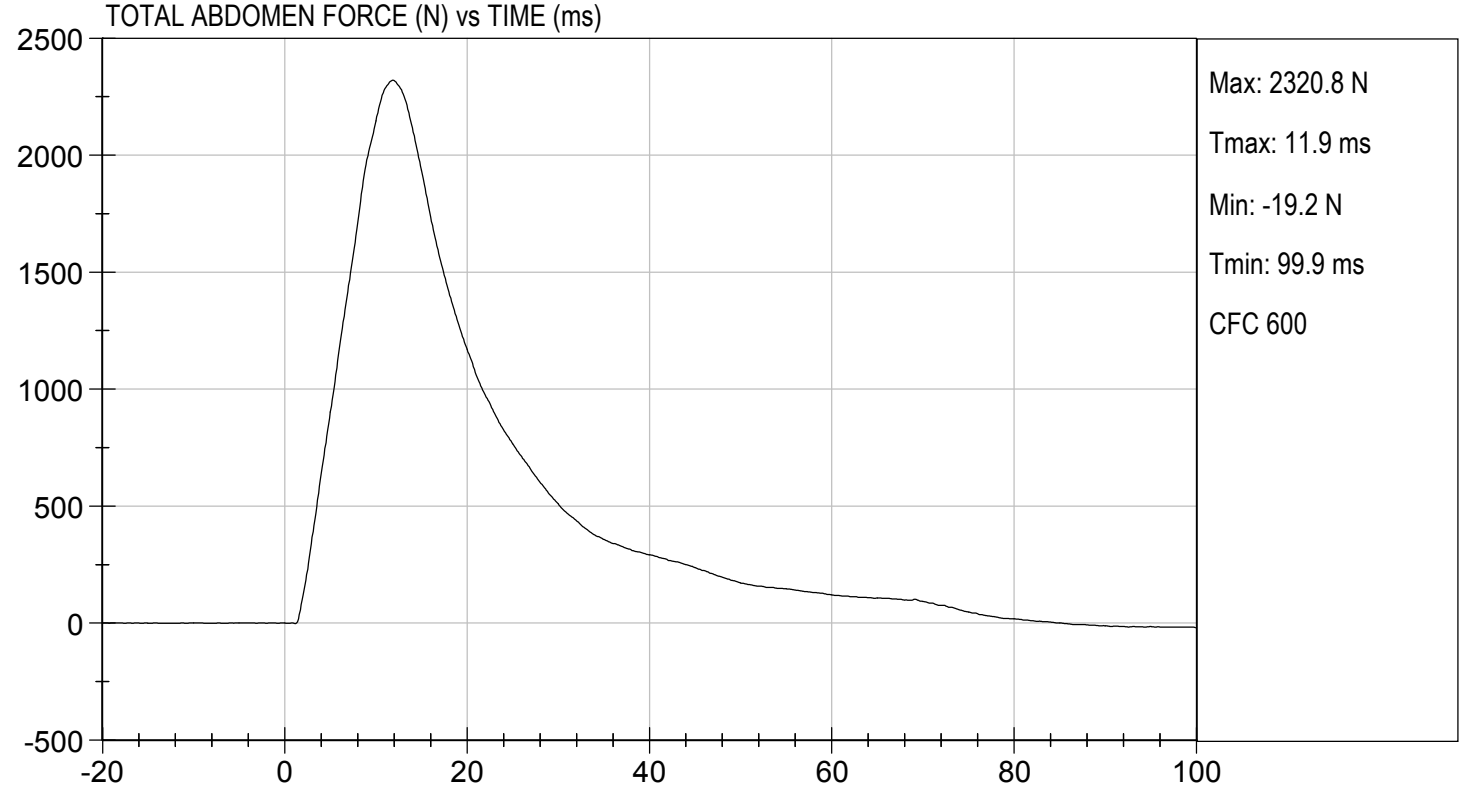
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.30 ft/s, 4.05 m/s

TEST DATE: 07/18/2019
TEST #: D192207

IMPACTOR FORCE (N) vs TIME (ms)



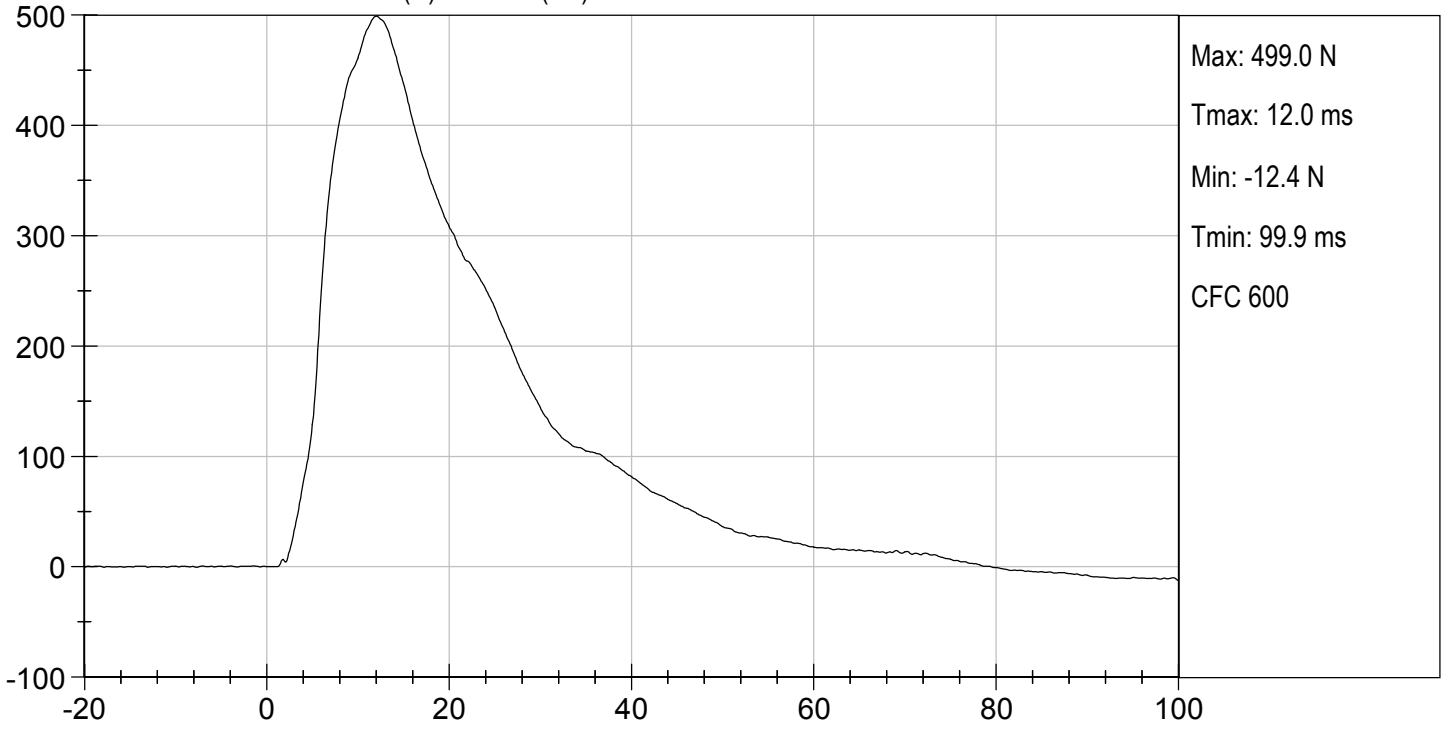

TOTAL ABDOMEN FORCE (N) vs TIME (ms)



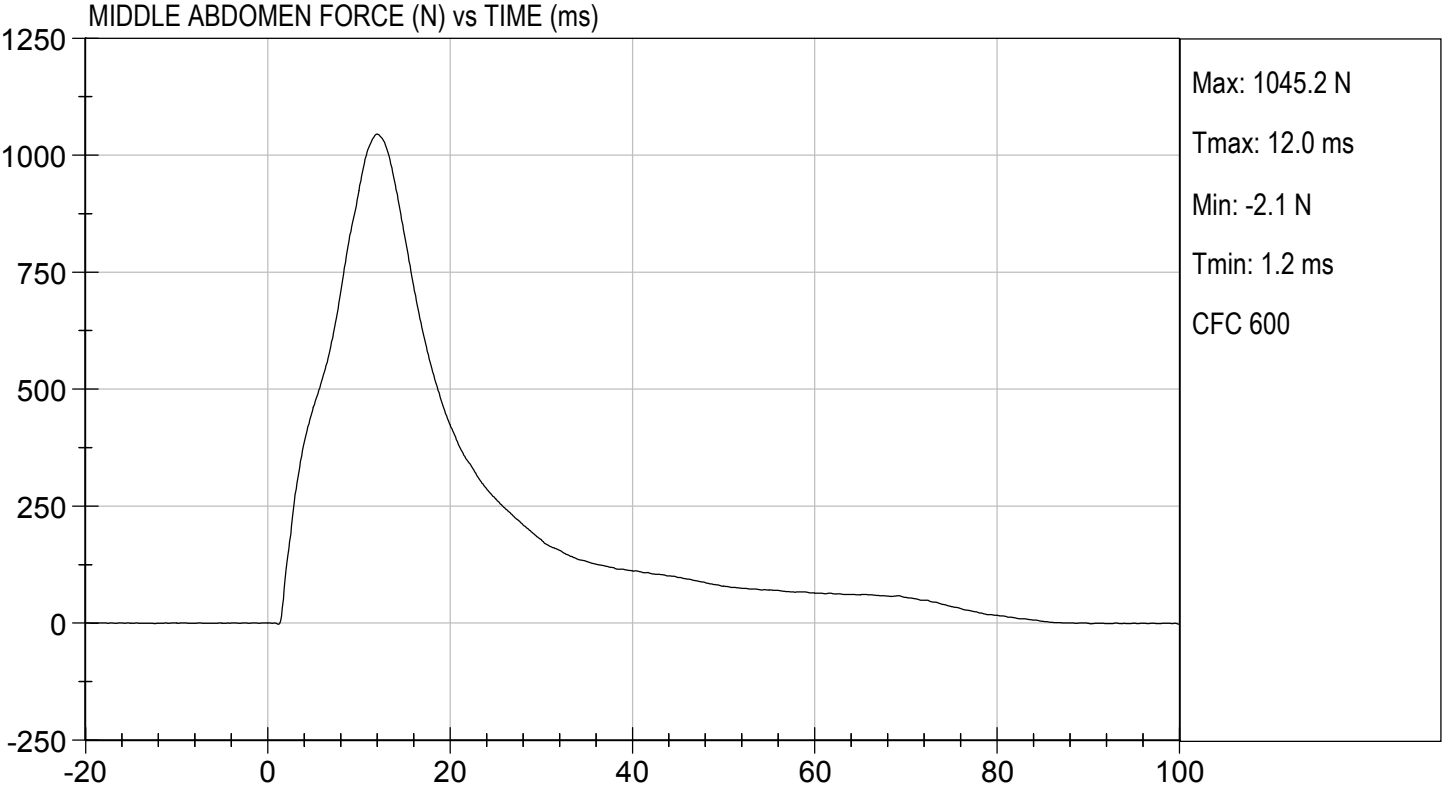
TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.30 ft/s, 4.05 m/s

TEST DATE: 07/18/2019
TEST #: D192207

FRONT ABDOMEN FORCE (N) vs TIME (ms)



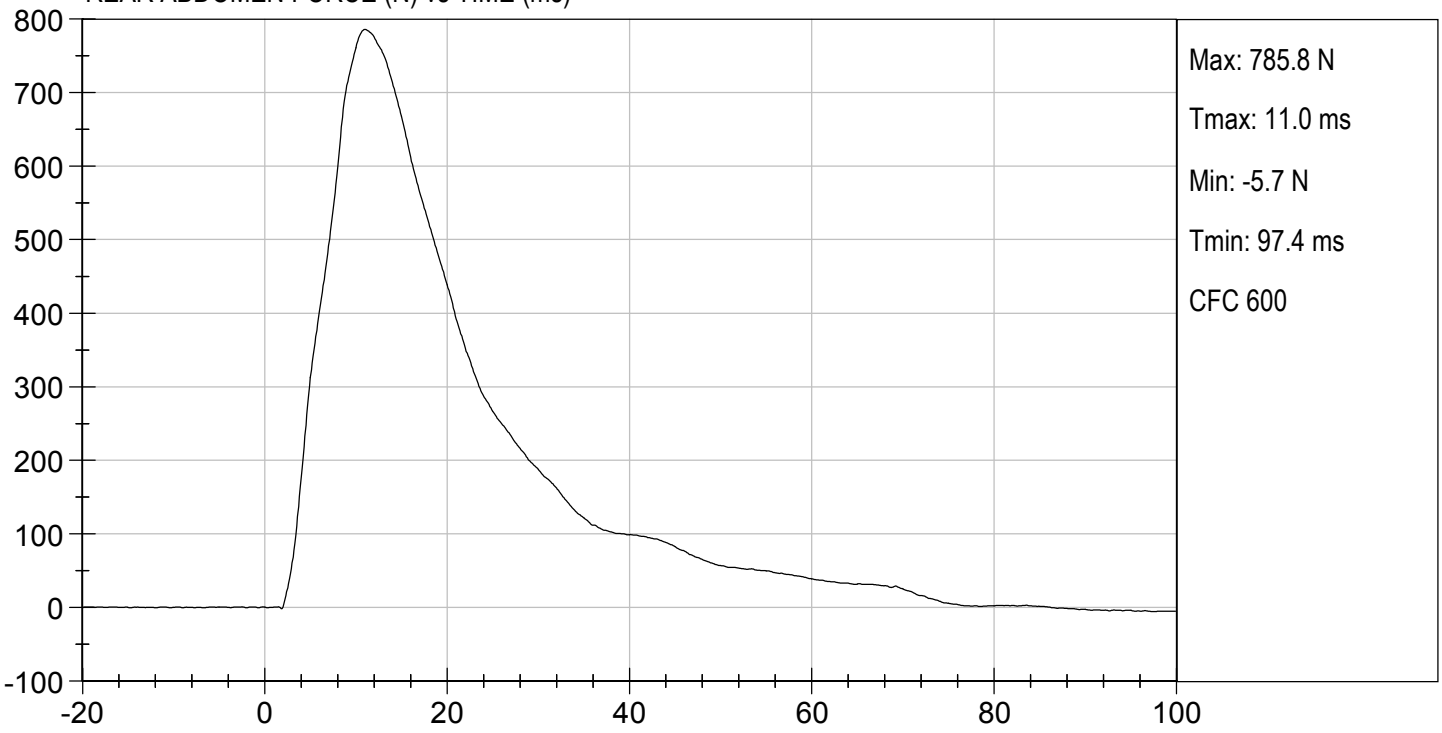

MIDDLE ABDOMEN FORCE (N) vs TIME (ms)



TEST DESC: ABDOMEN IMPACT
VELOCITY: 13.30 ft/s, 4.05 m/s

TEST DATE: 07/18/2019
TEST #: D192207

REAR ABDOMEN FORCE (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**LUMBAR SPINE TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D192208

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 45 | Pass |
| Pendulum Speed | | m/s | 5.95 to 6.15 | 6.12 | Pass |
| Pendulum Velocity | 1 ms | m/s | -0.05 to 0.00 | -0.00 | Pass |
| | 3.7 ms | m/s | -0.425 to -0.24 | -0.424 | Pass |
| | 27 ms | m/s | -6.50 to -5.80 | -5.96 | Pass |
| | 30 ms | m/s | >= -6.50 | -5.83 | Pass |
| Maximum Flexion Angle | | deg | 45.0 to 55.0 | 47.0 | Pass |
| Time of Maximum Flexion Angle | | ms | 39.0 to 53.0 | 42.5 | Pass |
| Headform Rotation Decay to Initial Position | | ms | 37 to 57 | 38 | Pass |
| | | | Overall Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

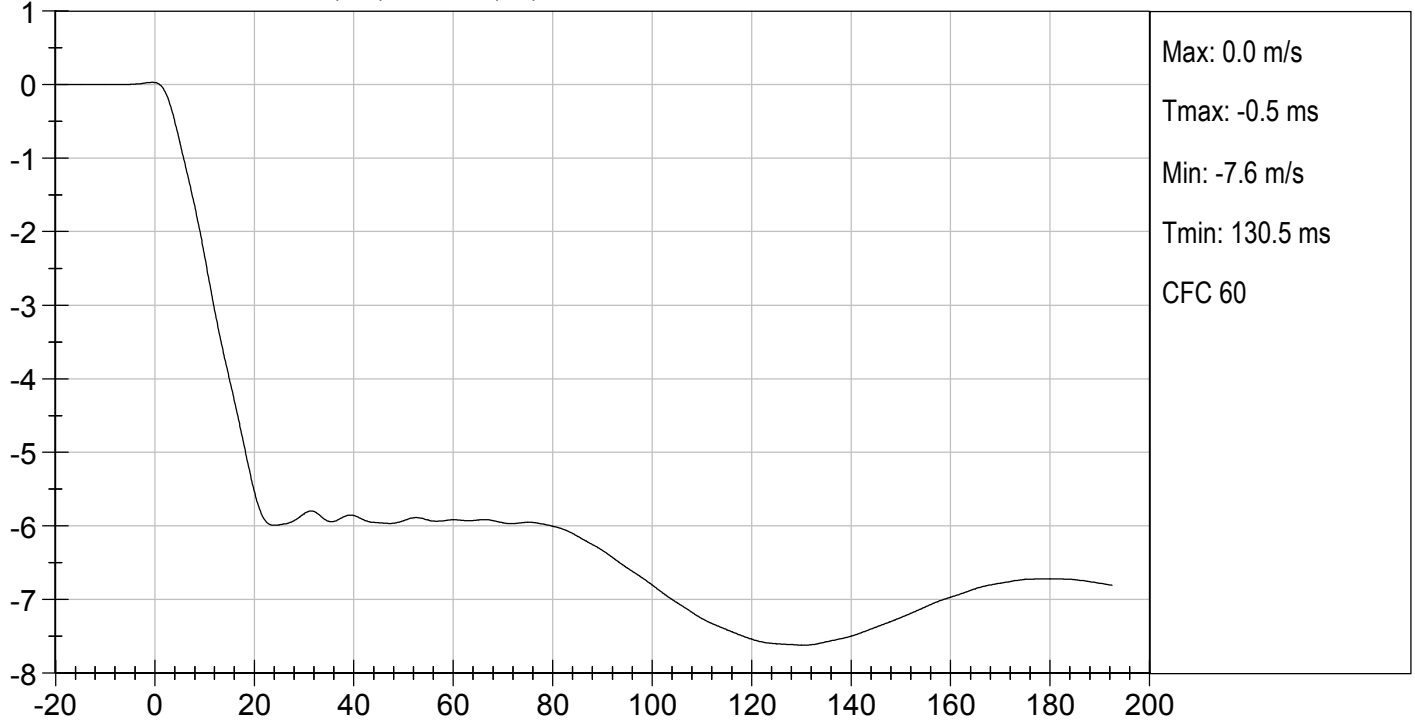
07/18/2019
Test Date

Approved By

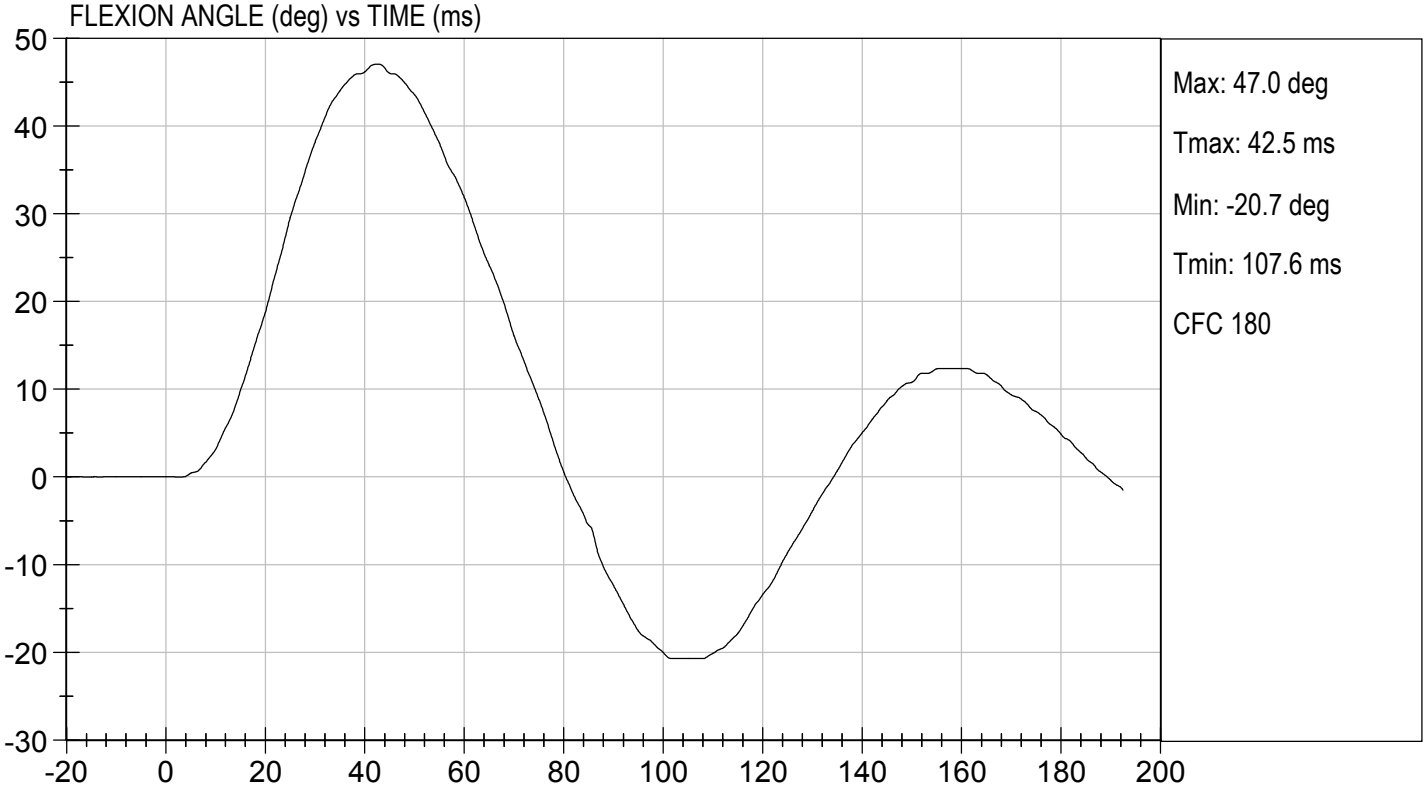
TEST DESC: LUMBAR BENDING
VELOCITY: 20.08 ft/s, 6.12 m/s

TEST DATE: 07/18/2019
TEST #: D192208

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

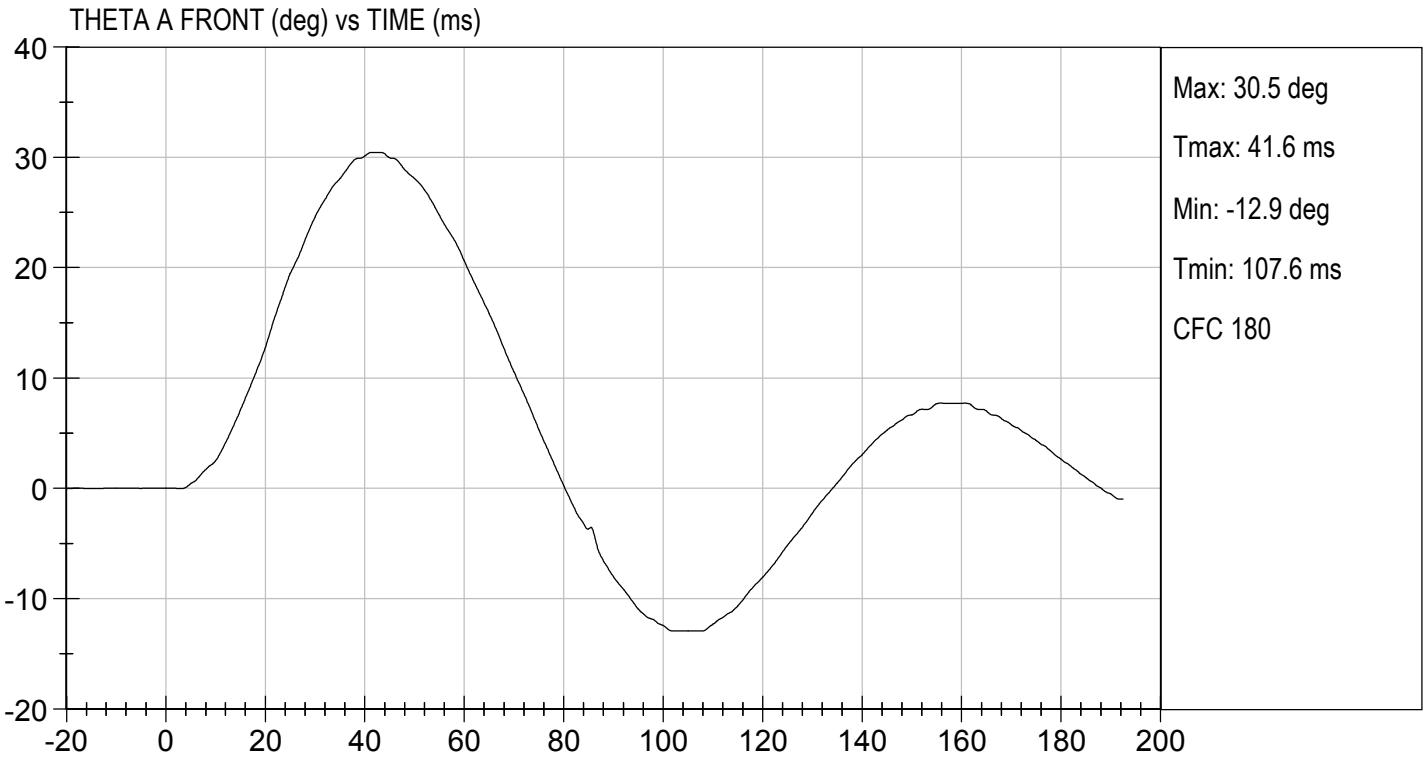


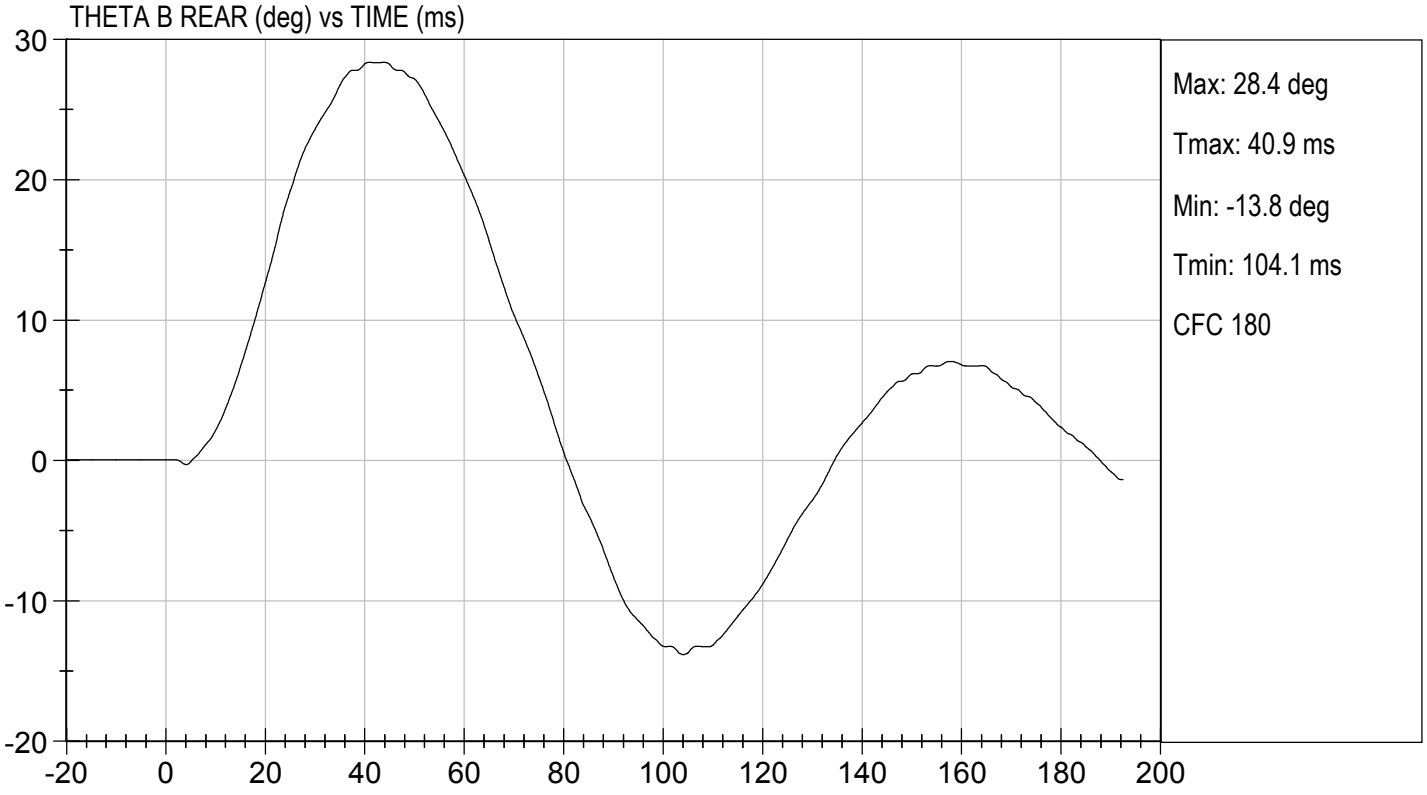

FLEXION ANGLE (deg) vs TIME (ms)



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

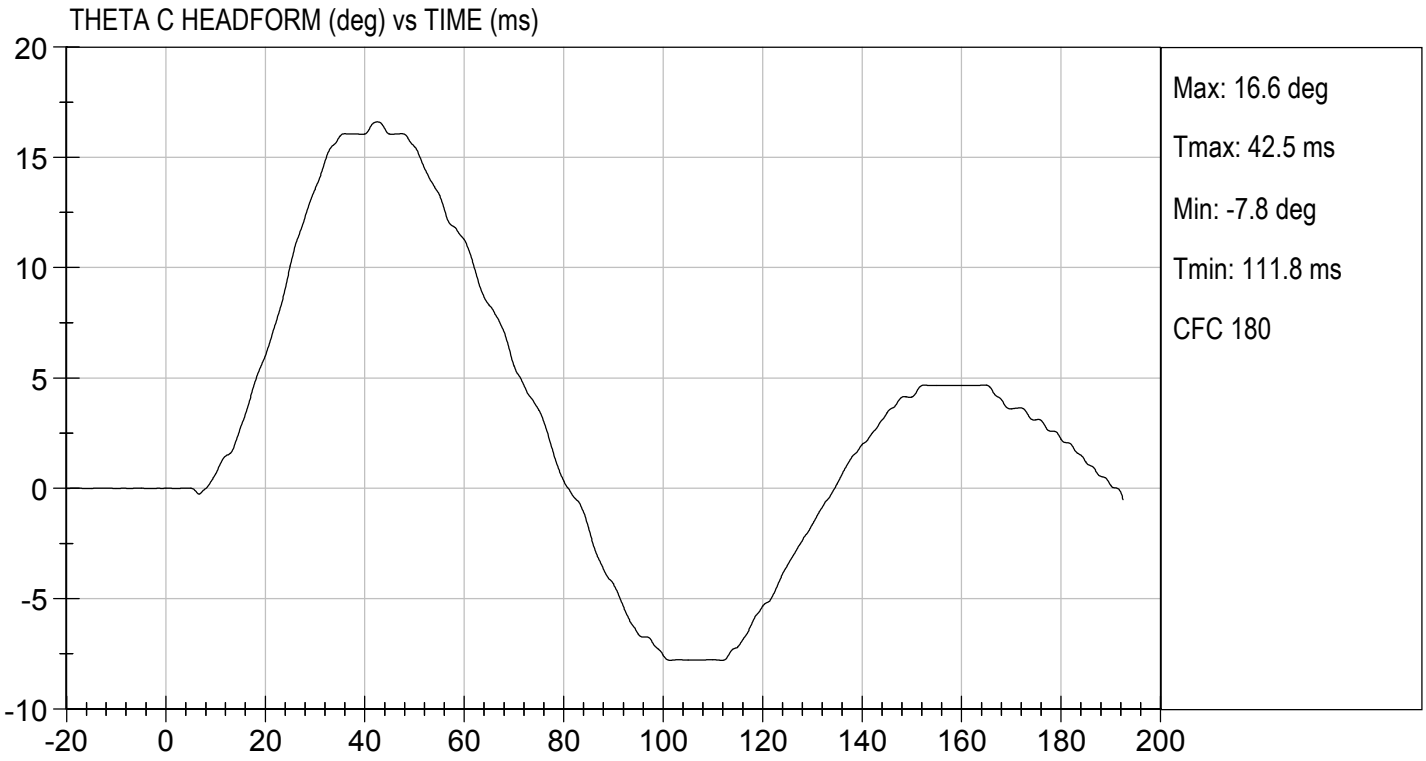
TEST DATE: 07/18/2019
TEST #: D192208



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

TEST DATE: 07/18/2019
TEST #: D192208



**MGA RESEARCH CORPORATION**

**PELVIS TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D192209

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Probe Speed | m/s | 4.20 to 4.40 | 4.27 | Pass |
| Maximum Impactor Force | N | 4700 to 5400 | 4930 | Pass |
| Time of Maximum Impactor Force | ms | 11.8 to 16.1 | 12.6 | Pass |
| Maximum Pubic Force | N | 1230 to 1590 | 1324 | Pass |
| Time of Maximum Pubic Force | ms | 12.2 to 17.0 | 12.3 | Pass |
| | | Overall Test Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

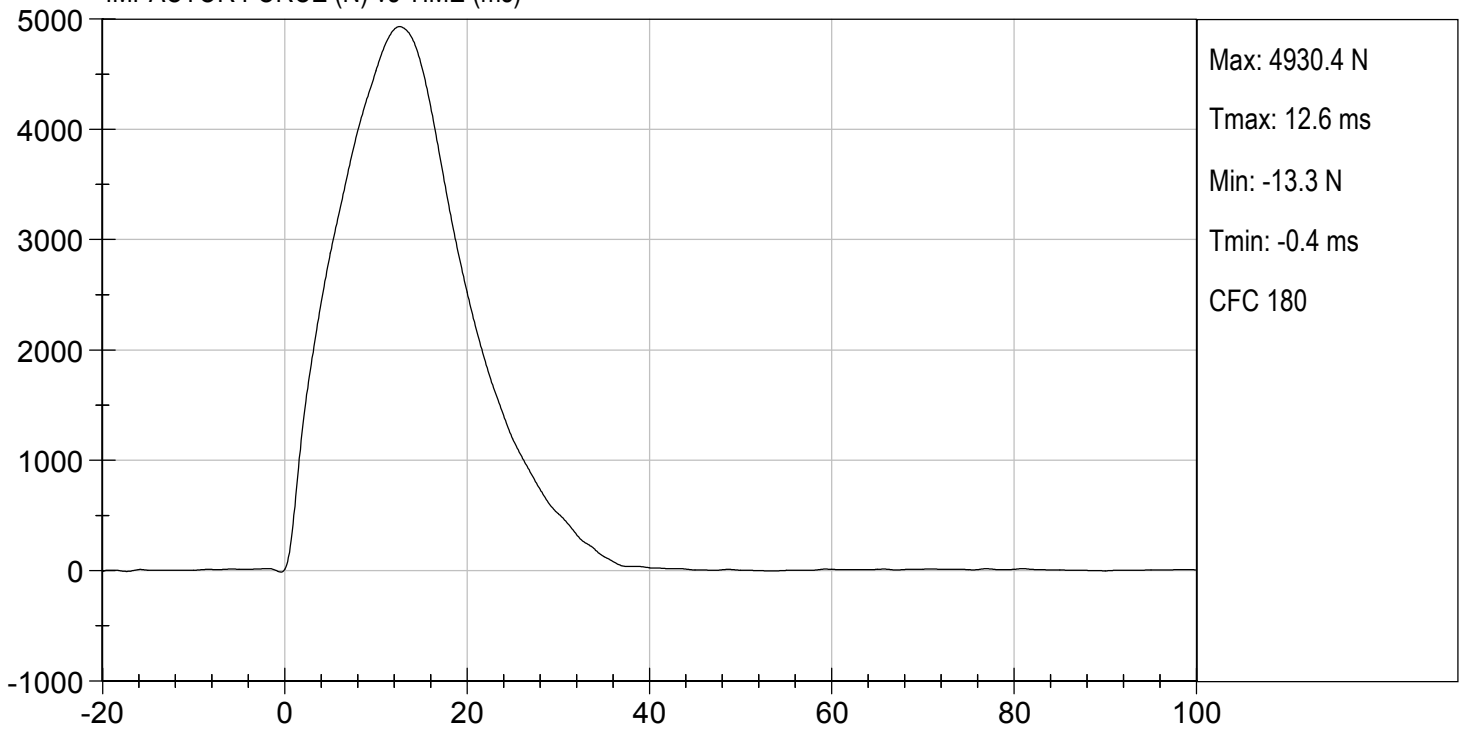
07/18/2019
Test Date

Approved By

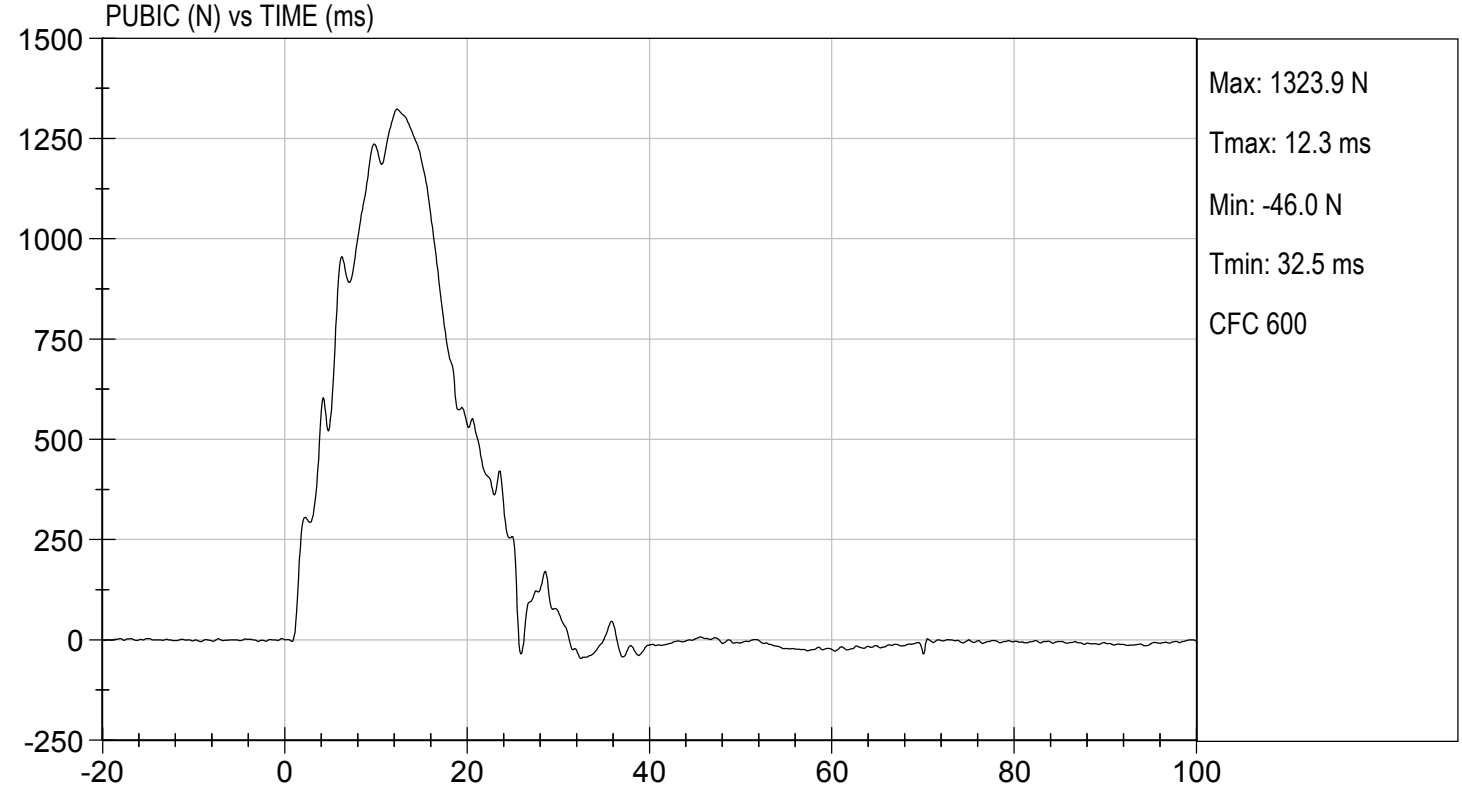
TEST DESC: PELVIS IMPACT
VELOCITY: 14.00 ft/s, 4.27 m/s

TEST DATE: 07/18/2019
TEST #: D192209

IMPACTOR FORCE (N) vs TIME (ms)




PUBIC (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**THORAX IMPACT TEST**

**ES-2re DUMMY**

**ATD Serial No:** 032 **Test I.D:** D192200

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Humidity | % | 10 to 70 | 45 | Pass |
| Probe Speed | m/s | 5.40 to 5.60 | 5.40 | Pass |
| Maximum Impactor Force (after 6 ms) | N | 5100 to 6200 | 5624 | Pass |
| Upper Rib Displacement | mm | 34.0 to 41.0 | 39.6 | Pass |
| Middle Rib Displacement | mm | 37.0 to 45.0 | 41.0 | Pass |
| Lower Rib Displacement | mm | 37.0 to 44.0 | 41.7 | Pass |
| | | Overall Test Results | | Pass |

Danielle Redinbaugh
Laboratory Technician

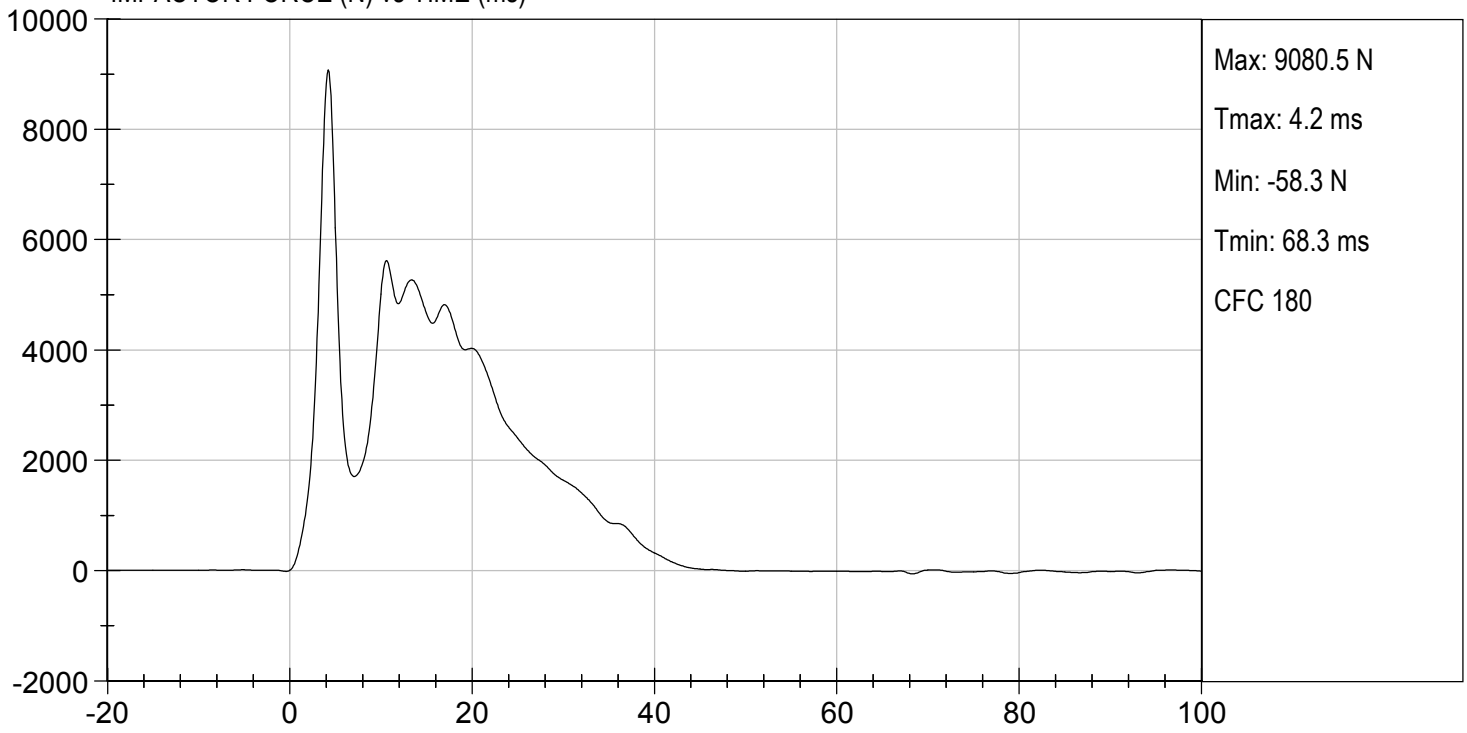
07/18/2019
Test Date

Approved By

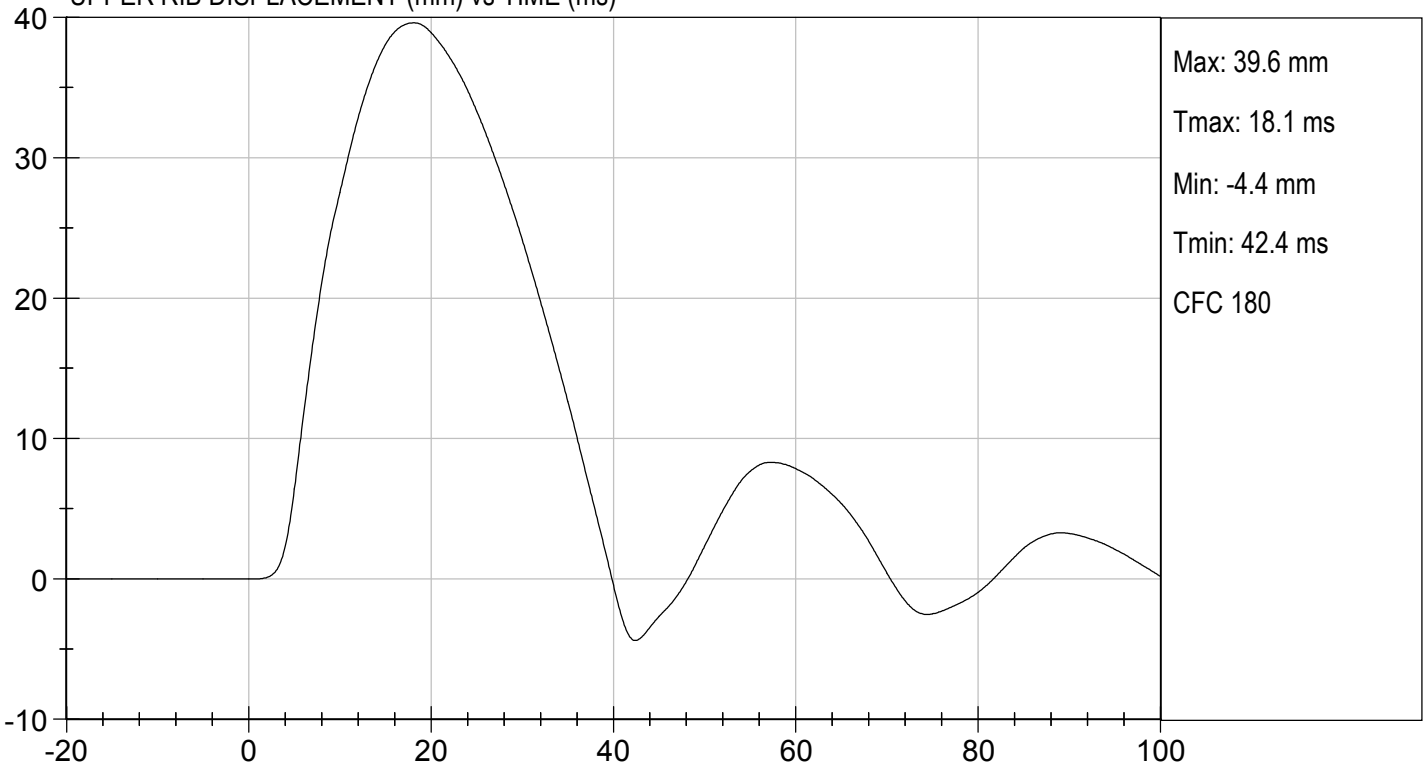
TEST DESC: THORAX IMPACT
VELOCITY: 17.73 ft/s, 5.40 m/s

TEST DATE: 07/18/2019
TEST #: D192200

IMPACTOR FORCE (N) vs TIME (ms)



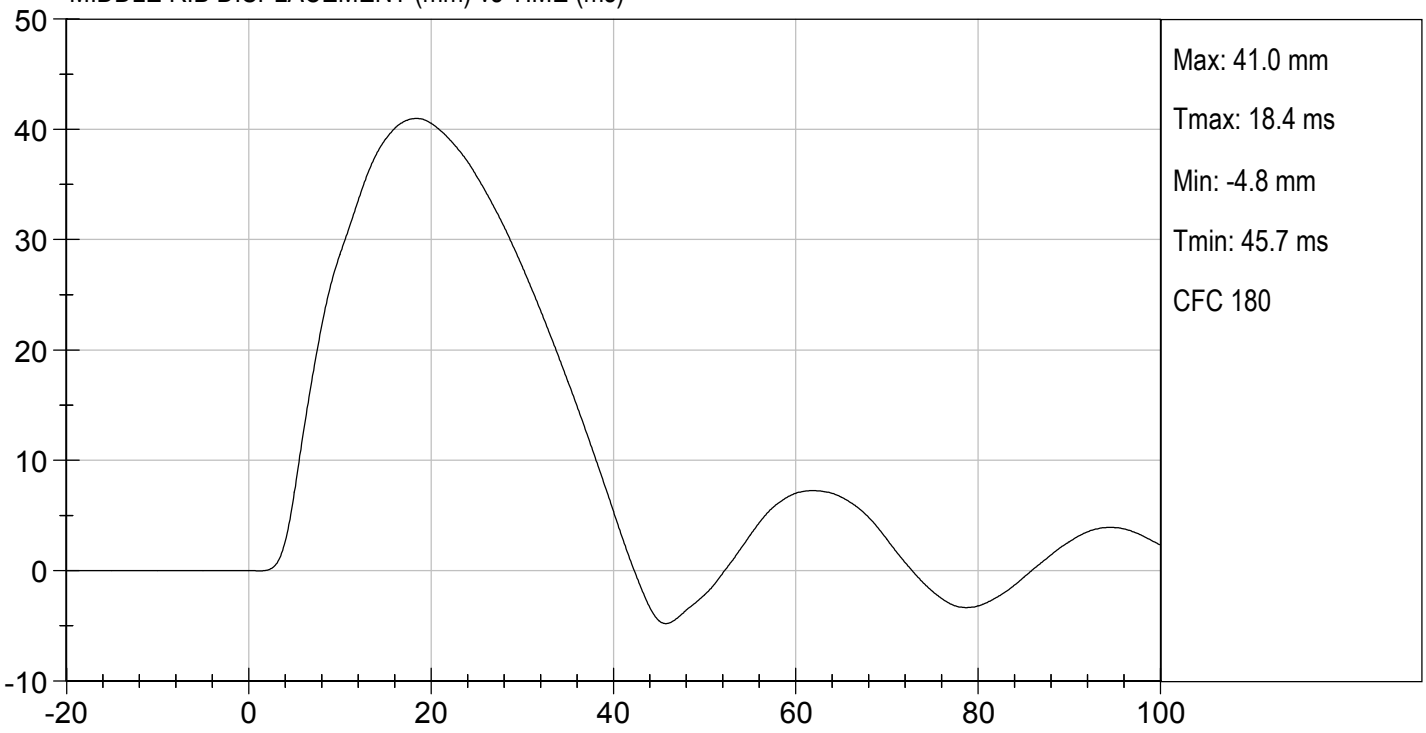

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



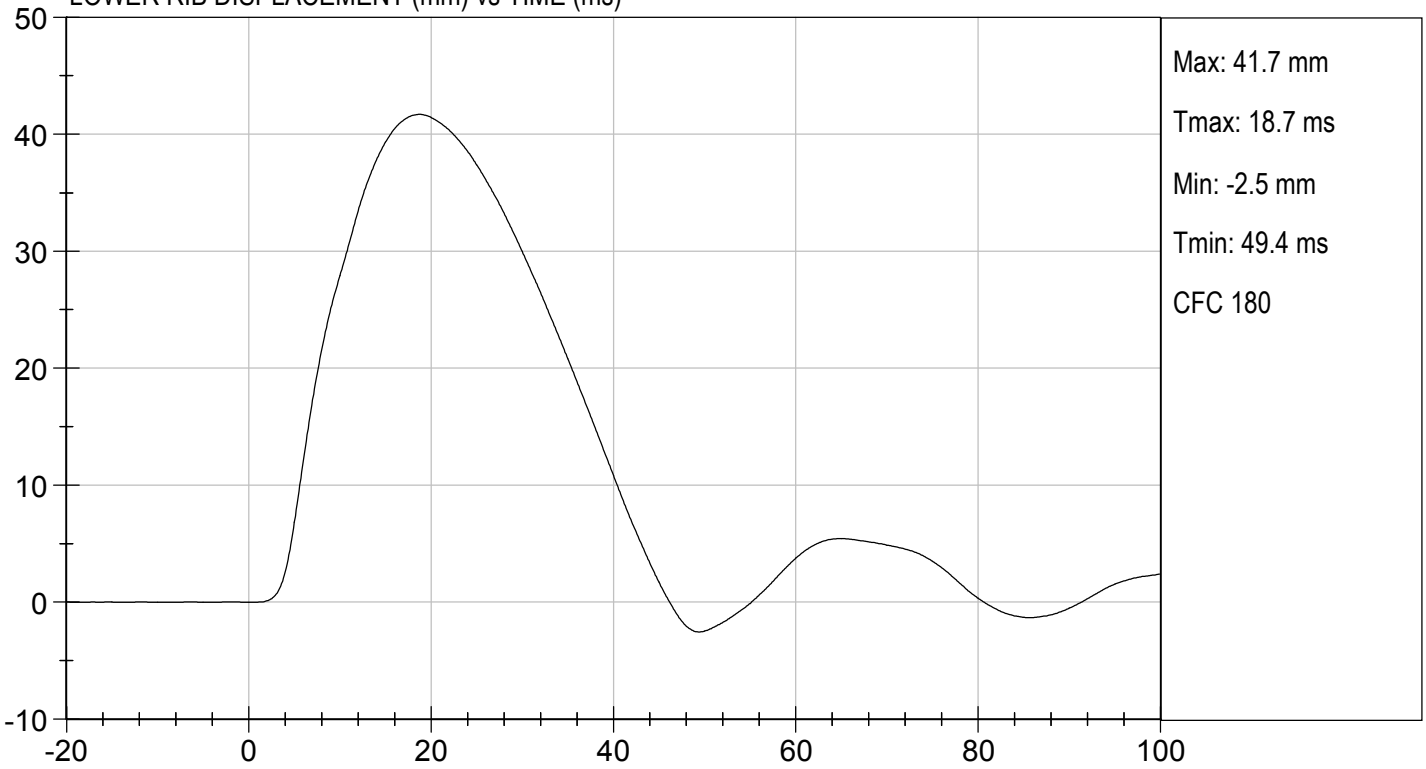
TEST DESC: THORAX IMPACT
VELOCITY: 17.73 ft/s, 5.40 m/s

TEST DATE: 07/18/2019
TEST #: D192200

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:** D191691

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 52 | Pass |
| Peak Resultant Acceleration | G's | 115 to 137 | 130 | Pass |
| Peak Longitudinal Acceleration | G's | +/- 15 | 2.5 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | <15% | Yes | Pass |
| | | Overall Test Results | | Pass |

Laboratory Technician

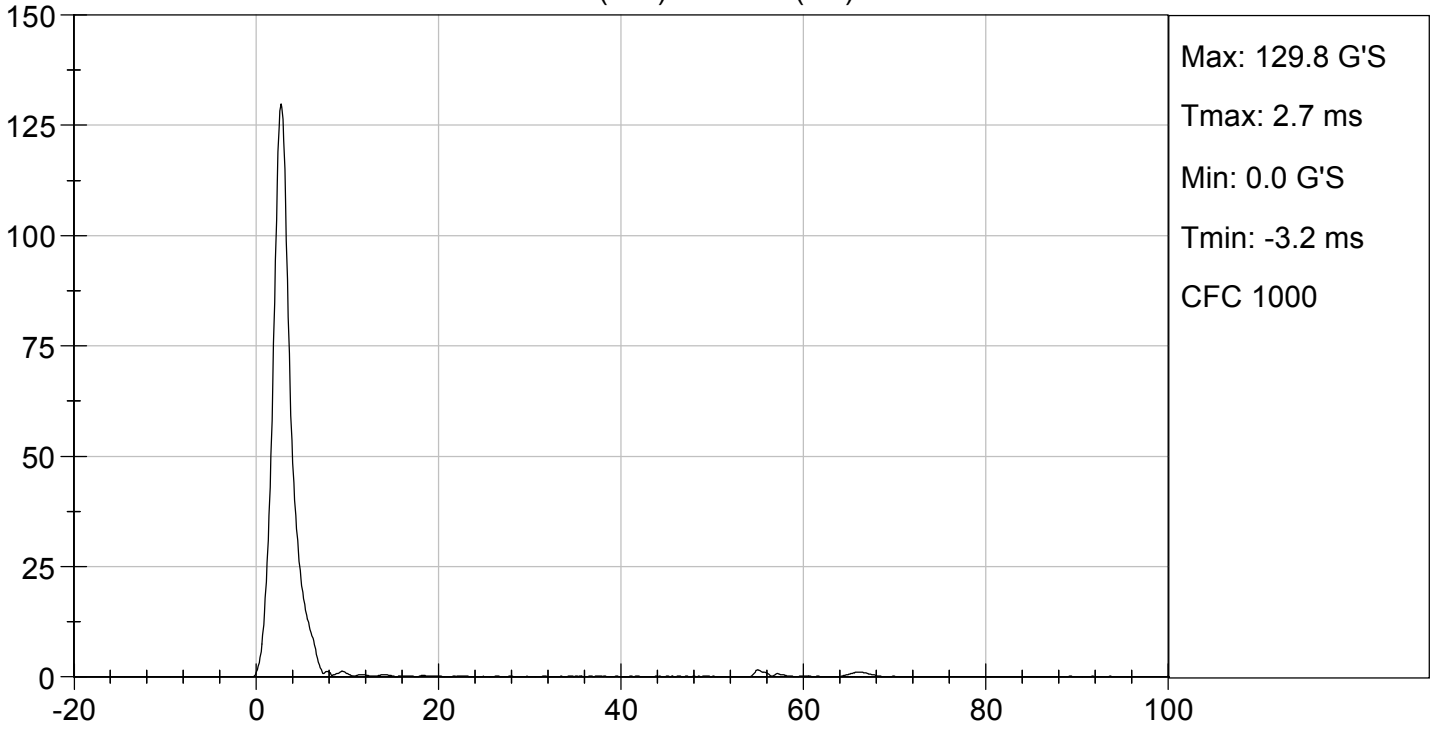
05/31/2019
Test Date

Approved By

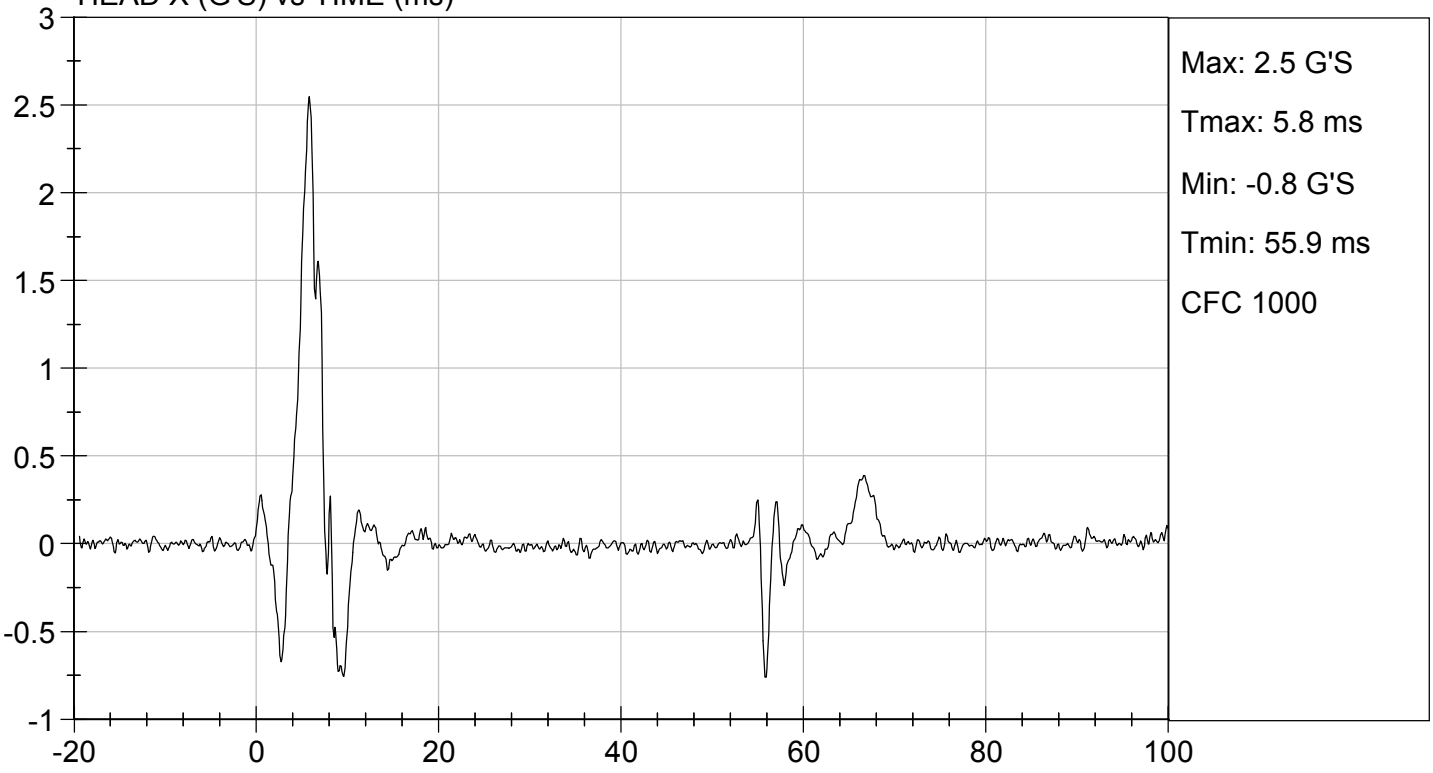
TEST DESC: HEAD DROP

TEST DATE: 05/31/2019
TEST #: D191691

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

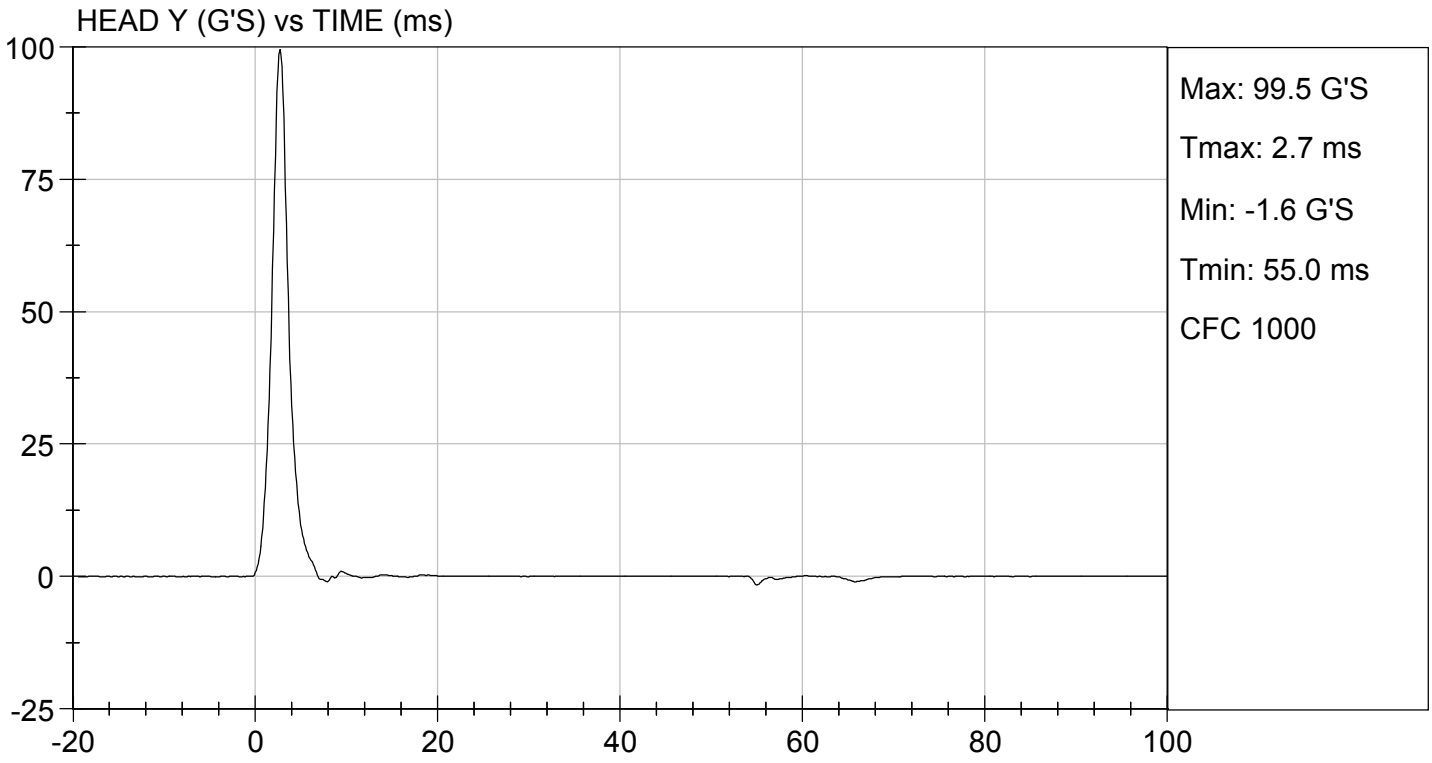


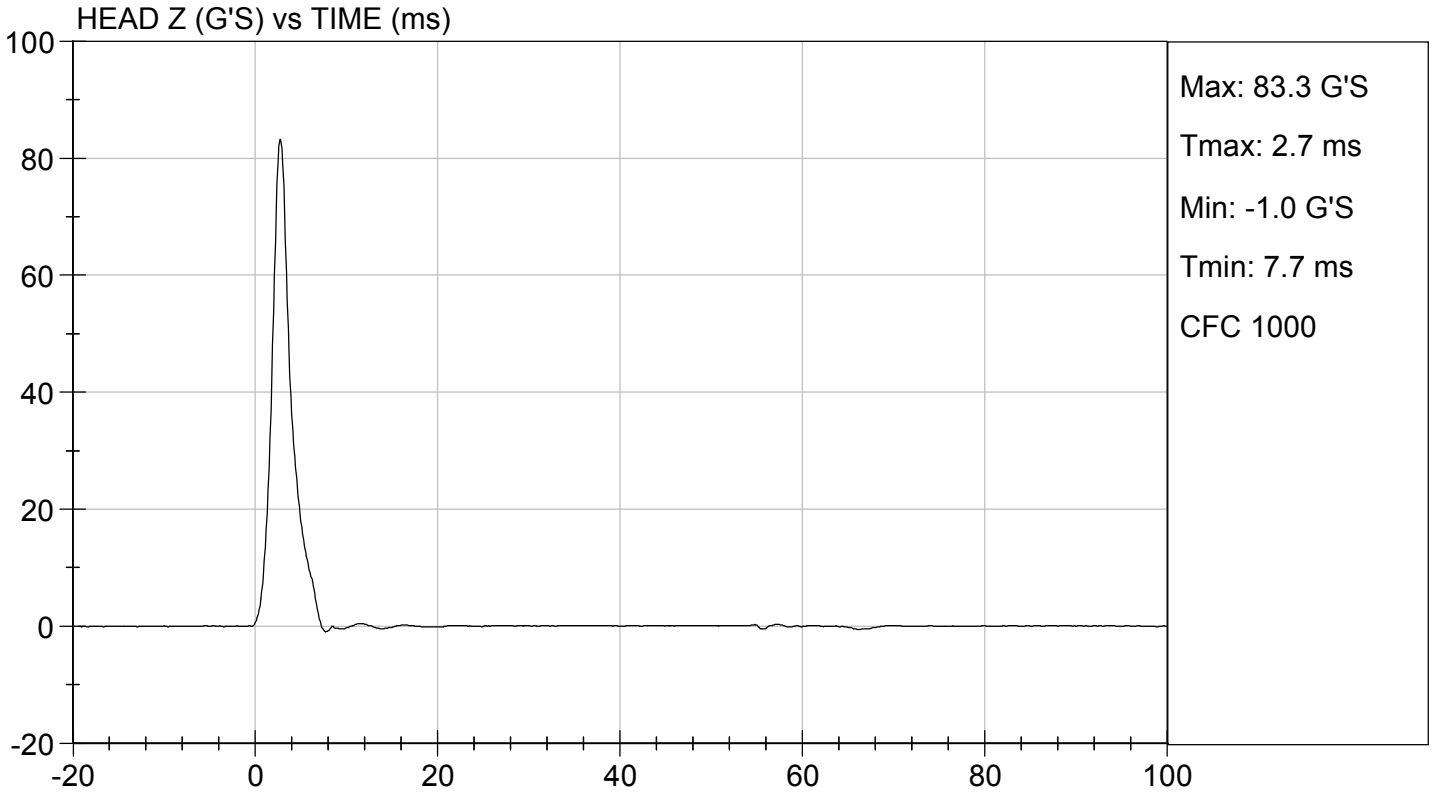

HEAD X (G'S) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 05/31/2019
TEST #: D191691



**MGA RESEARCH CORPORATION**

**LATERAL NECK PENDULUM TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D191692

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Temperature | | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Humidity | | % | 10 to 70 | 52 | Pass |
| Impact Velocity | | m/s | 5.51 to 5.63 | 5.58 | Pass |
| Pendulum Velocity | 10 ms | m/s | 2.20 to 2.80 | 2.38 | Pass |
| | 15 ms | m/s | 3.30 to 4.10 | 3.47 | Pass |
| | 20 ms | m/s | 4.40 to 5.40 | 4.82 | Pass |
| | 25 ms | m/s | 5.40 to 6.10 | 5.90 | Pass |
| | 25-100 ms | m/s | 5.50 to 6.20 | 5.96 | Pass |
| Maximum D-Plane Rotation | | deg | 71 to 81 | 78 | Pass |
| Time of Maximum D-Plane Rotation | | ms | 50 to 70 | 64 | Pass |
| Maximum Occipital Condyle Moment | | Nm | -44 to -36 | -39 | Pass |
| Time of Moment Decay to 0 Nm | | ms | 102 to 126 | 120 | Pass |
| | | | Overall Test Results | | Pass |

Danielle Redinbaugh

Laboratory Technician

05/31/2019

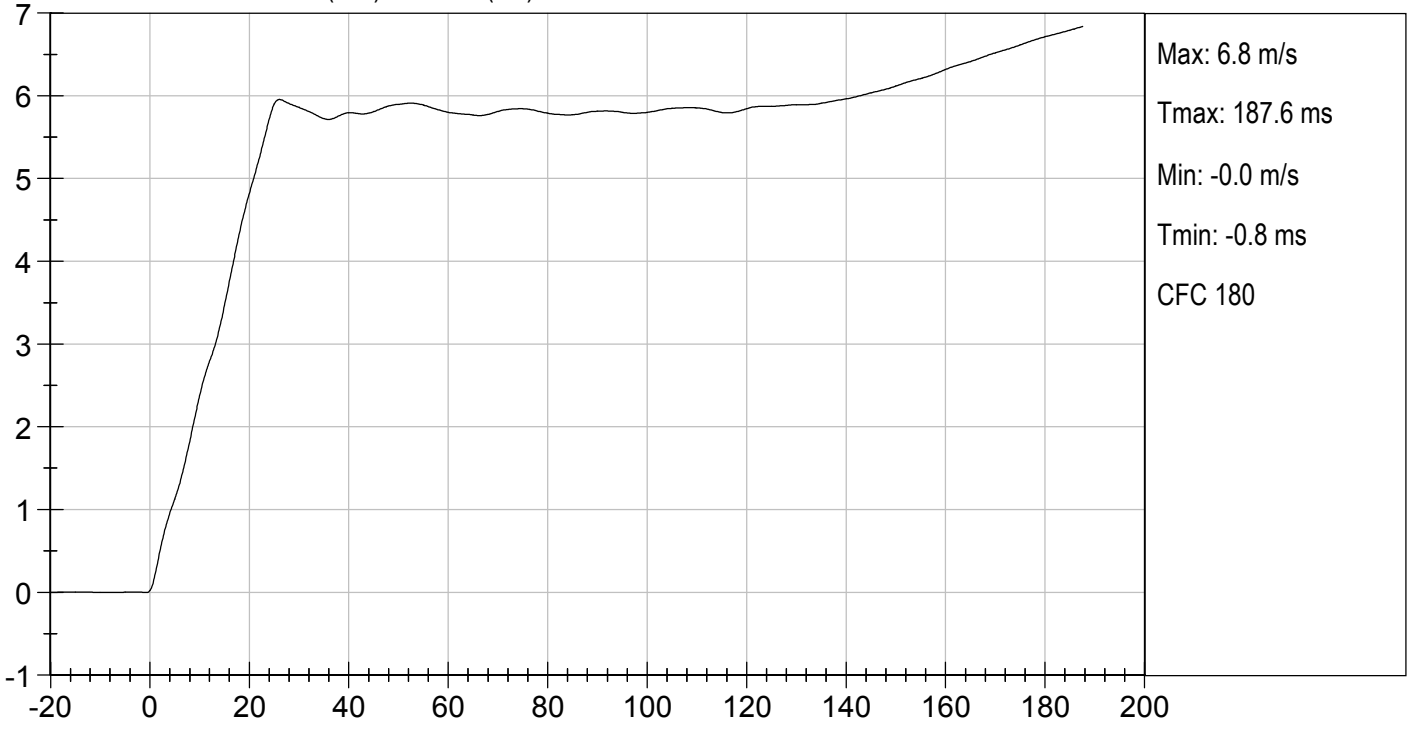
Test Date

Approved By

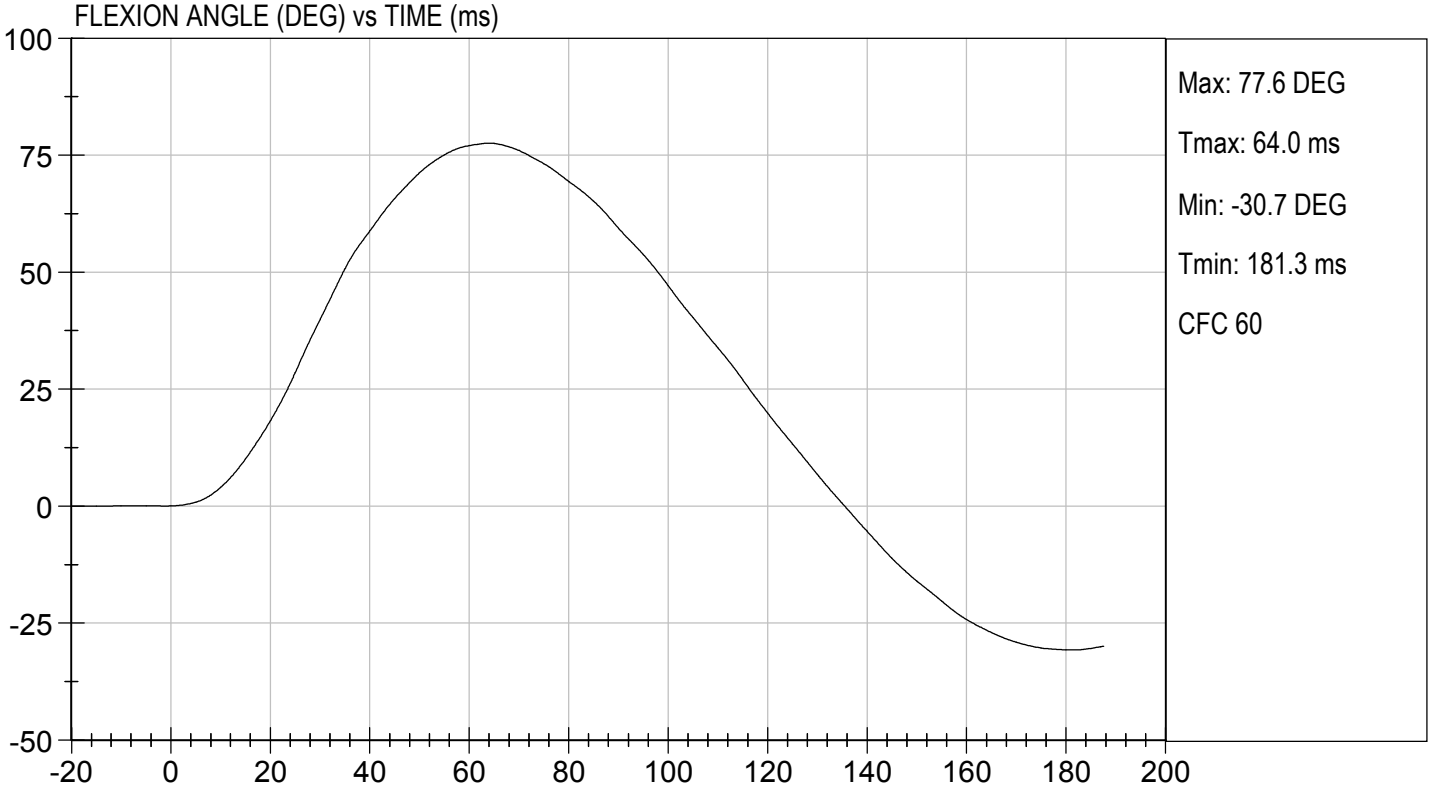
TEST DESC: NECK BENDING
VELOCITY: 18.30 ft/s, 5.58 m/s

TEST DATE: 05/31/2019
TEST #: D191692

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

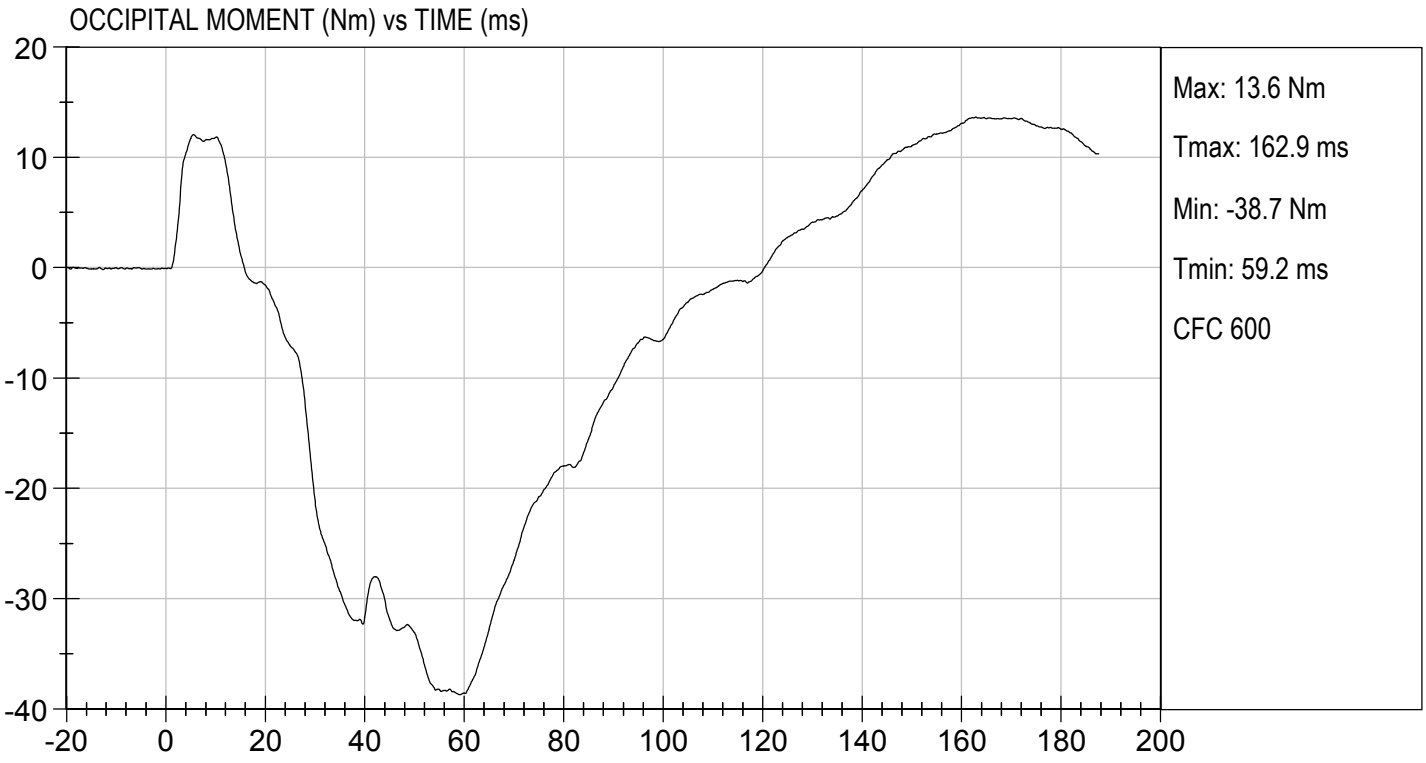



FLEXION ANGLE (DEG) vs TIME (ms)



TEST DESC: NECK BENDING
VELOCITY: 18.30 ft/s, 5.58 m/s

TEST DATE: 05/31/2019
TEST #: D191692



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test ID:** D191693

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 48 | 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 | 28 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 17 to 22 | 19 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor

Laboratory Technician

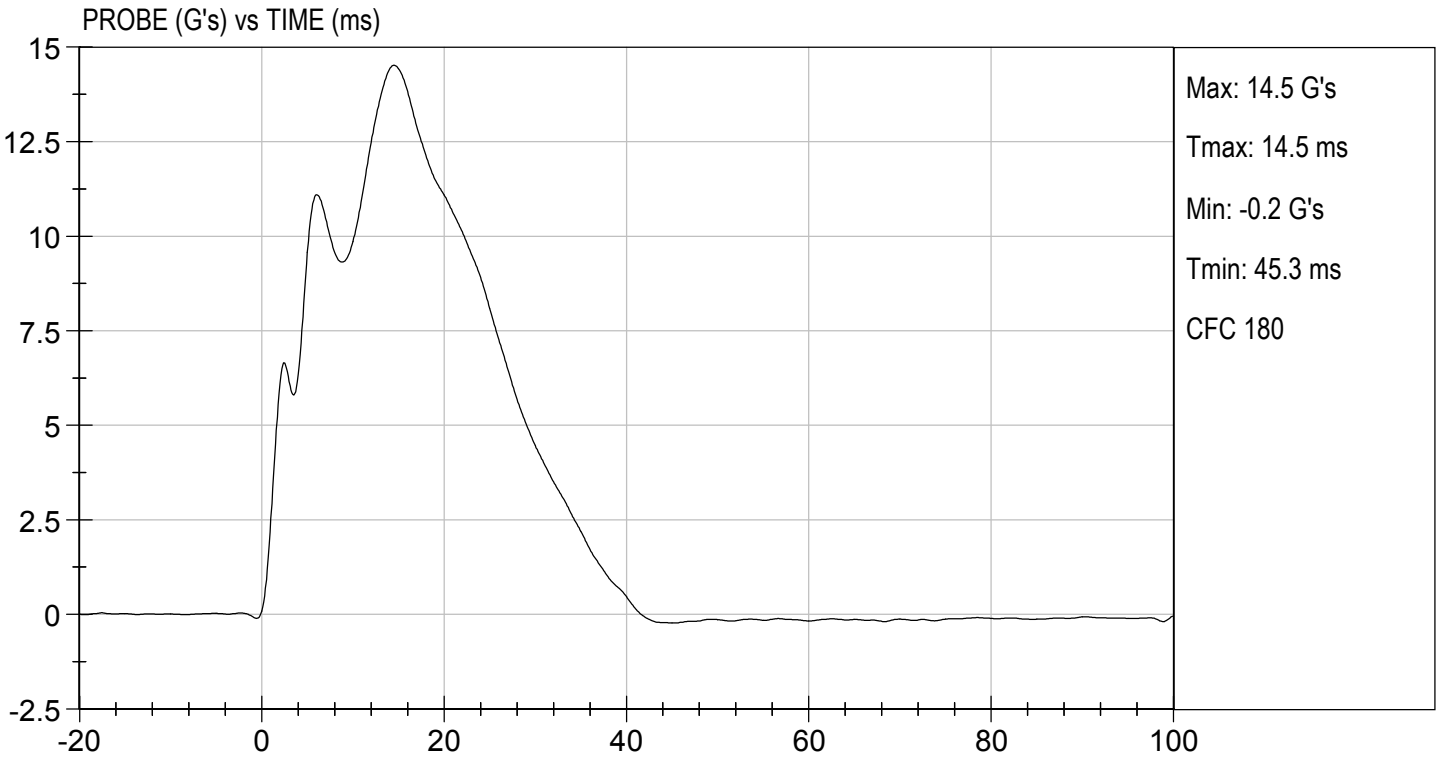
05/30/2019

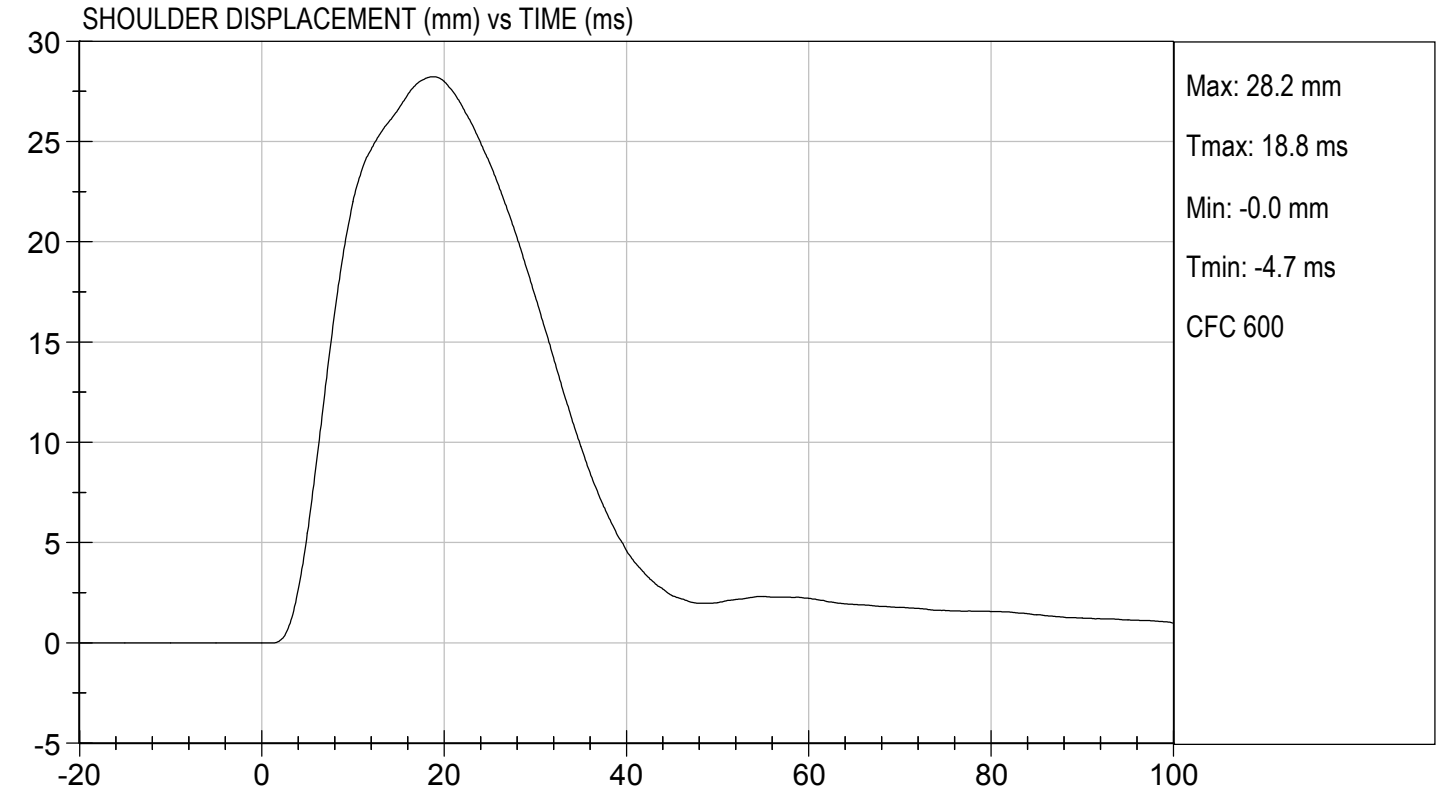
Test Date

Approved By

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

TEST DATE: 05/30/2019
TEST #: D191693

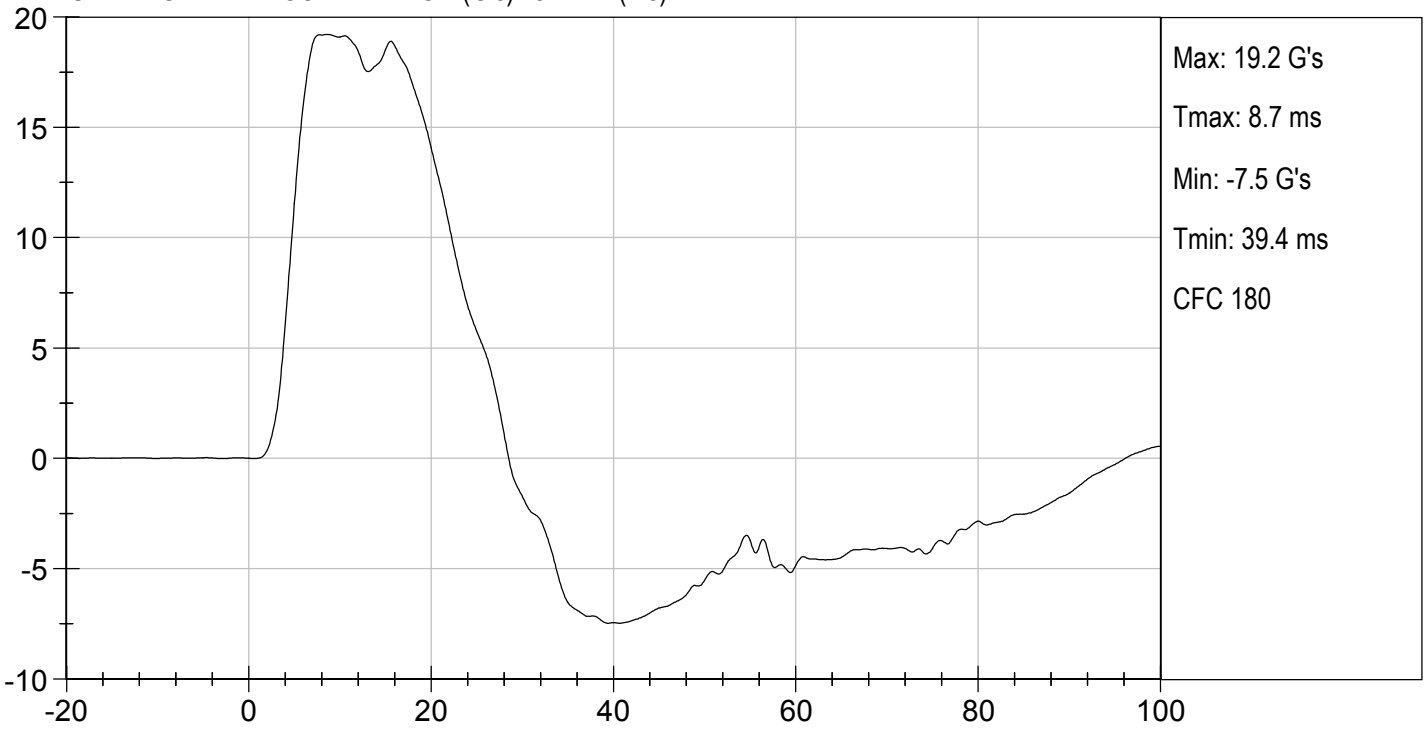


TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 05/30/2019
TEST #: D191693

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:** D191694

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 6.60 to 6.80 | 6.80 | Pass |
| Maximum Probe Acceleration | G's | 30 to 36 | 33 | Pass |
| Shoulder Displacement | mm | 31 to 40 | 33 | Pass |
| Upper Rib Displacement | mm | 25 to 32 | 27 | Pass |
| Middle Rib Displacement | mm | 30 to 36 | 31 | Pass |
| Lower Rib Displacement | mm | 32 to 38 | 33 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 34 to 43 | 41 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 29 to 37 | 33 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor

Laboratory Technician

05/30/2019

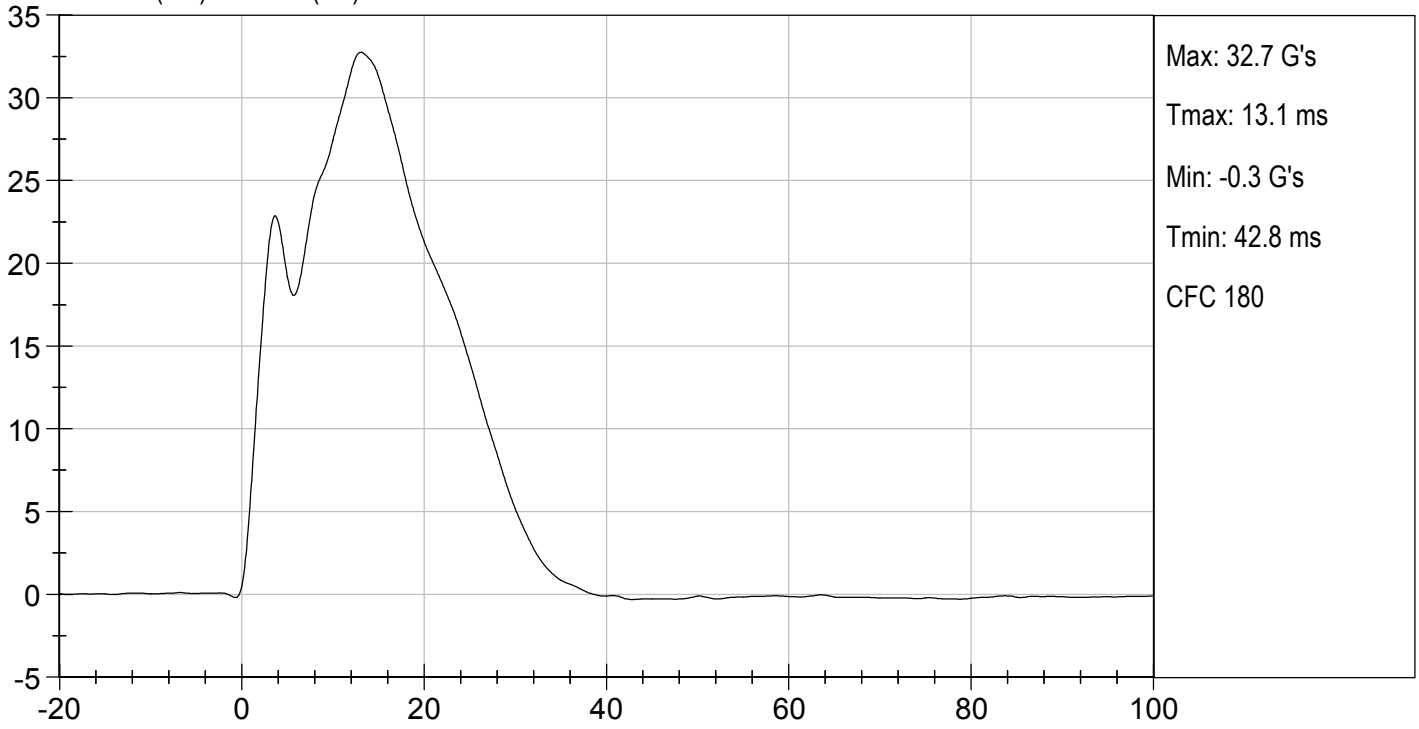
Test Date

Approved By

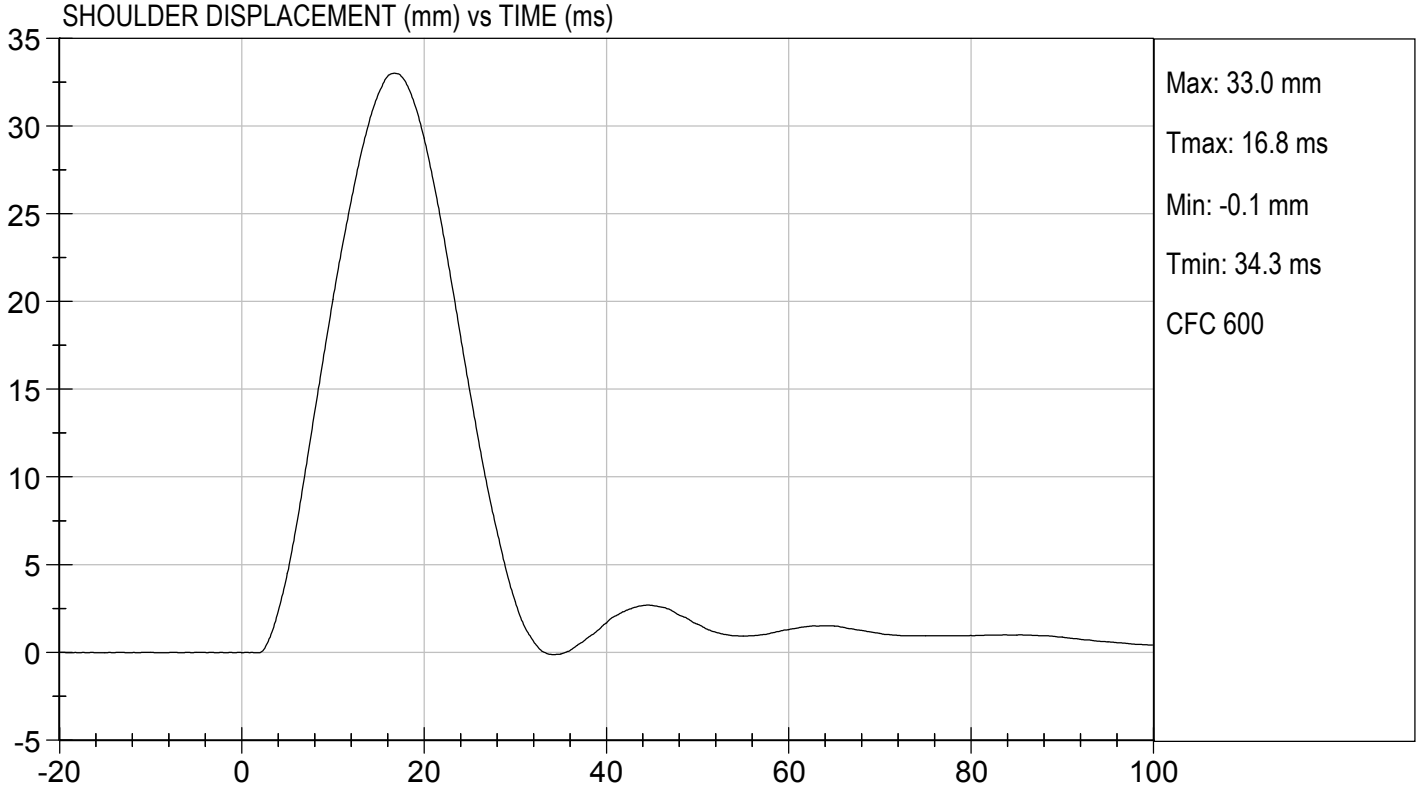
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

TEST DATE: 05/30/2019
TEST #: D191694

PROBE (G's) vs TIME (ms)



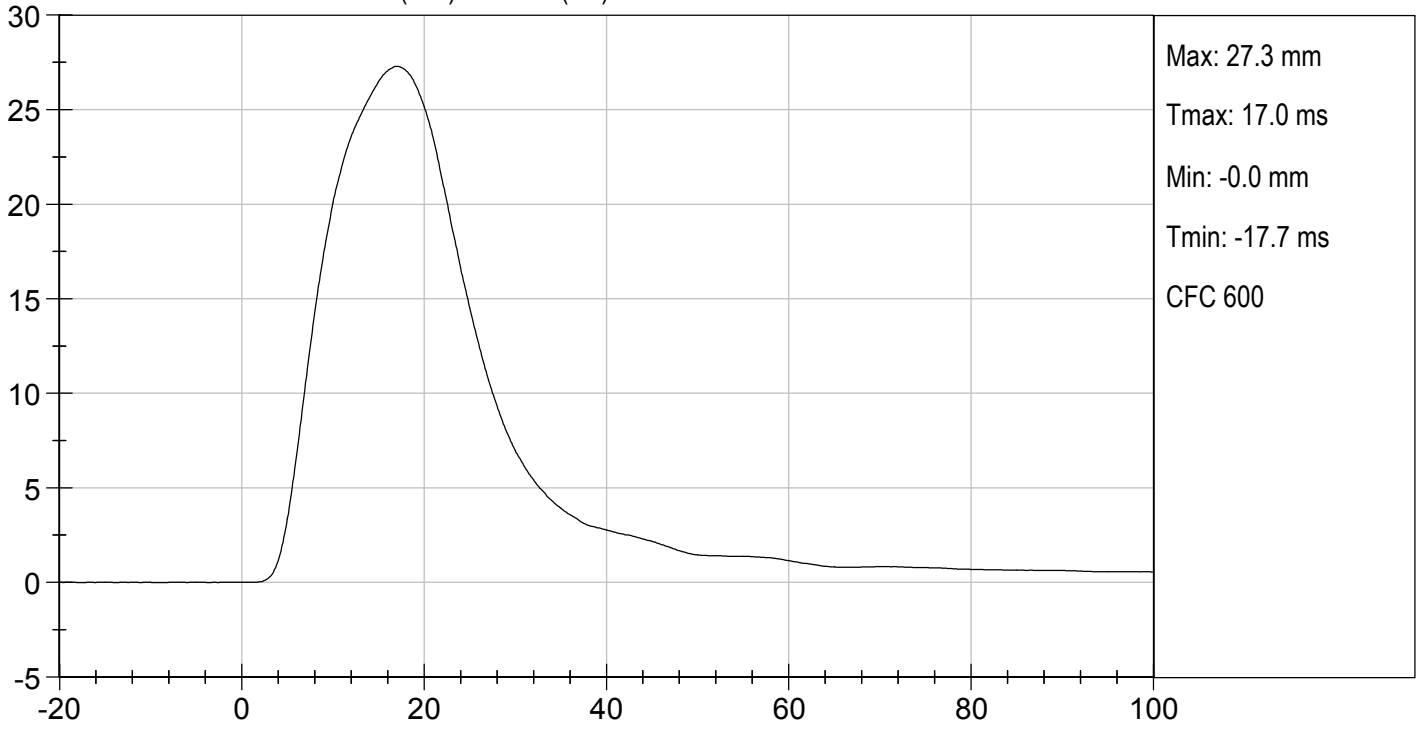

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



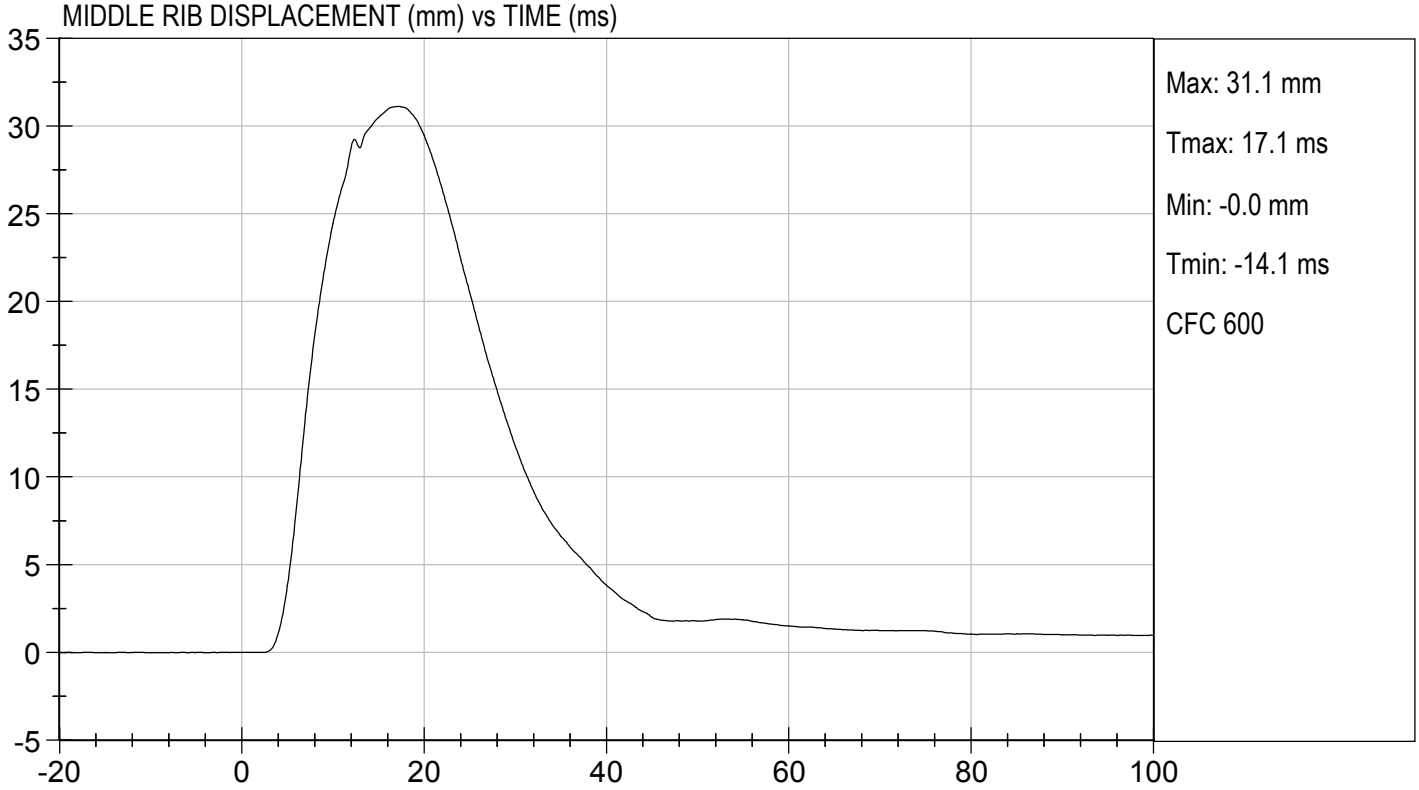
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

TEST DATE: 05/30/2019
TEST #: D191694

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



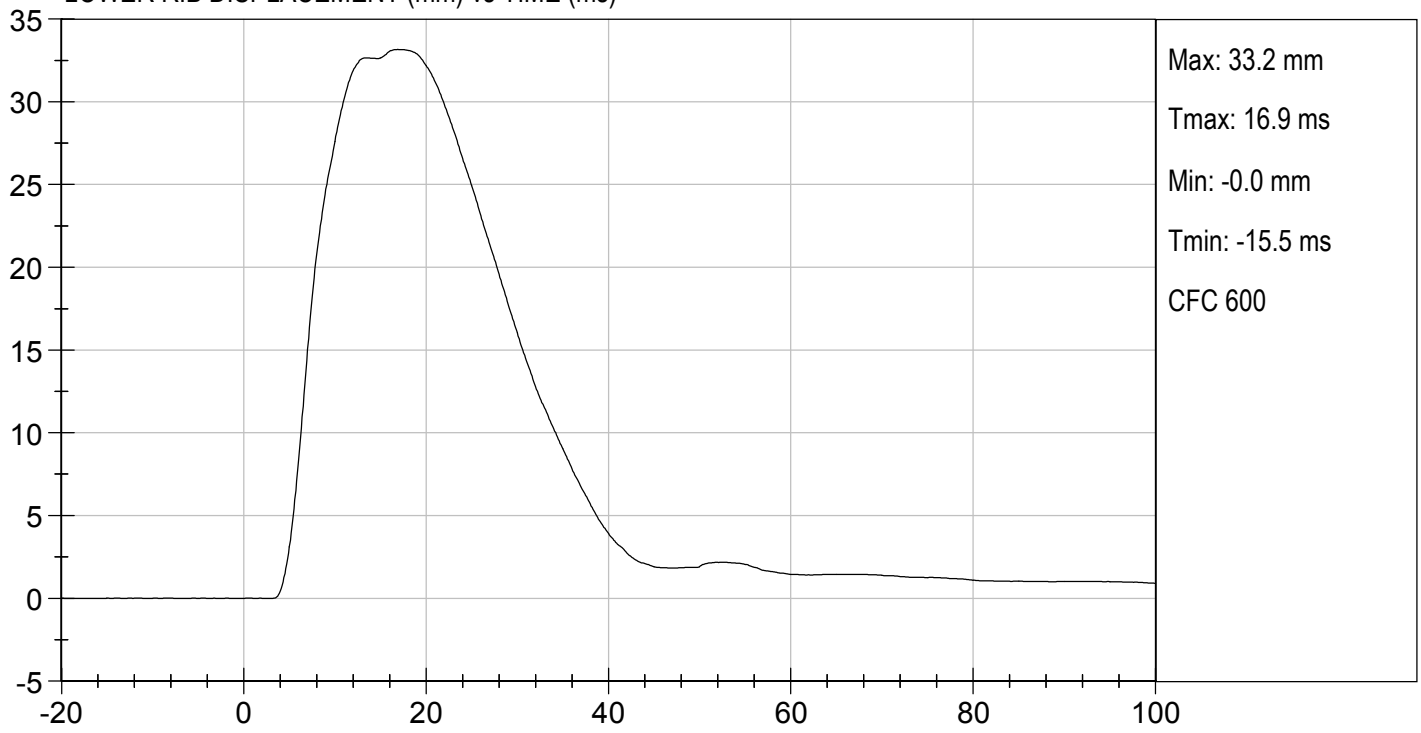

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



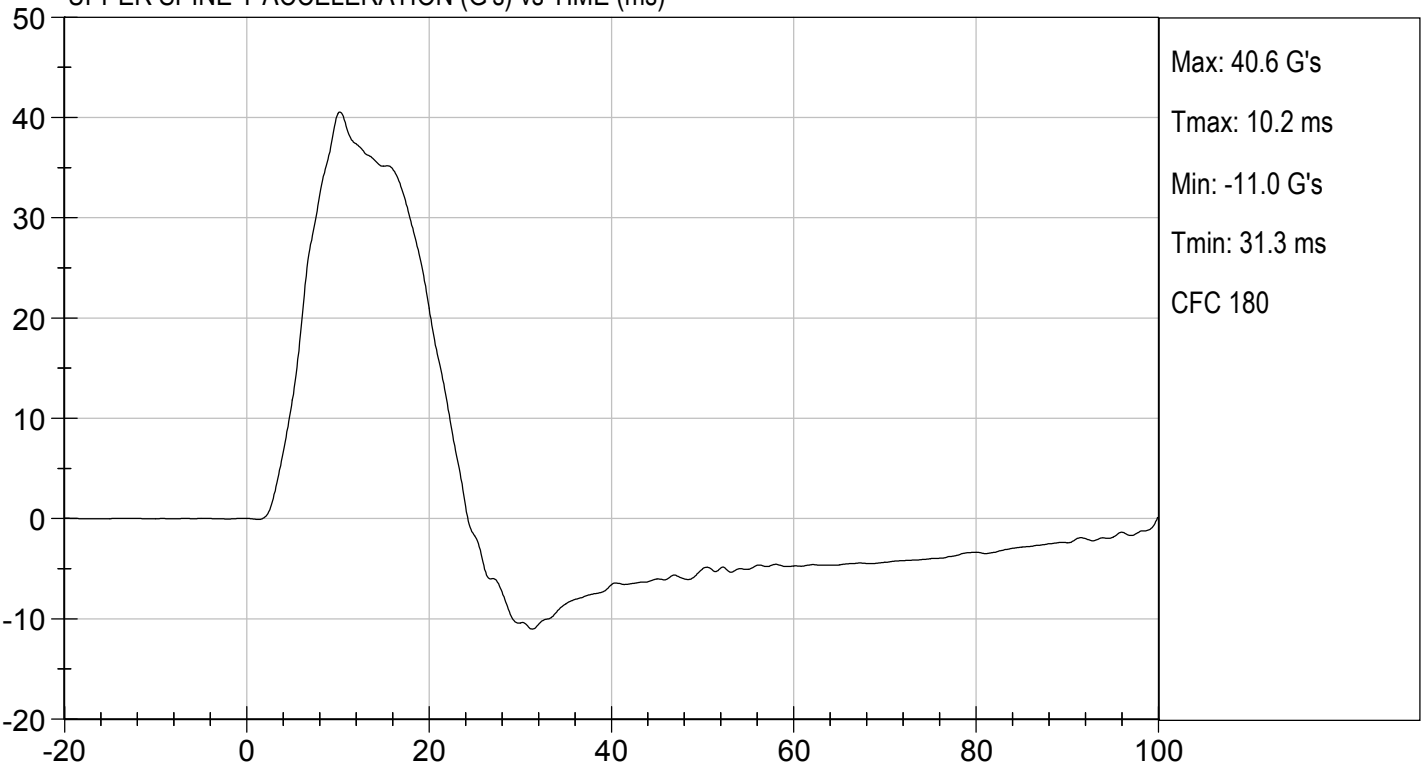
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

TEST DATE: 05/30/2019
TEST #: D191694

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



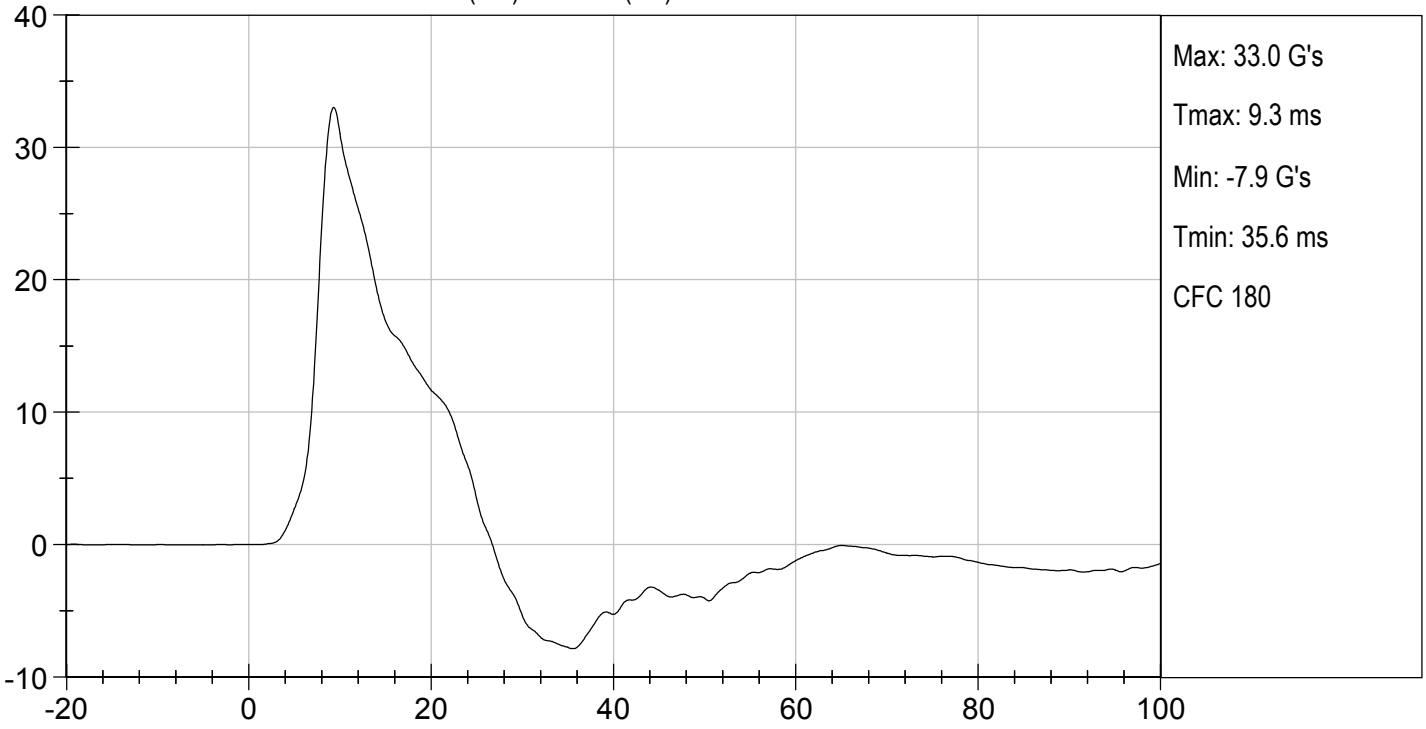

UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.30 ft/s, 6.80 m/s

TEST DATE: 05/30/2019
TEST #: D191694

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



**MGA RESEARCH CORPORATION**

**THORAX (WITHOUT ARM) IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D191695

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.34 | Pass |
| Maximum Probe Acceleration | G's | 14 to 18 | 15 | Pass |
| Upper Rib Displacement | mm | 32 to 40 | 38 | Pass |
| Middle Rib Displacement | mm | 39 to 45 | 41 | 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 |

Jacob D Taylor
Laboratory Technician

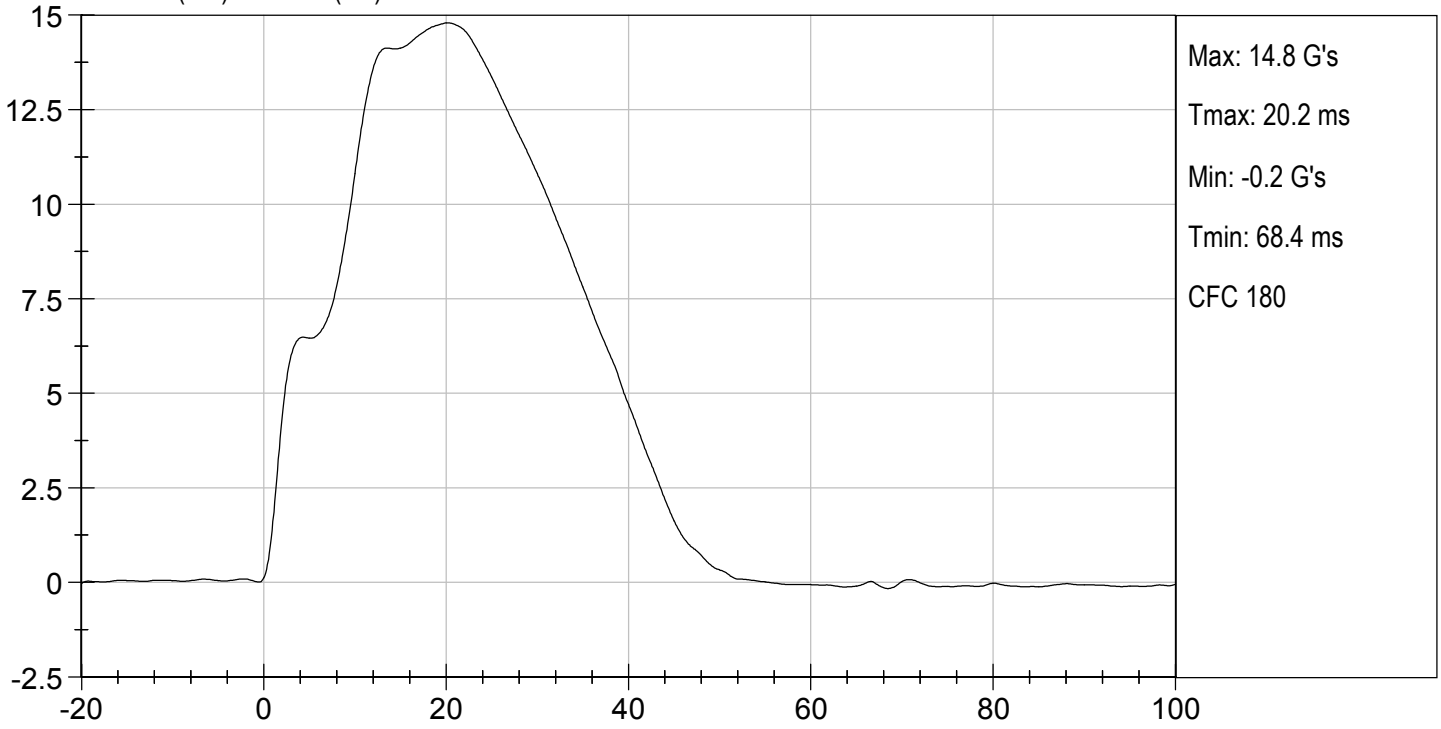
05/30/2019
Test Date

Approved By

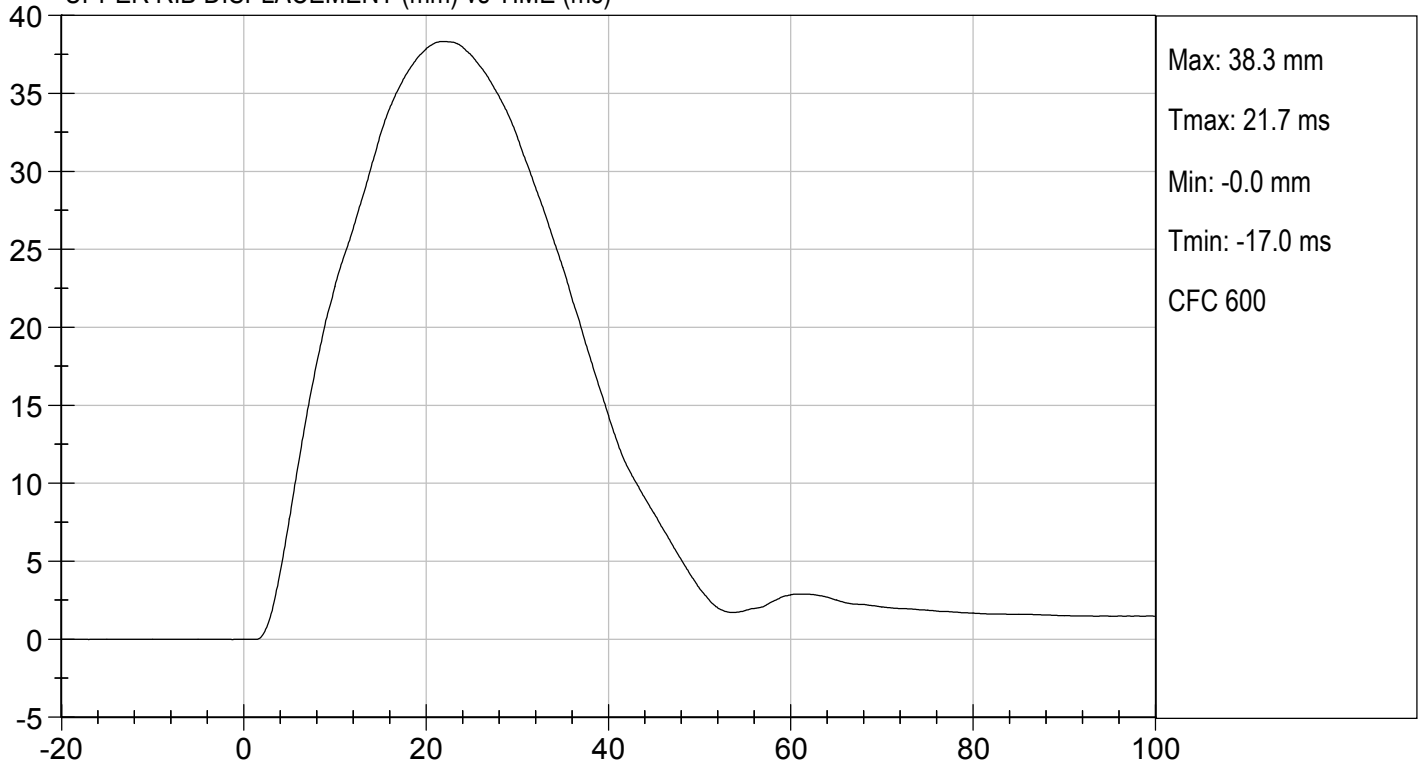
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 05/30/2019
TEST #: D191695

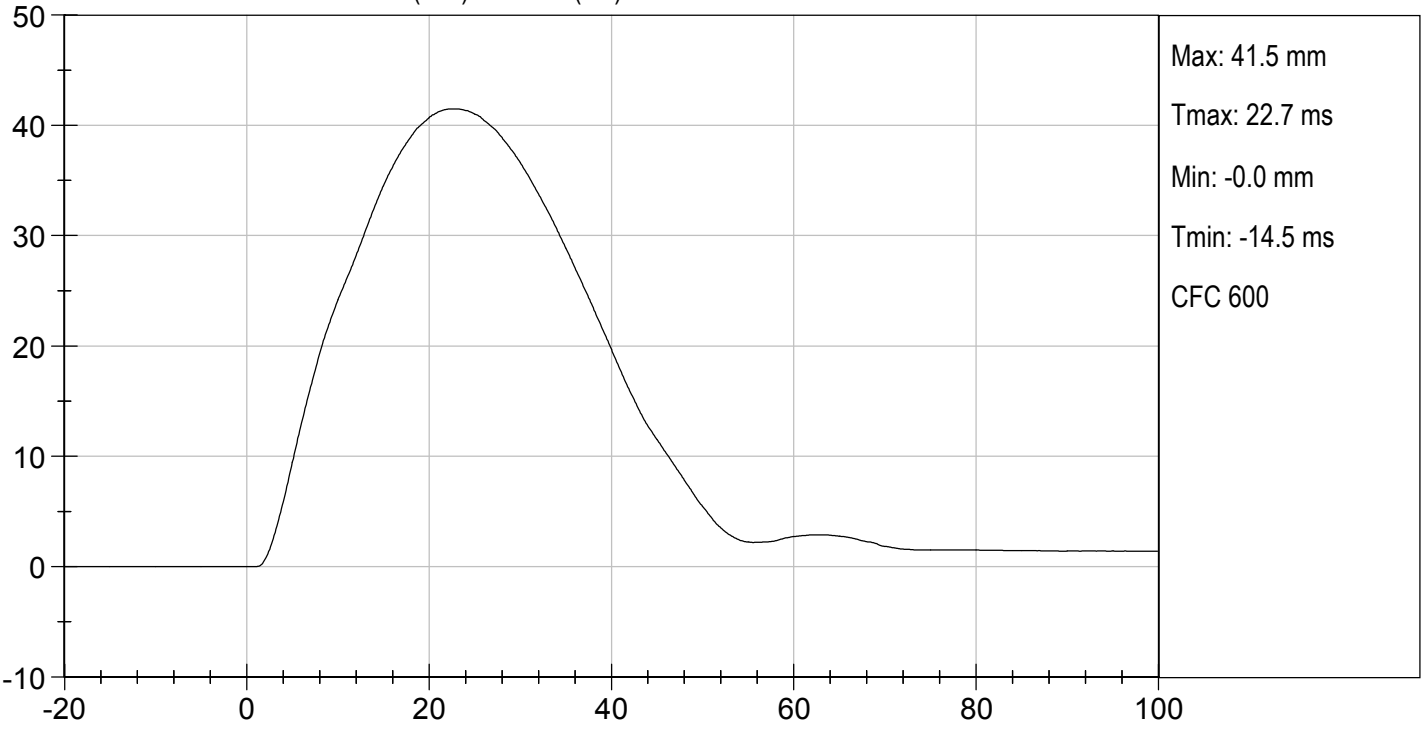
PROBE (G's) vs TIME (ms)



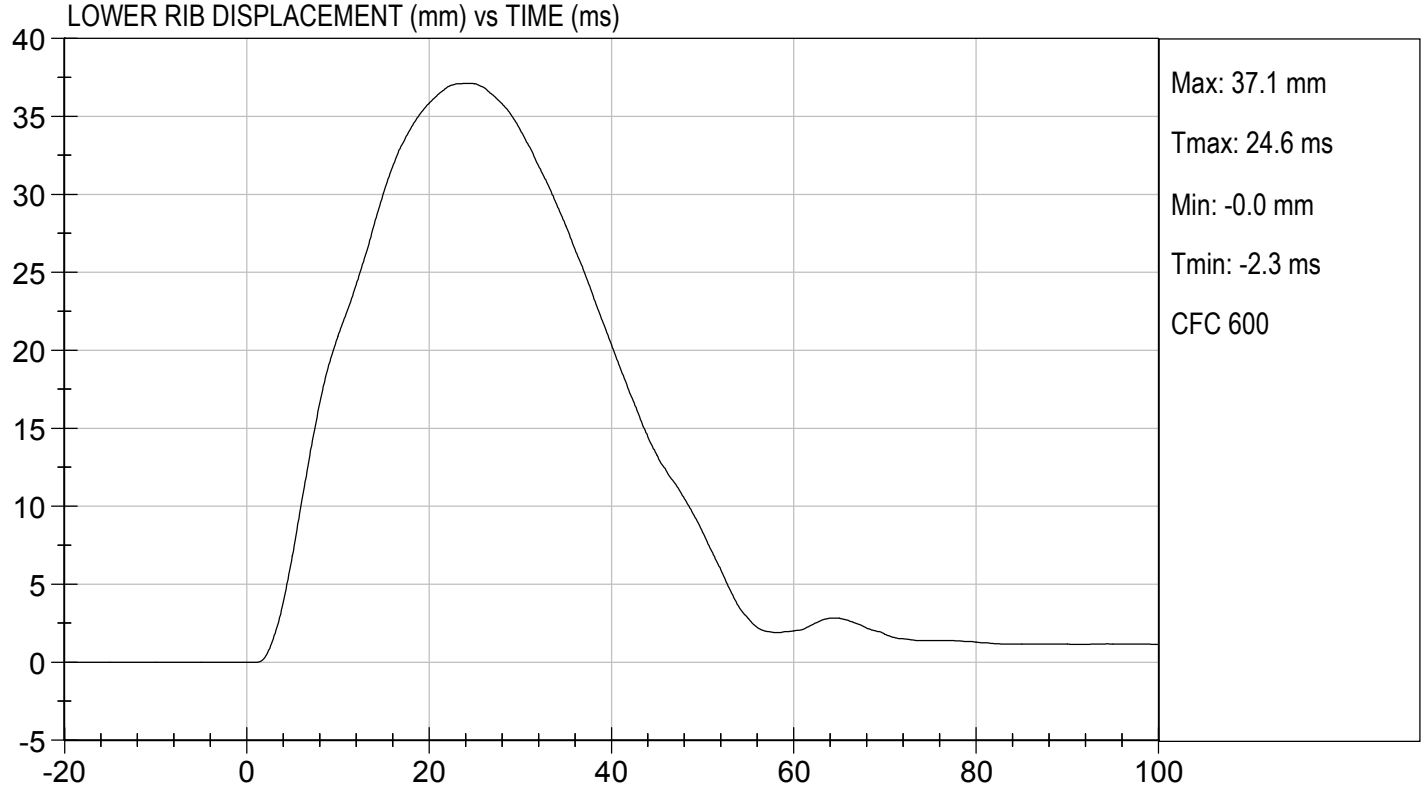

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



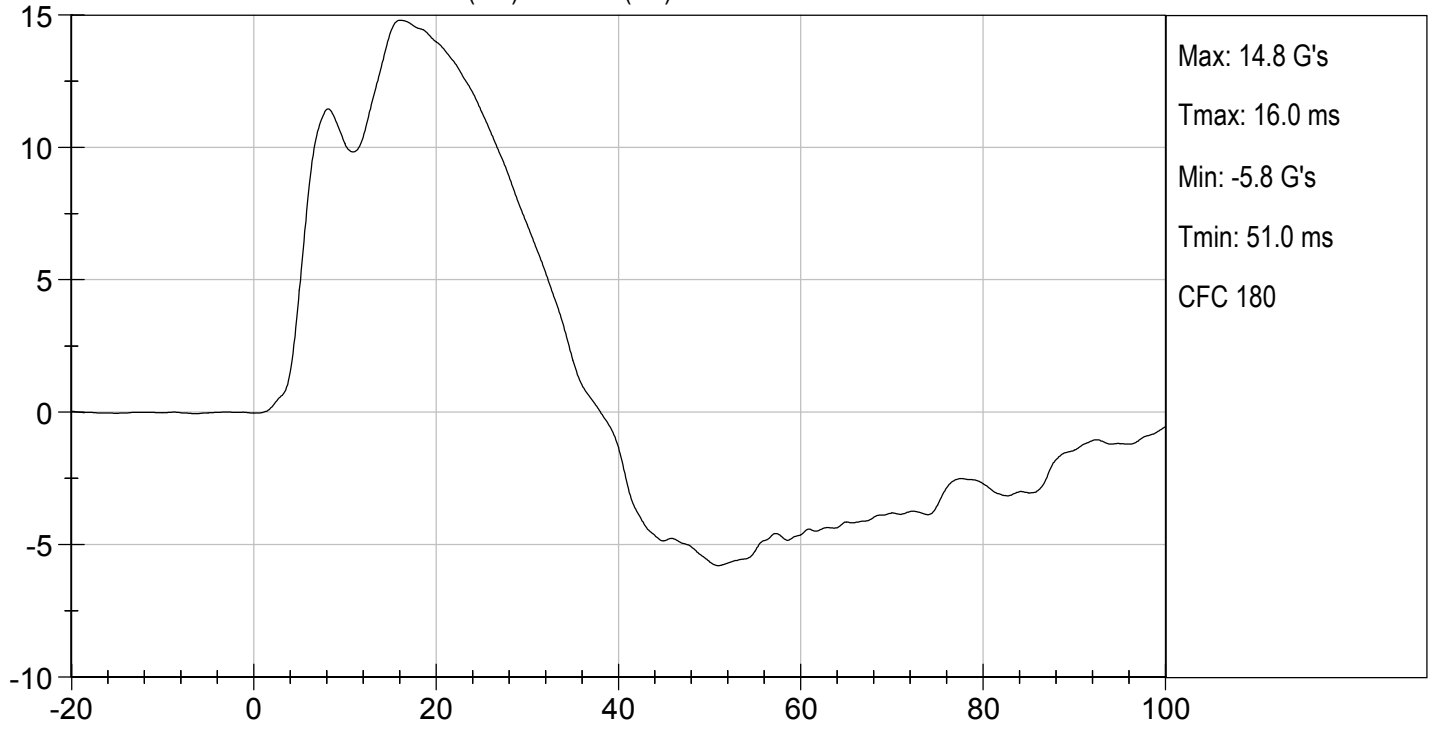

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



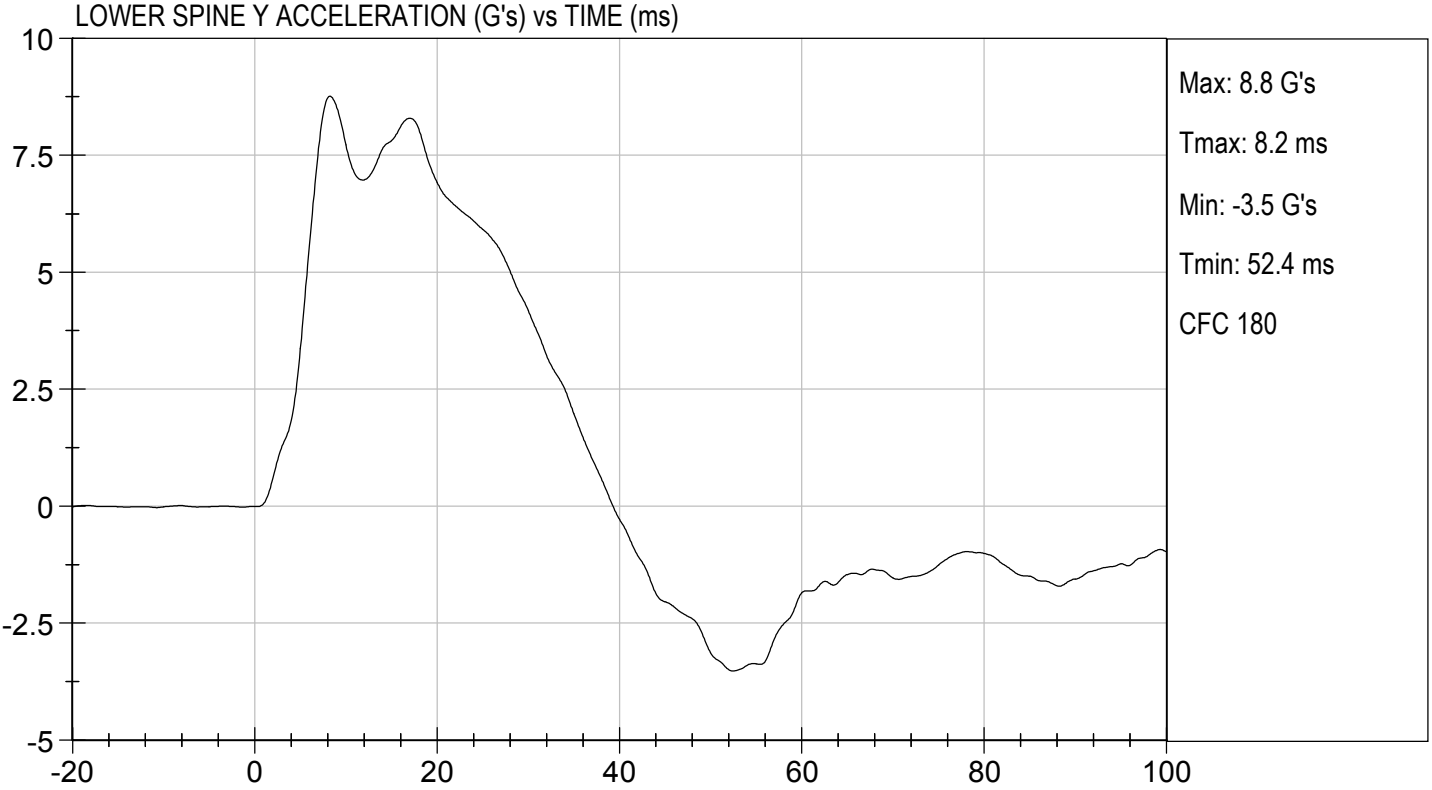
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 05/30/2019
TEST #: D191695

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:** D191696

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.34 | Pass |
| Maximum Probe Acceleration | G's | 12 to 16 | 14 | Pass |
| Upper Abdomen Rib Displacement | mm | 36 to 47 | 41 | Pass |
| Lower Abdomen Rib Displacement | mm | 33 to 44 | 37 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 9 to 14 | 12 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor

Laboratory Technician

05/30/2019

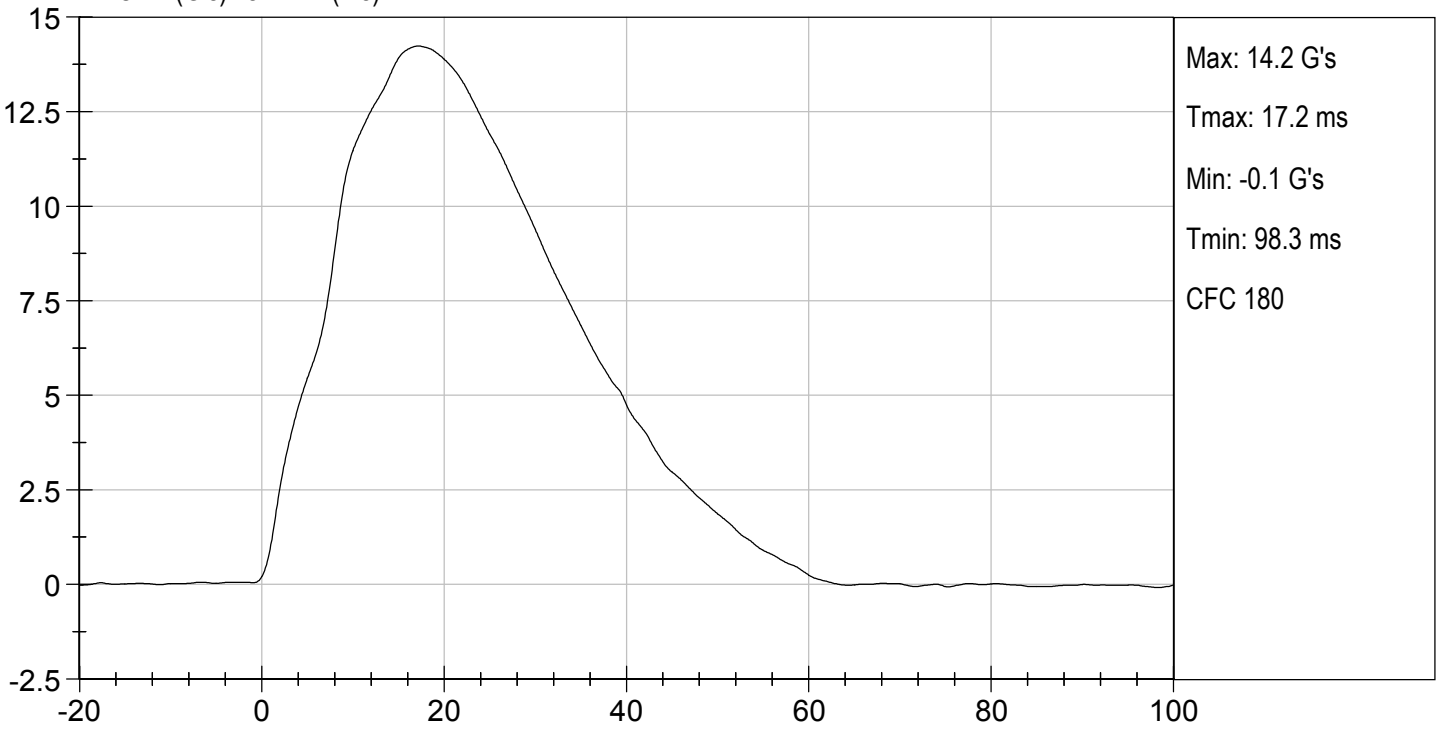
Test Date

Approved By

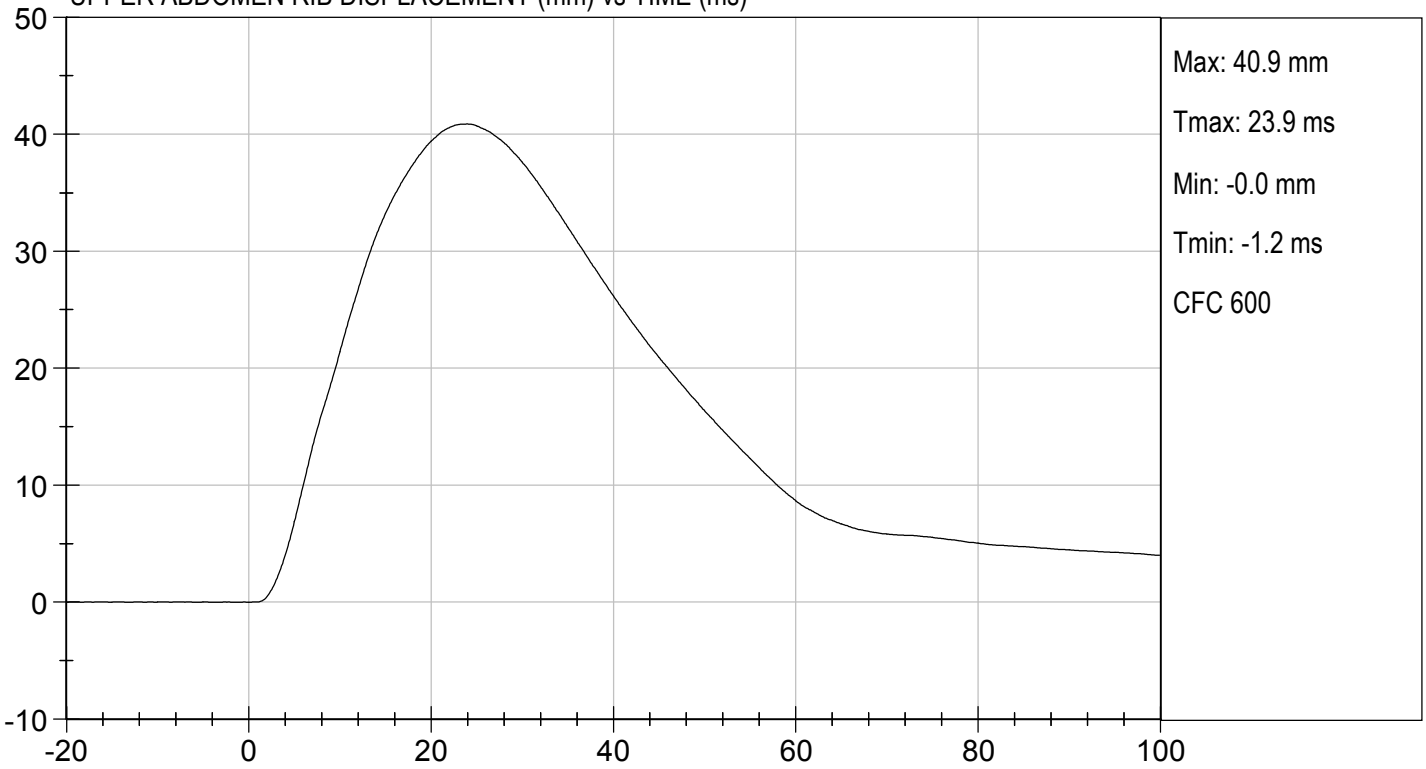
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 05/30/2019
TEST #: D191696

PROBE (G's) vs TIME (ms)



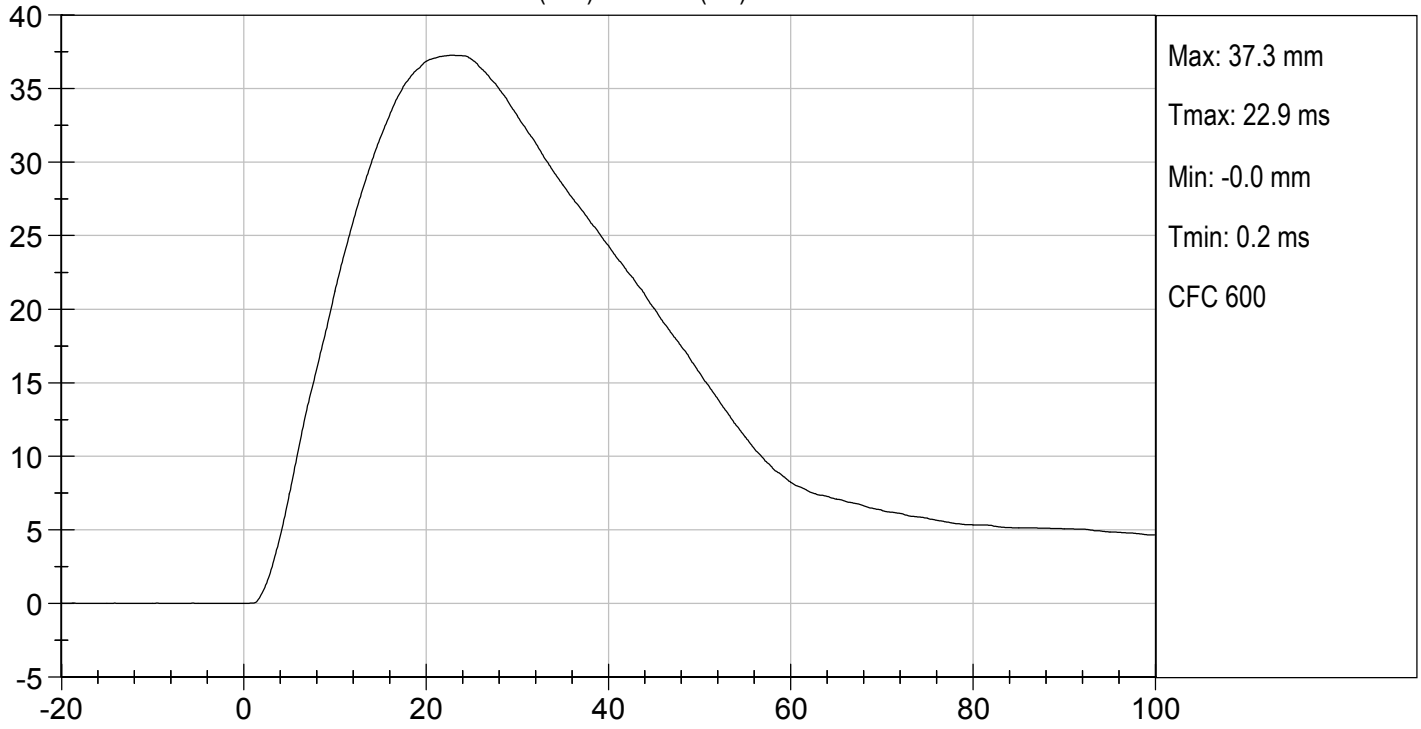

UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



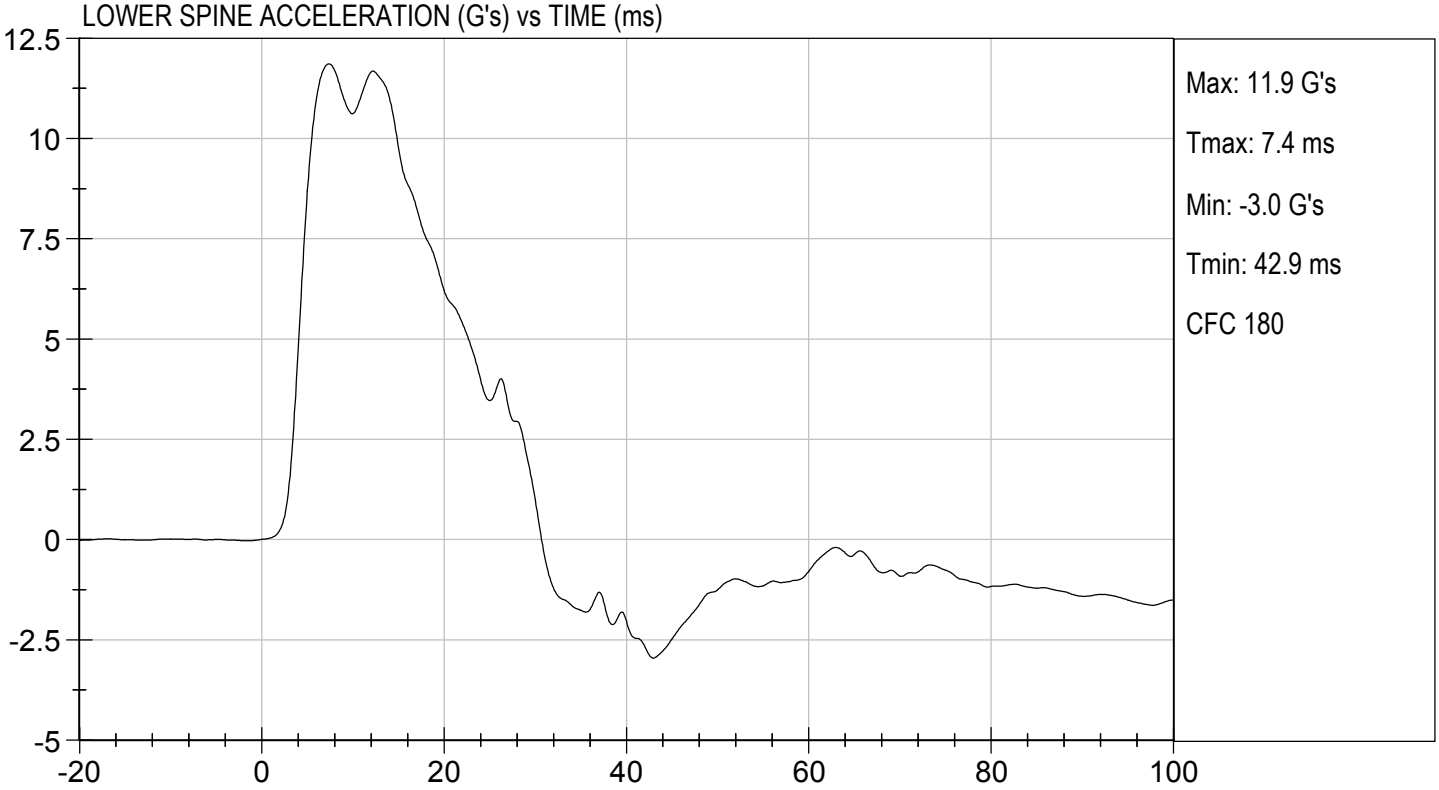
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 05/30/2019
TEST #: D191696

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:** D191697

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 6.60 to 6.80 | 6.60 | Pass |
| Maximum Probe Acceleration | G's | 38 to 47 | 43 | Pass |
| Pelvis Y Acceleration After 6 ms | G's | 34 to 42 | 37 | Pass |
| Peak Acetabulum Force | N | 3600 to 4300 | 4,018 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

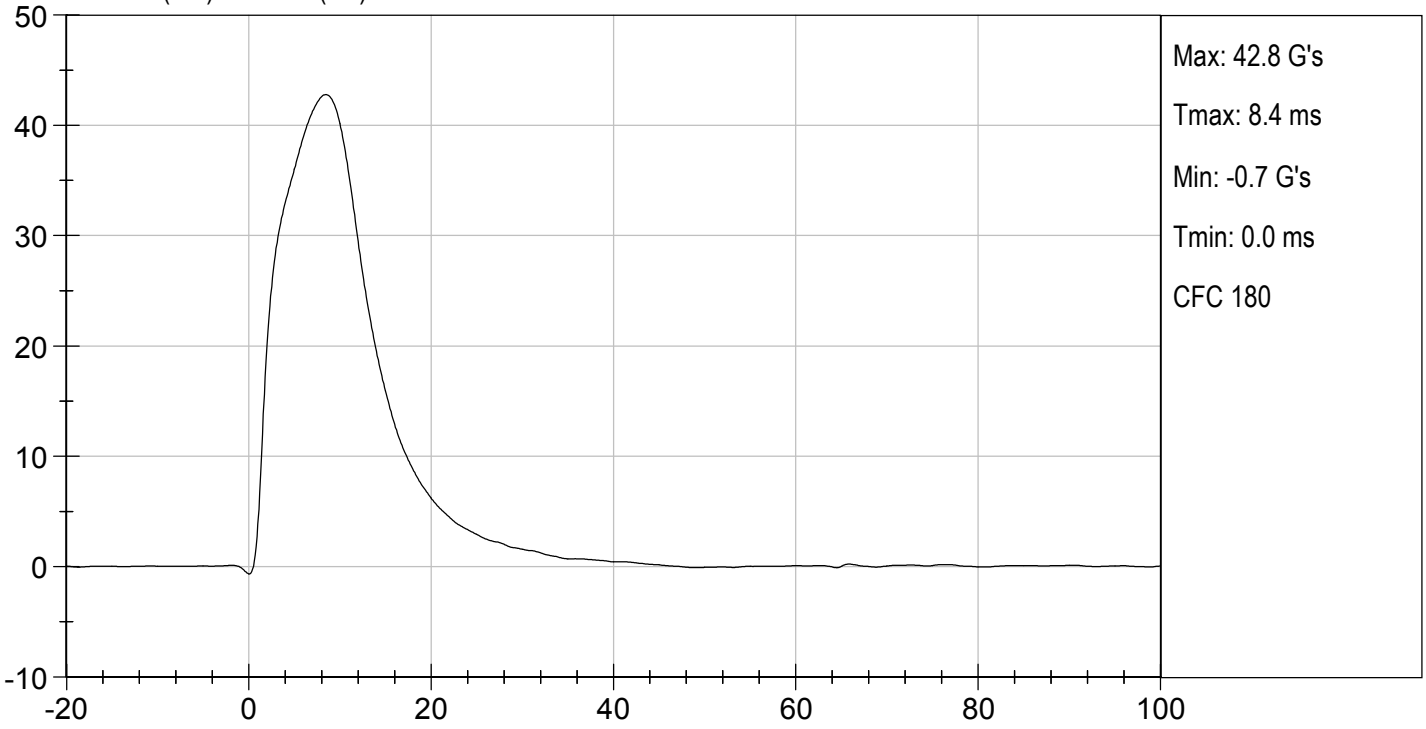
05/30/2019
Test Date

Approved By

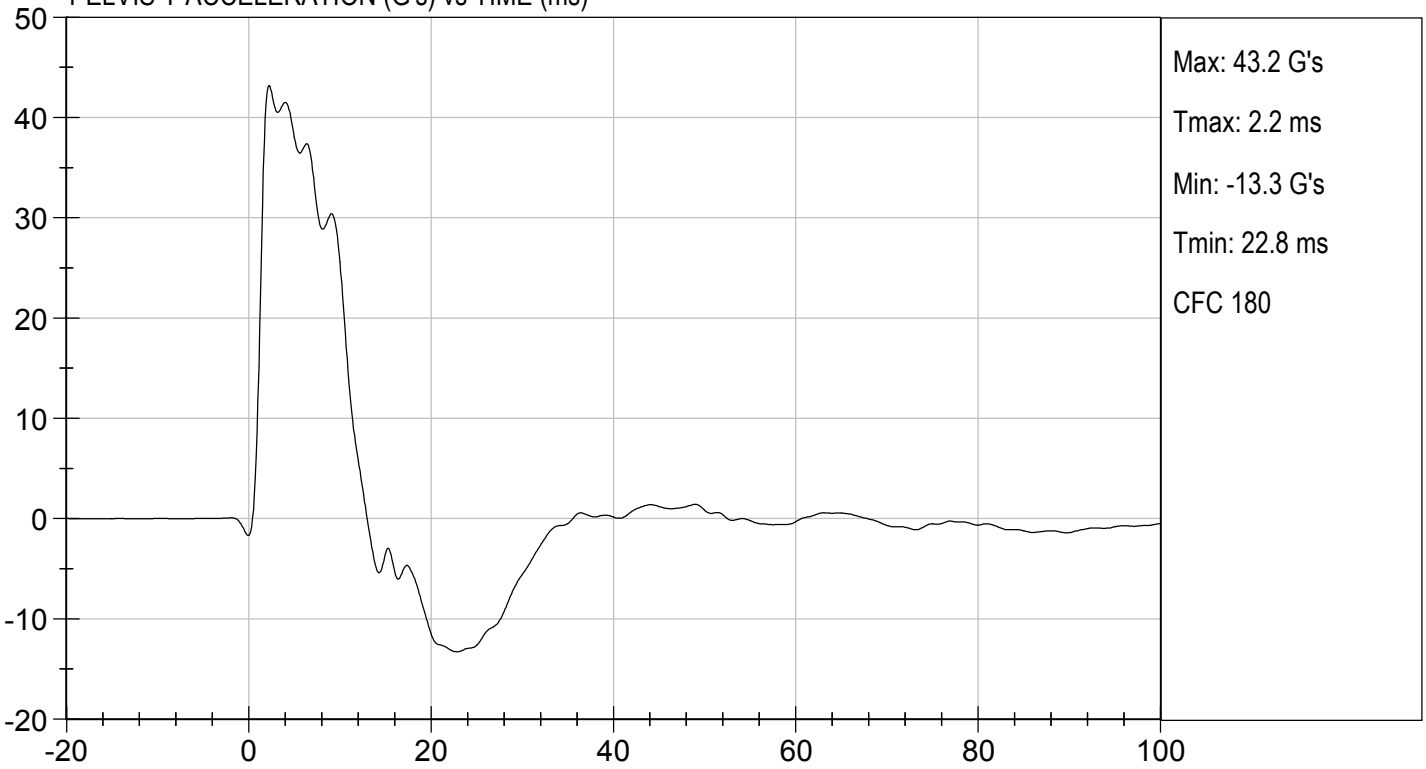
TEST DESC: PELVIS IMPACT
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 05/30/2019
TEST #: D191697

PROBE (G's) vs TIME (ms)



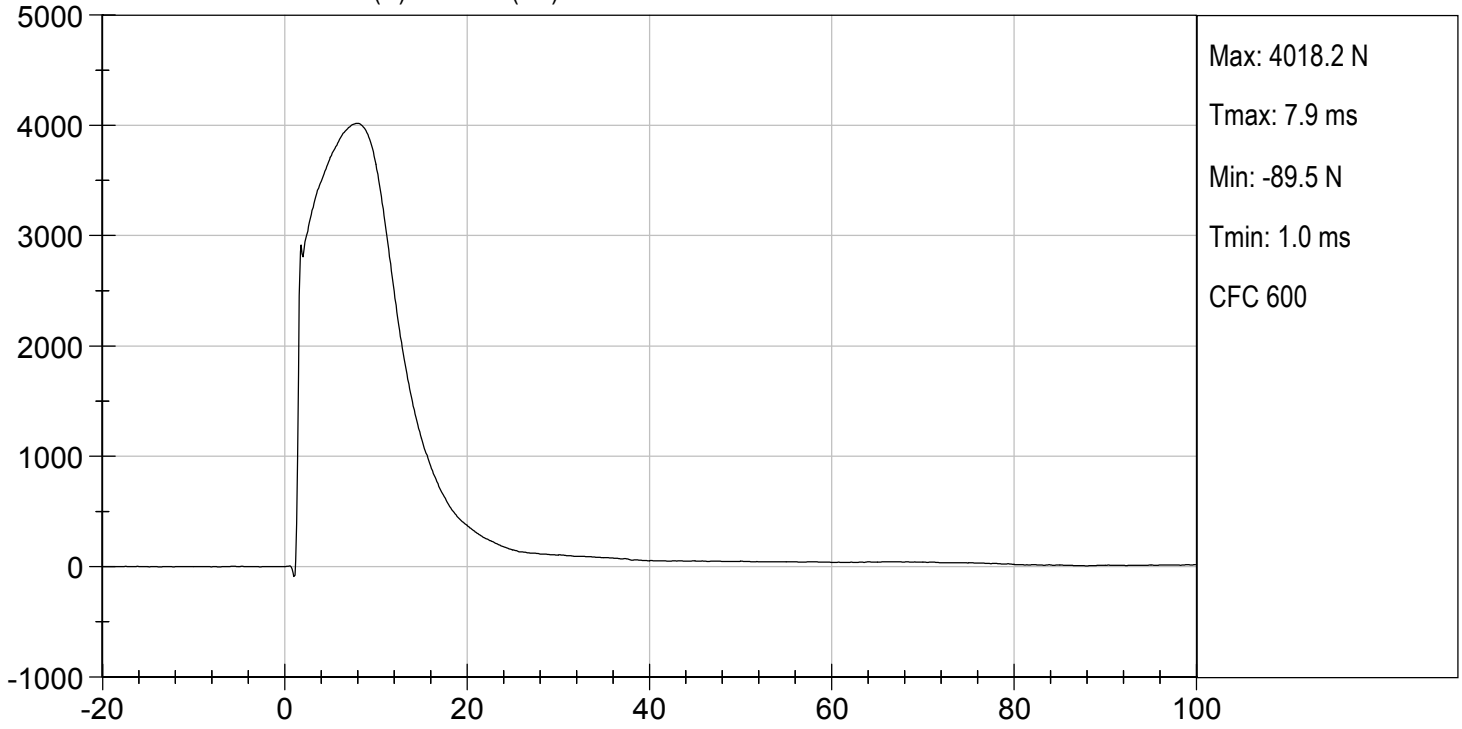

PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: PELVIS IMPACT
VELOCITY: 21.65 ft/s, 6.60 m/s

TEST DATE: 05/30/2019
TEST #: D191697

ACETABULUM FORCE (N) vs TIME (ms)



**MGA RESEARCH CORPORATION**

**ILIAC IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D191698

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.6 | Pass |
| Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.21 | Pass |
| Maximum Probe Acceleration | G's | 36 to 45 | 40 | Pass |
| Pelvis Y Acceleration | G's | 28 to 39 | 35 | Pass |
| Peak Pelvis Iliac Force | N | 4100 to 5100 | 4,628 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor

Laboratory Technician

05/30/2019

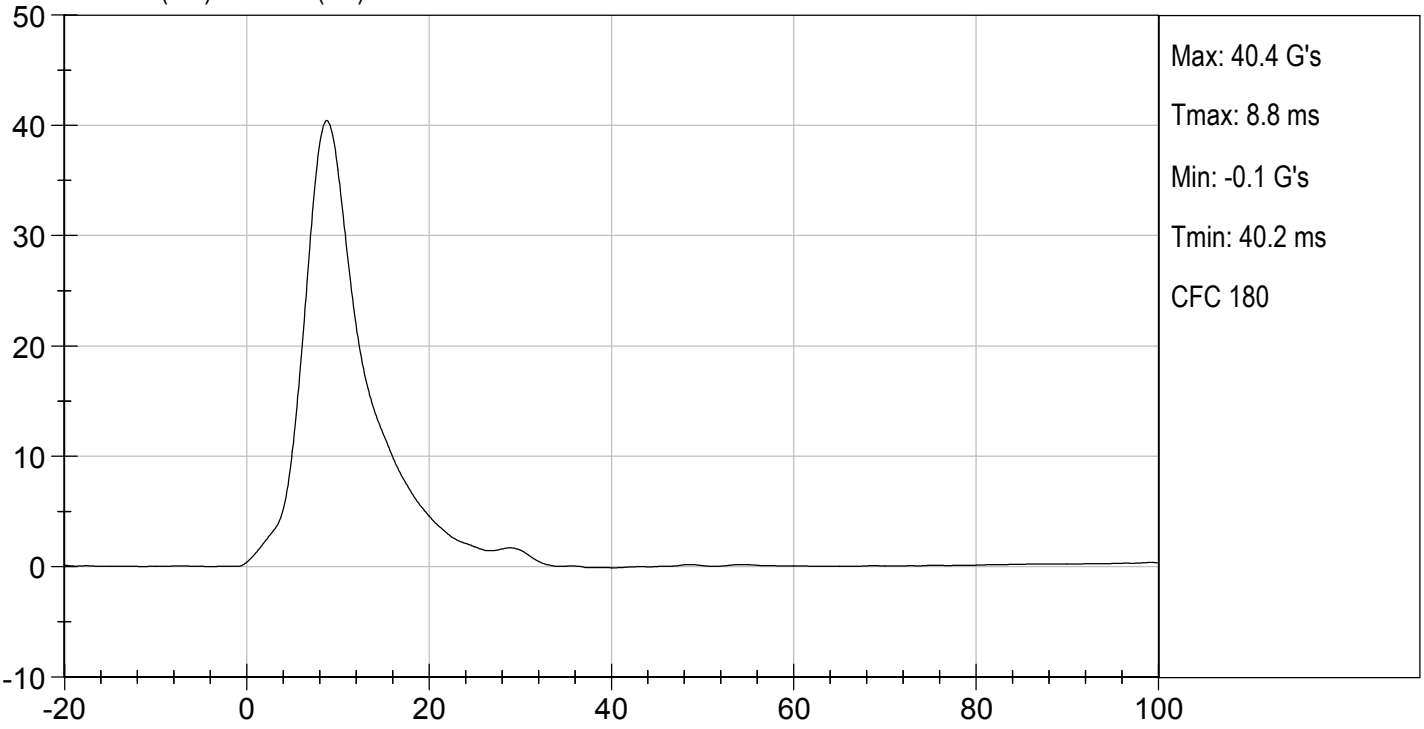
Test Date

Approved By

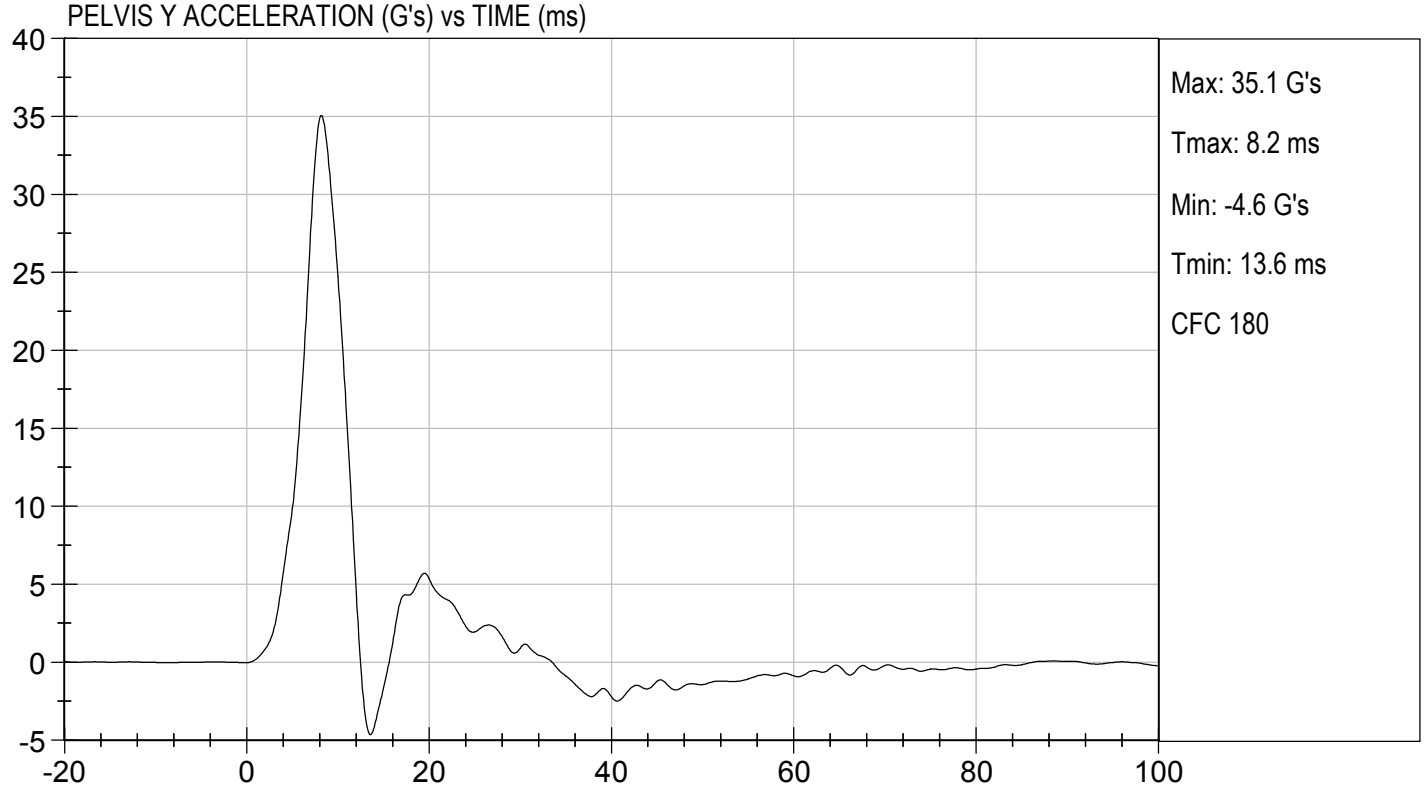
TEST DESC: ILLIAC
VELOCITY: 13.80 ft/s, 4.21 m/s

TEST DATE: 05/30/2019
TEST #: D191698

PROBE (G's) vs TIME (ms)

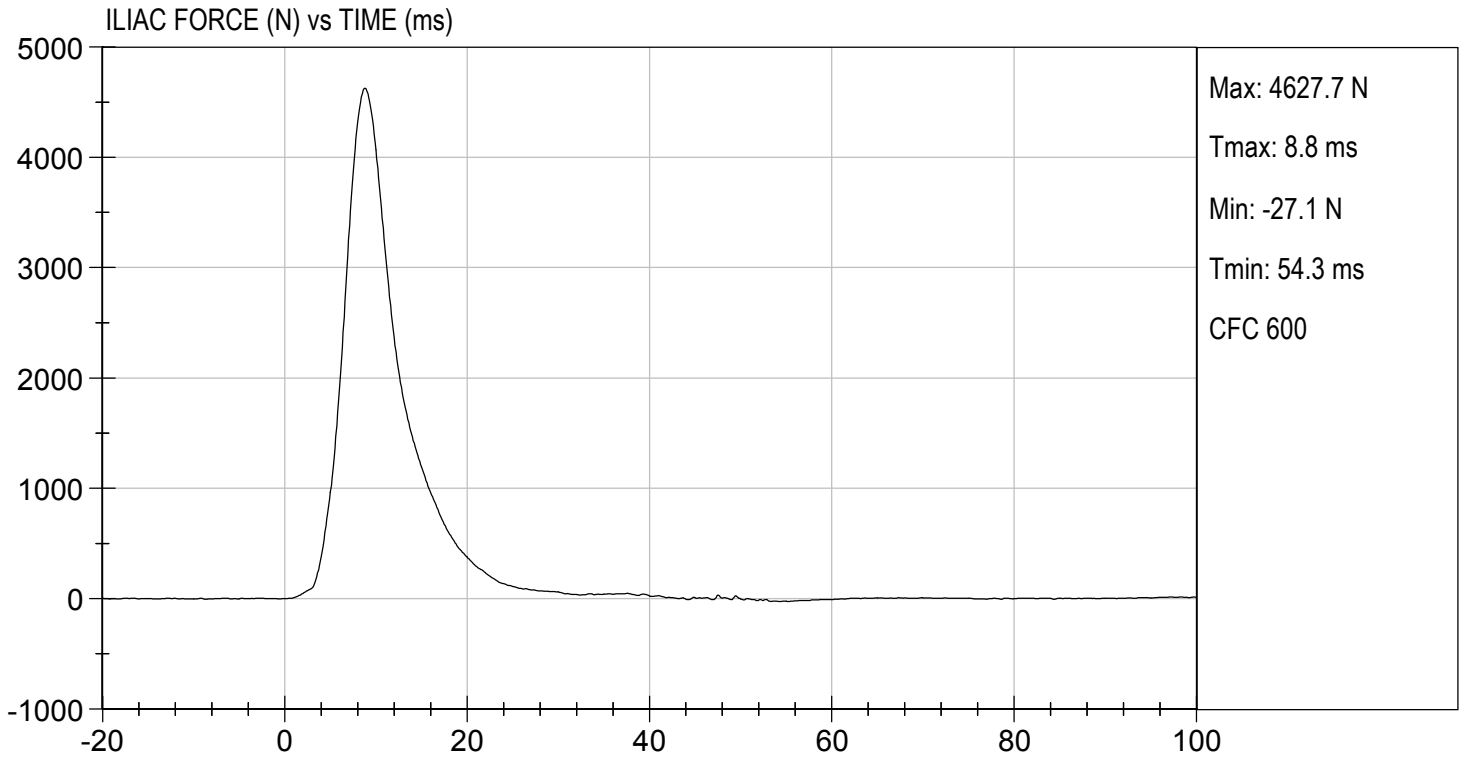



PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILLIAC
VELOCITY: 13.80 ft/s, 4.21 m/s

TEST DATE: 05/30/2019
TEST #: D191698



**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:** D192211

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 45 | Pass |
| Peak Resultant Acceleration | G's | 115 to 137 | 123 | Pass |
| Peak Longitudinal Acceleration | G's | +/- 15 | 5.4 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | <15% | Yes | Pass |
| | | Overall Test Results | | Pass |

Danielle Redenbaugh
Laboratory Technician

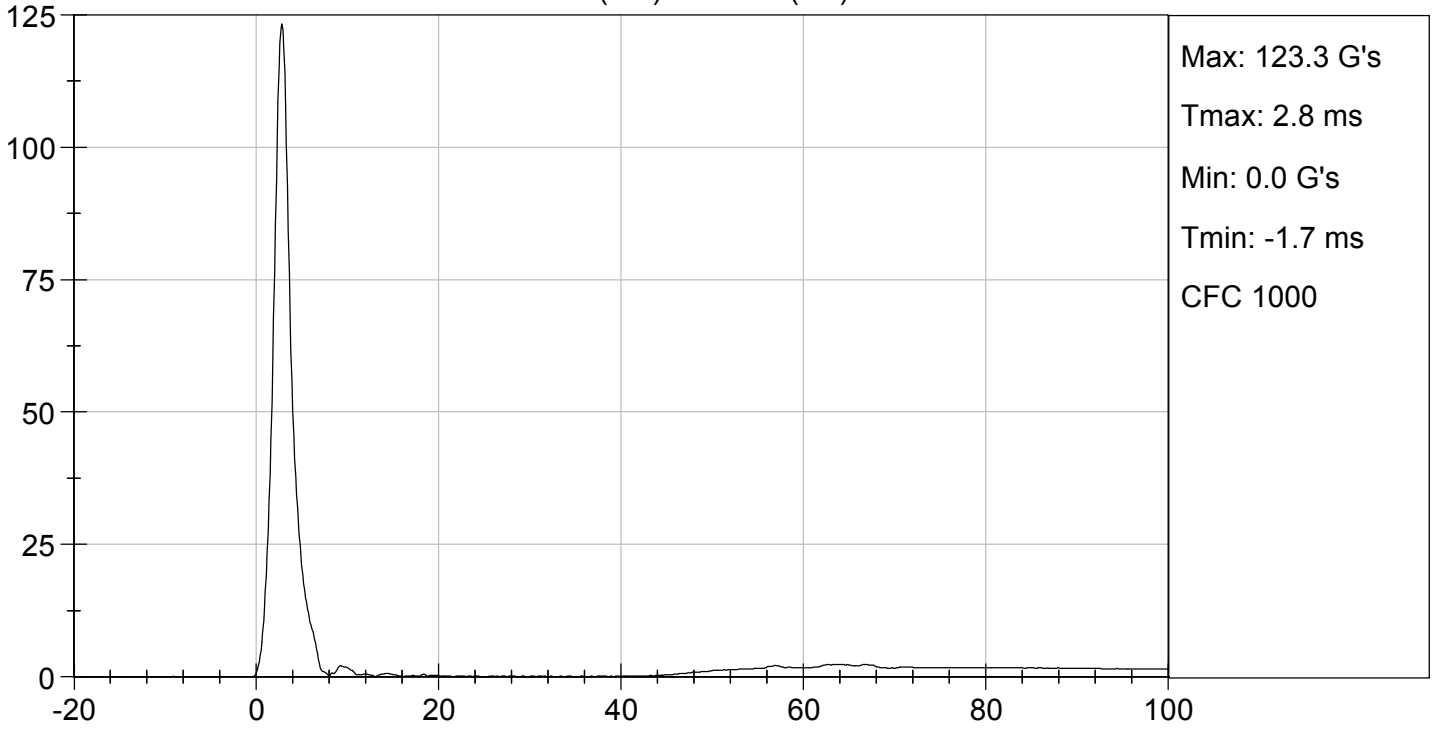
07/18/2019
Test Date

Approved By

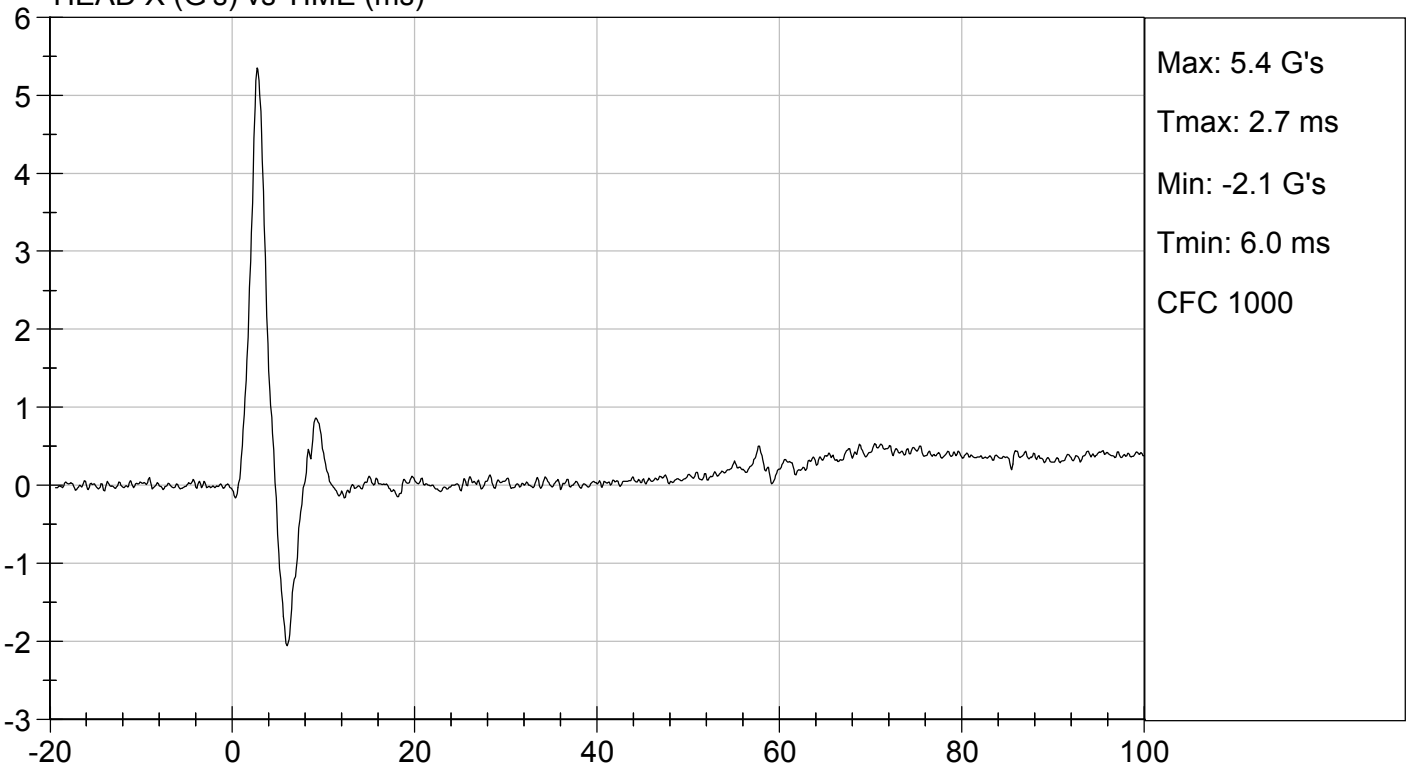
TEST DESC: HEAD DROP

TEST DATE: 07/18/2019
TEST #: D192211

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

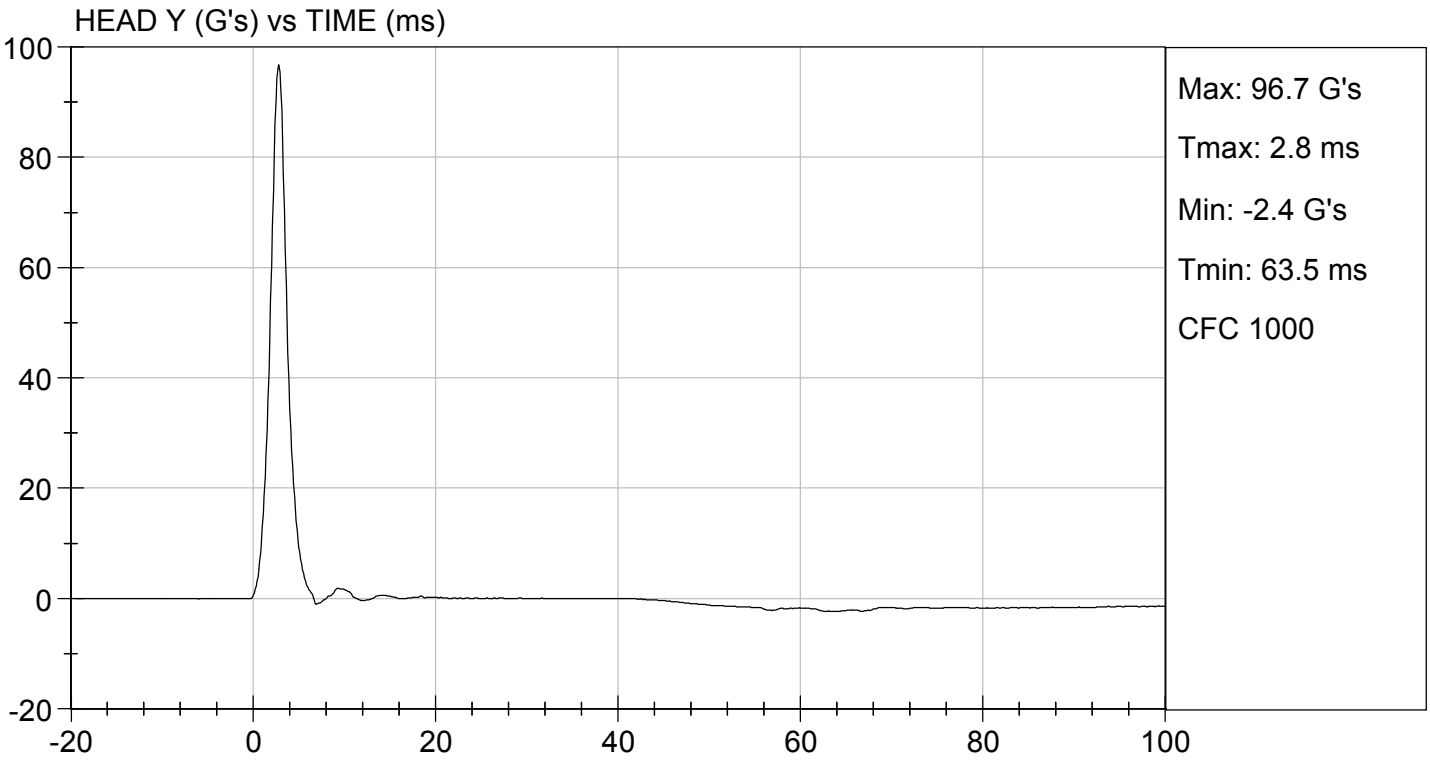


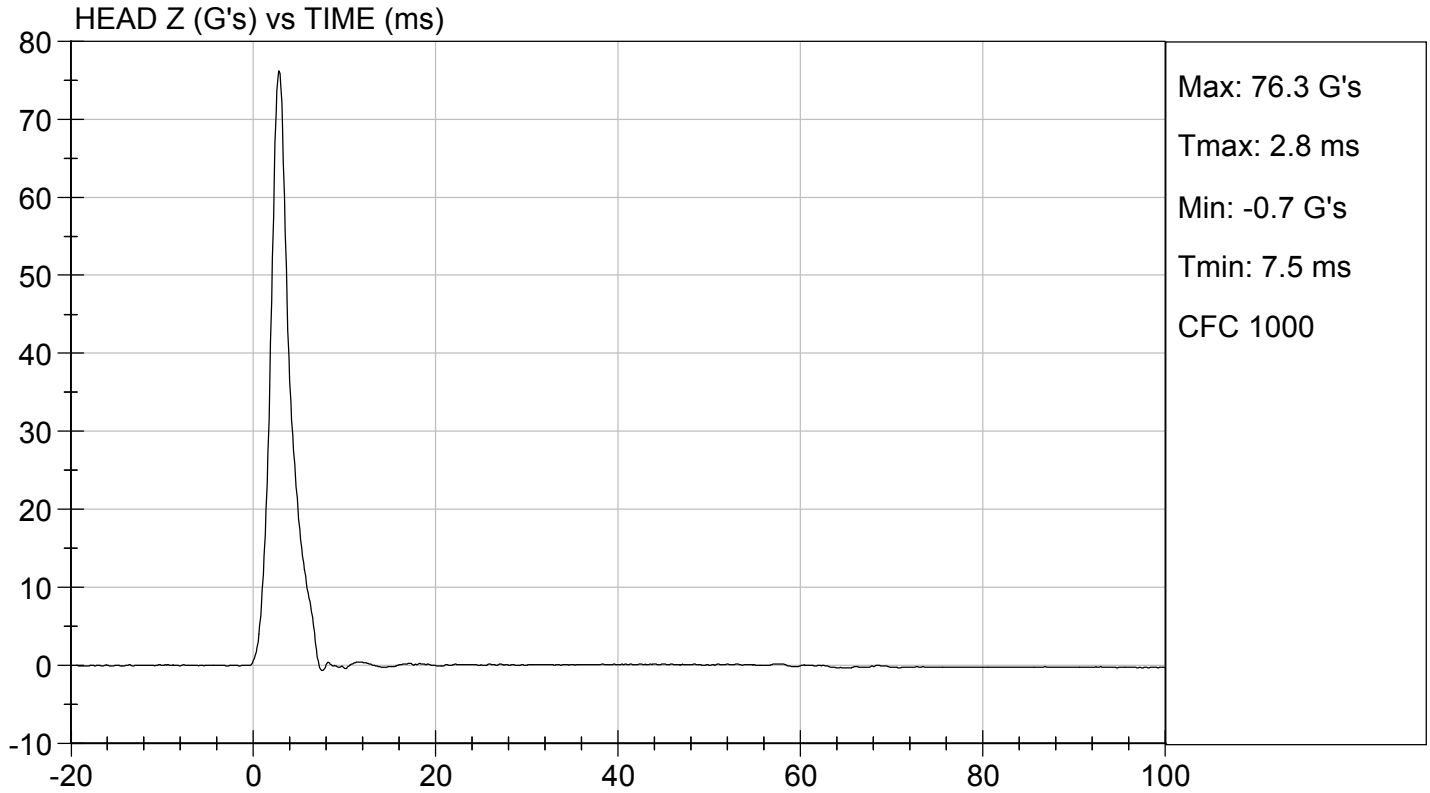

HEAD X (G's) vs TIME (ms)



TEST DESC: HEAD DROP

TEST DATE: 07/18/2019
TEST #: D192211



**MGA RESEARCH CORPORATION**

**LATERAL NECK PENDULUM TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D192212

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|---|
| Temperature | | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Humidity | | % | 10 to 70 | 45 | Pass |
| Impact Velocity | | m/s | 5.51 to 5.63 | 5.61 | Pass |
| Pendulum Velocity | 10 ms | m/s | 2.20 to 2.80 | 2.25 | Pass |
| | 15 ms | m/s | 3.30 to 4.10 | 3.31 | Pass |
| | 20 ms | m/s | 4.40 to 5.40 | 4.69 | Pass |
| | 25 ms | m/s | 5.40 to 6.10 | 5.65 | Pass |
| | 25-100 ms | m/s | 5.50 to 6.20 | 5.66 | Pass |
| Maximum D-Plane Rotation | | deg | 71 to 81 | 76 | Pass |
| Time of Maximum D-Plane Rotation | | ms | 50 to 70 | 64 | Pass |
| Maximum Occipital Condyle Moment | | Nm | -44 to -36 | -37 | Pass |
| Time of Moment Decay to 0 Nm | | ms | 102 to 126 | 112 | Pass |
| | | | Overall Test Results | | Pass |

Danielle Redinbaugh

Laboratory Technician

07/18/2019

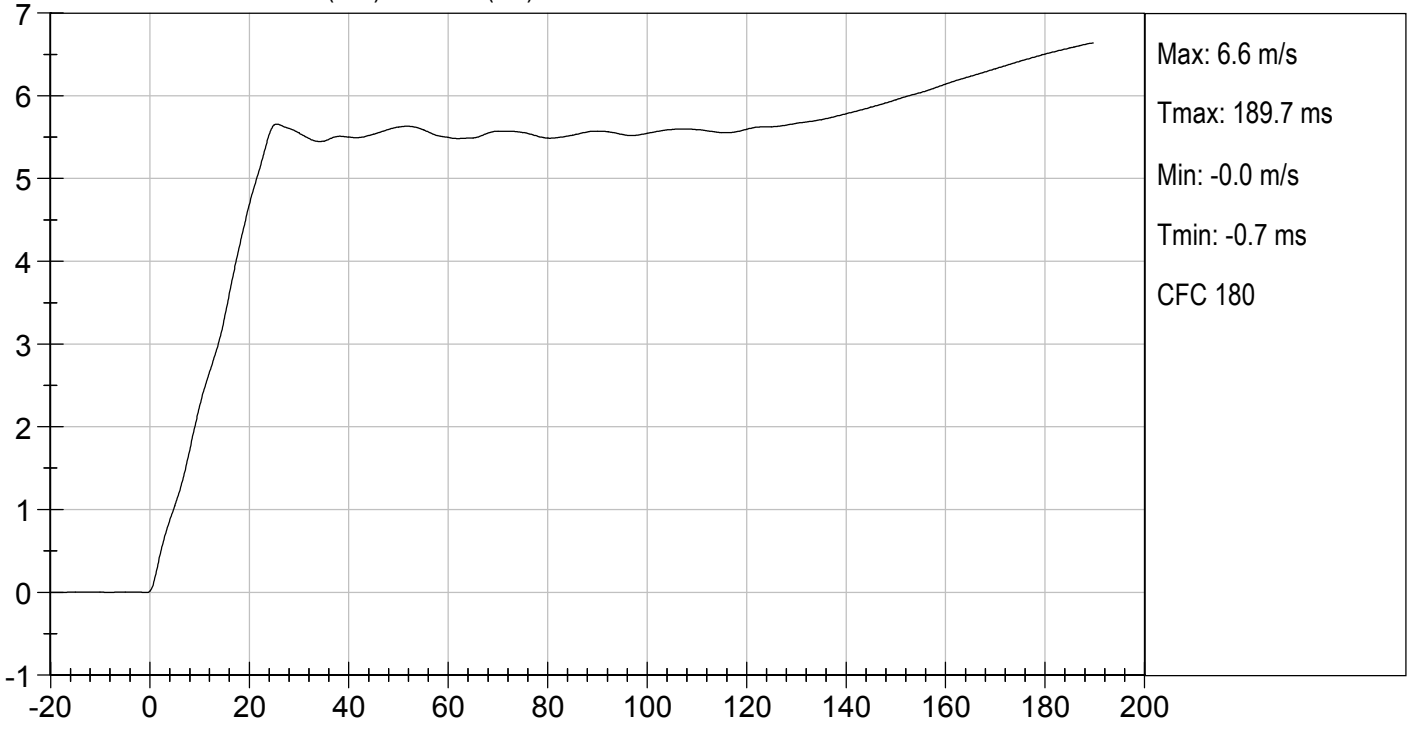
Test Date

Approved By

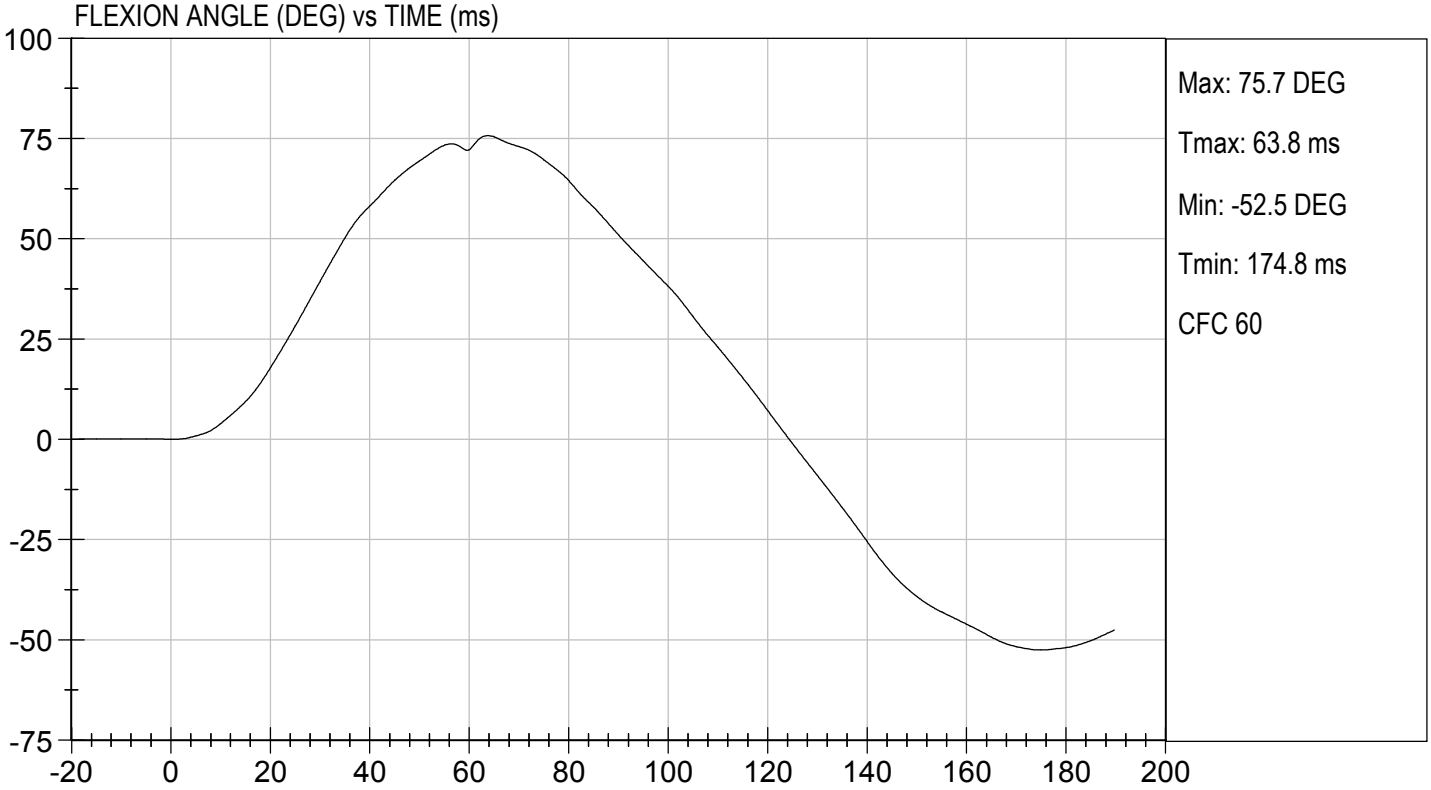
TEST DESC: NECK BENDING
VELOCITY: 18.40 ft/s, 5.61 m/s

TEST DATE: 07/18/2019
TEST #: D192212

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

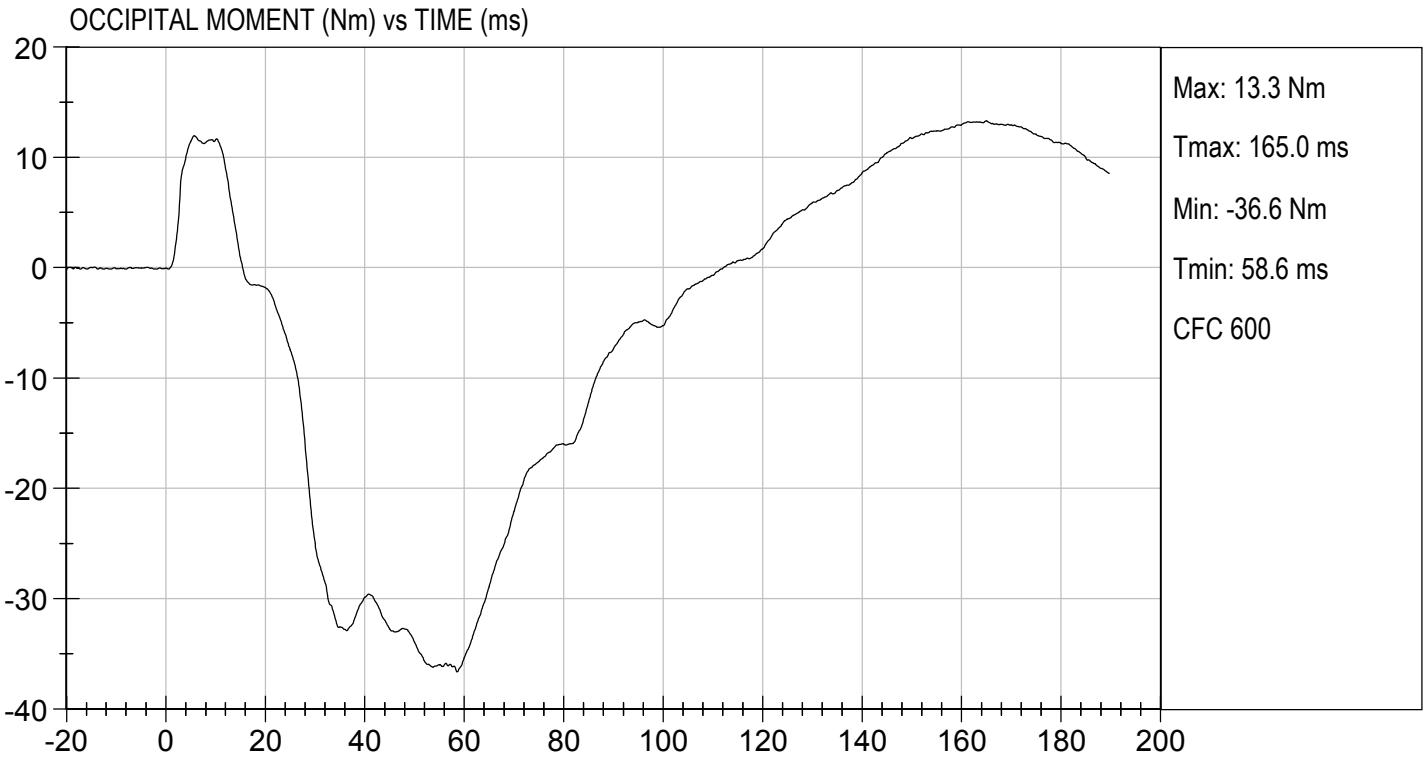



FLEXION ANGLE (DEG) vs TIME (ms)



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

TEST DATE: 07/18/2019
TEST #: D192212



**MGA RESEARCH CORPORATION**

**SHOULDER IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test ID:** D192213

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.3 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.34 | Pass |
| Maximum Probe Acceleration | G's | 13 to 18 | 14 | Pass |
| Shoulder Displacement | mm | 28 to 37 | 28 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 17 to 22 | 20 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

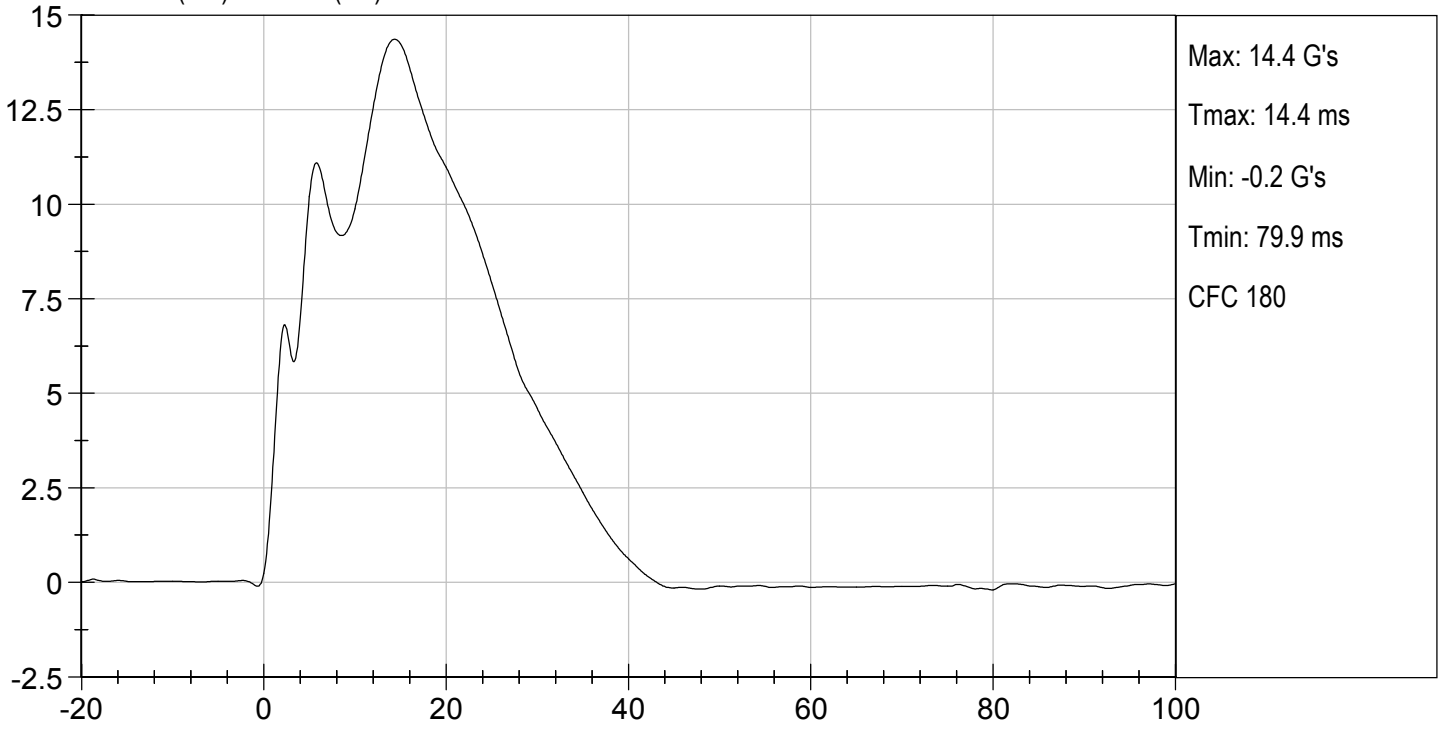
07/19/2019
Test Date

Approved By

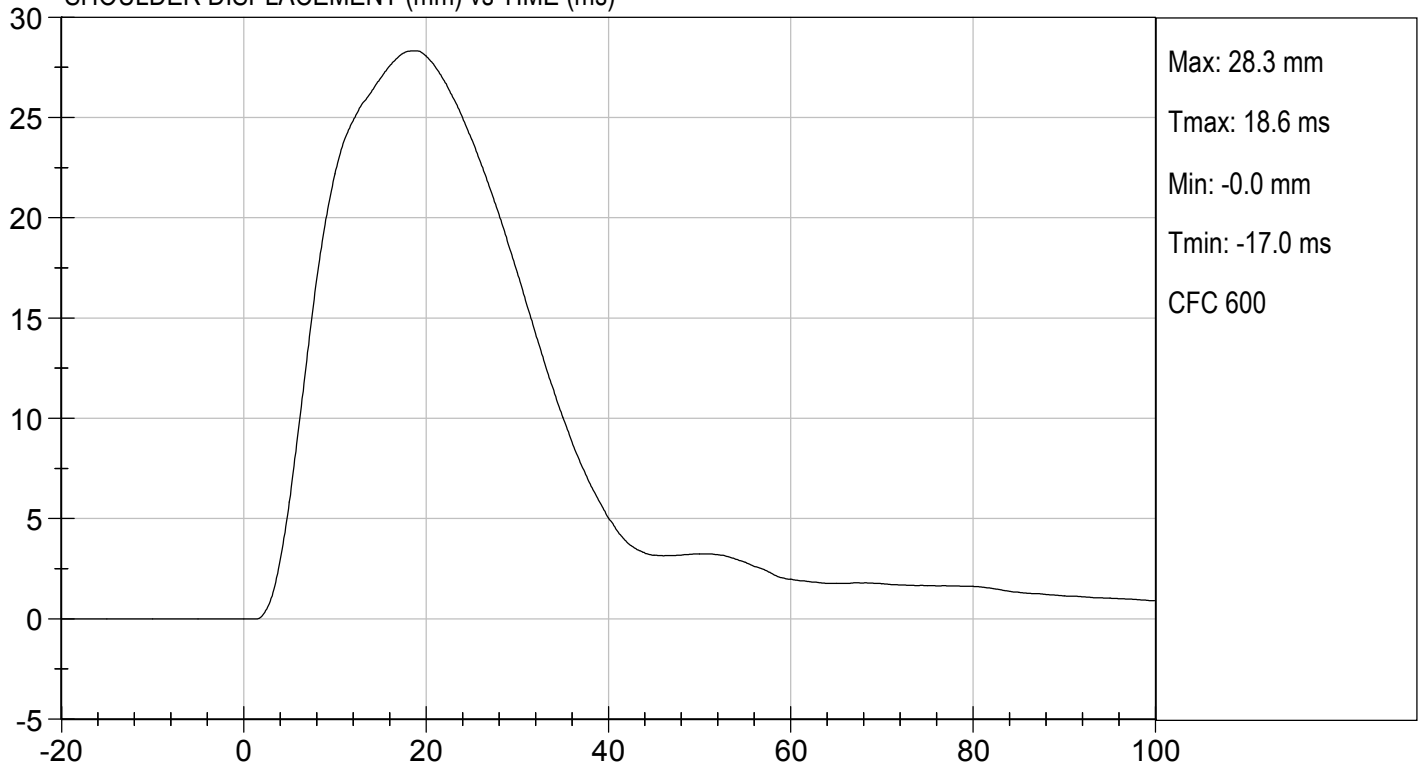
TEST DESC: SHOULDER IMPACT
VELOCITY: 14.25 ft/s, 4.34 m/s

TEST DATE: 07/19/2019
TEST #: D192213

PROBE (G's) vs TIME (ms)

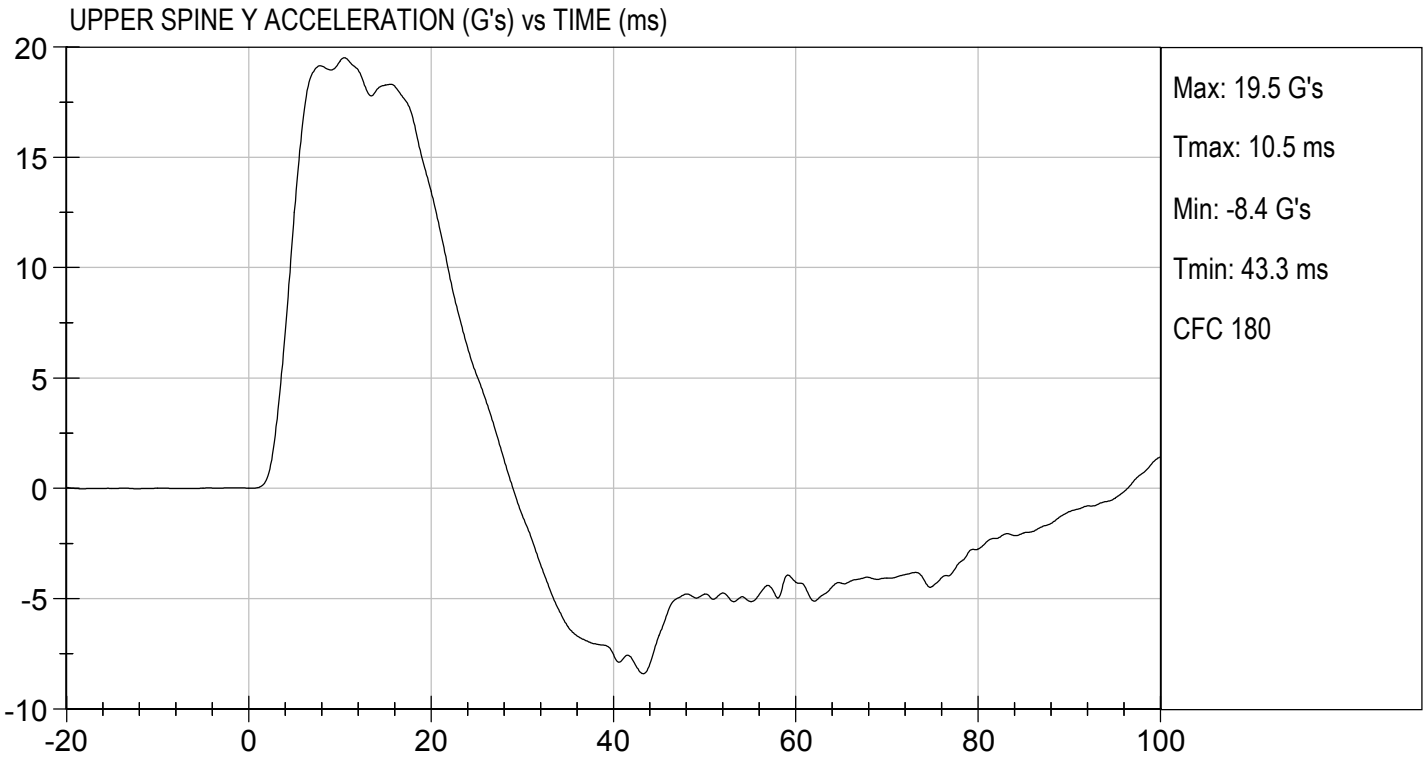



SHOULDER DISPLACEMENT (mm) vs TIME (ms)



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

TEST DATE: 07/19/2019
TEST #: D192213



**MGA RESEARCH CORPORATION**

**THORAX (WITH ARM) IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D192214

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.3 | Pass |
| Humidity | % | 10 to 70 | 48 | 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 | 33 | Pass |
| Upper Rib Displacement | mm | 25 to 32 | 27 | Pass |
| Middle Rib Displacement | mm | 30 to 36 | 32 | Pass |
| Lower Rib Displacement | mm | 32 to 38 | 34 | Pass |
| Upper Spine (T1) Y Acceleration | G's | 34 to 43 | 40 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 29 to 37 | 33 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor
Laboratory Technician

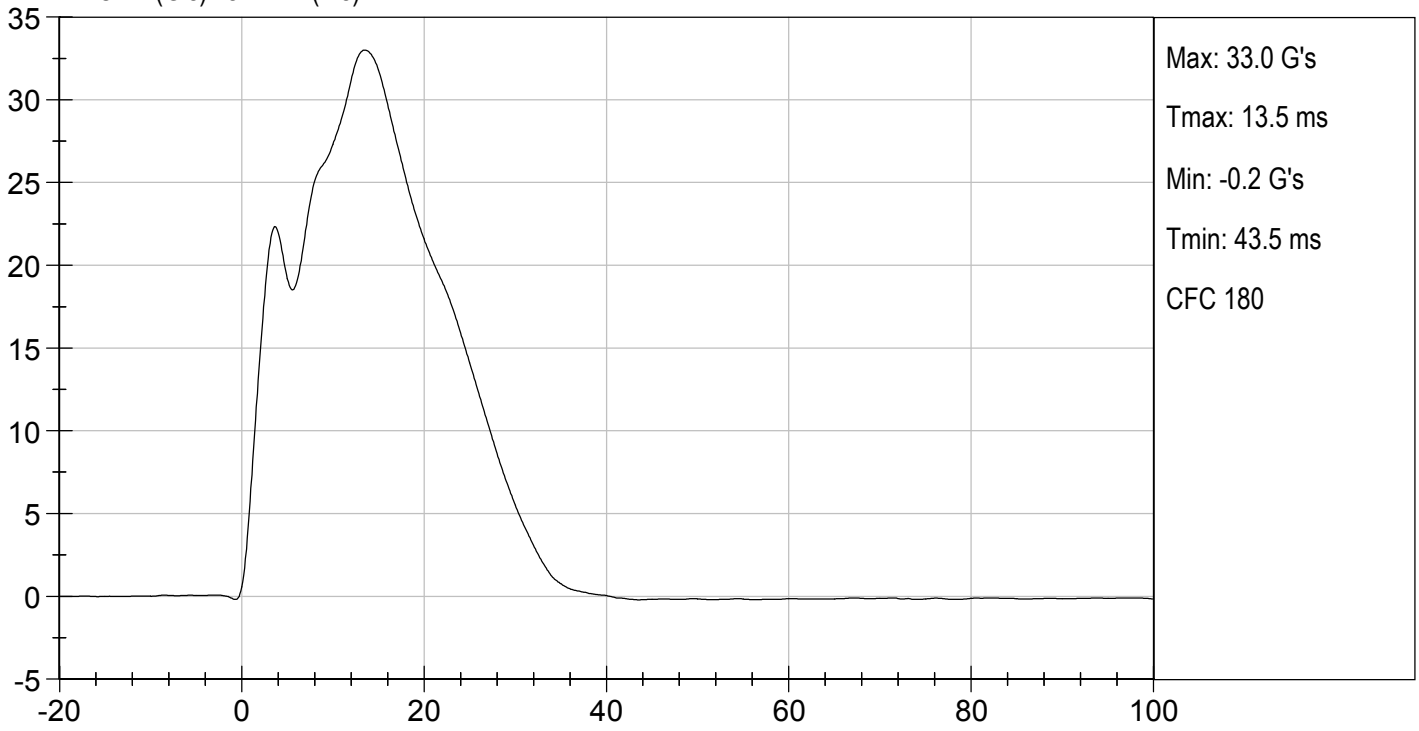
07/19/2019
Test Date

Approved By

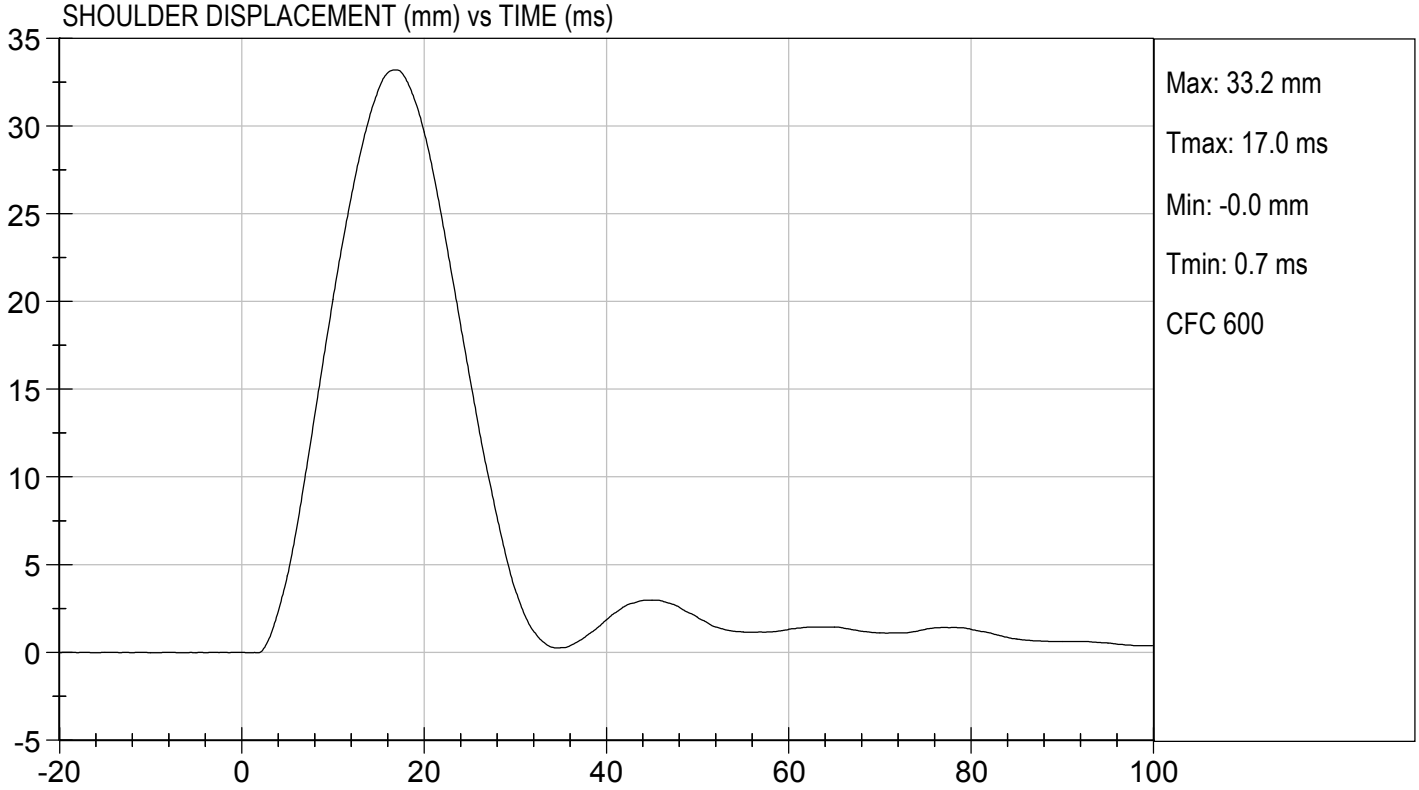
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 07/19/2019
TEST #: D192214

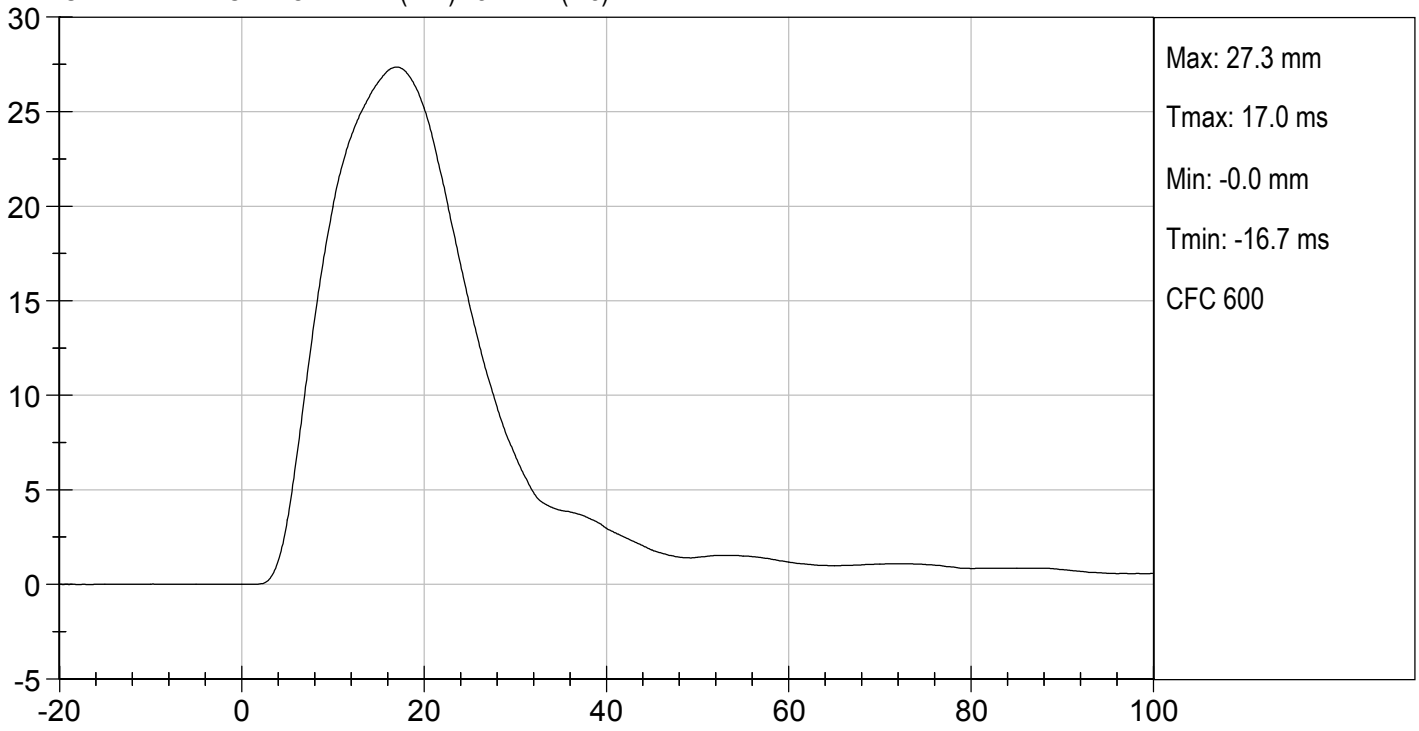
PROBE (G's) vs TIME (ms)



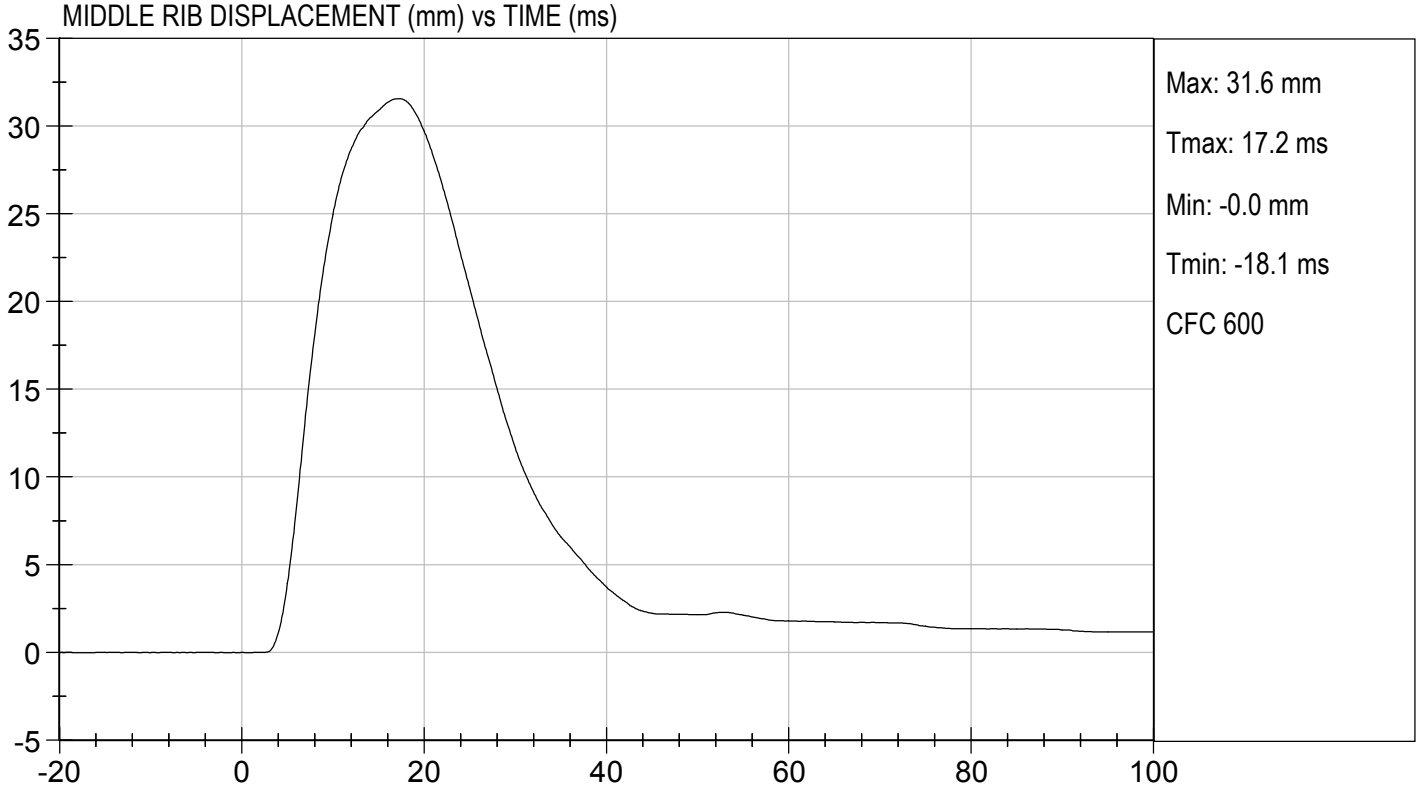

SHOULDER DISPLACEMENT (mm) vs TIME (ms)



UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



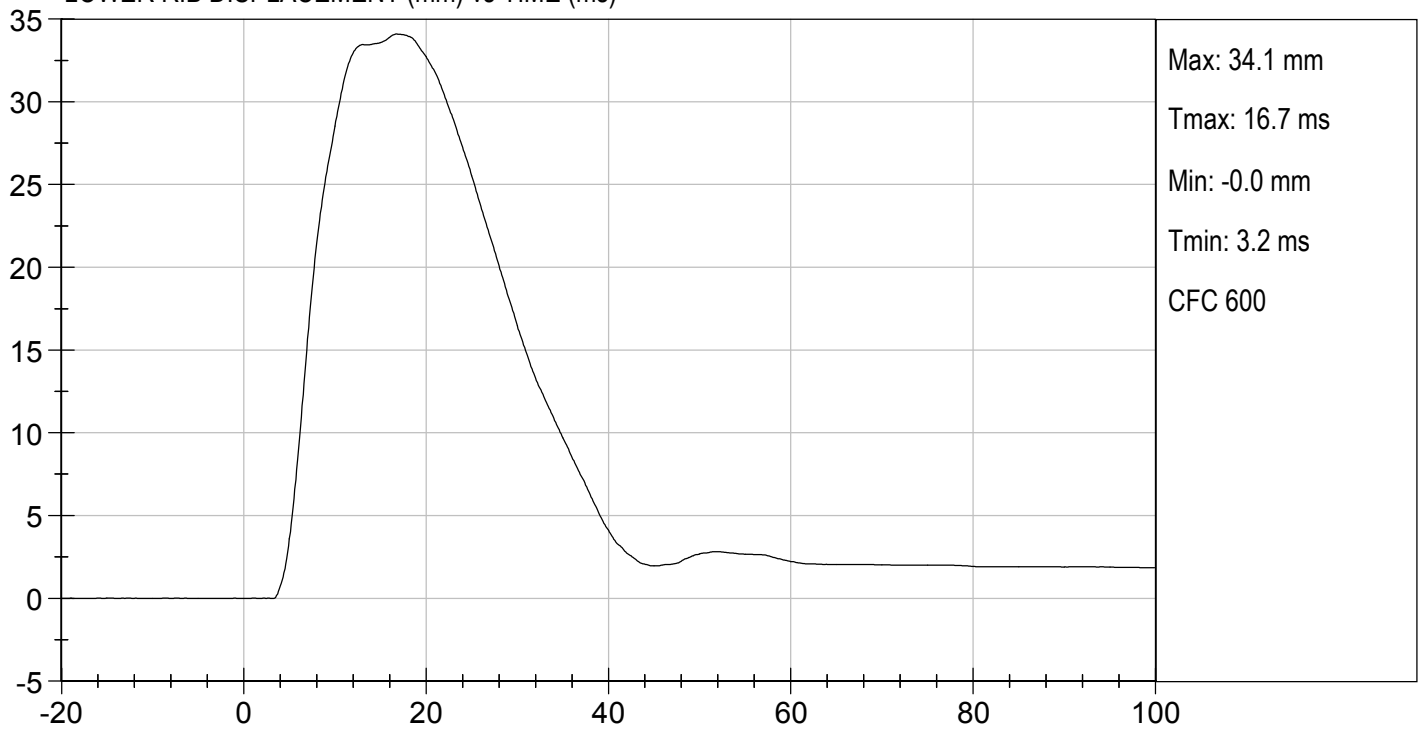

MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



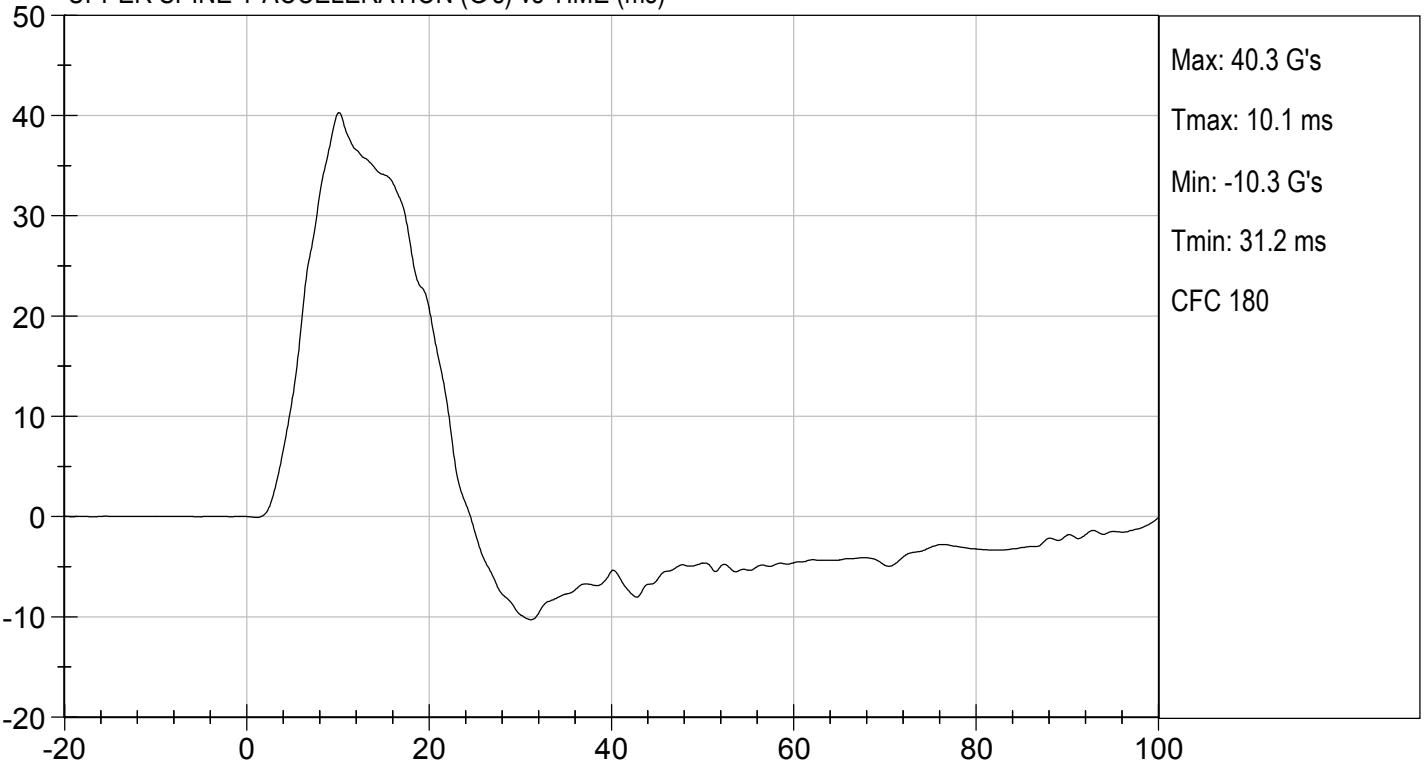
TEST DESC: THORAX IMPACT WITH ARM
VELOCITY: 22.22 ft/s, 6.77 m/s

TEST DATE: 07/19/2019
TEST #: D192214

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)

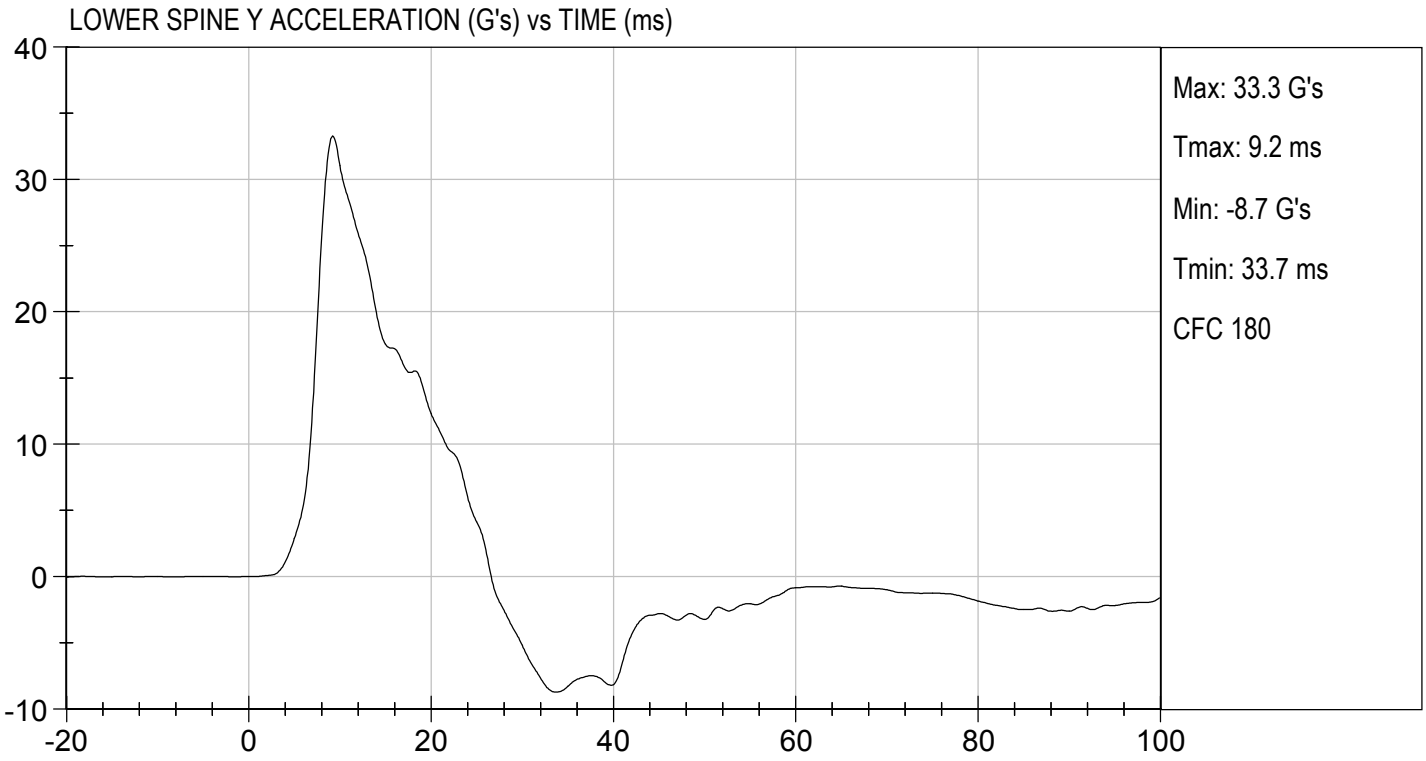



UPPER SPINE Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 07/19/2019
TEST #: D192214



**MGA RESEARCH CORPORATION**

**THORAX (WITHOUT ARM) IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D192215

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.3 | Pass |
| Humidity | % | 10 to 70 | 48 | 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 | 36 | 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 |

Jacob D Taylor

Laboratory Technician

07/19/2019

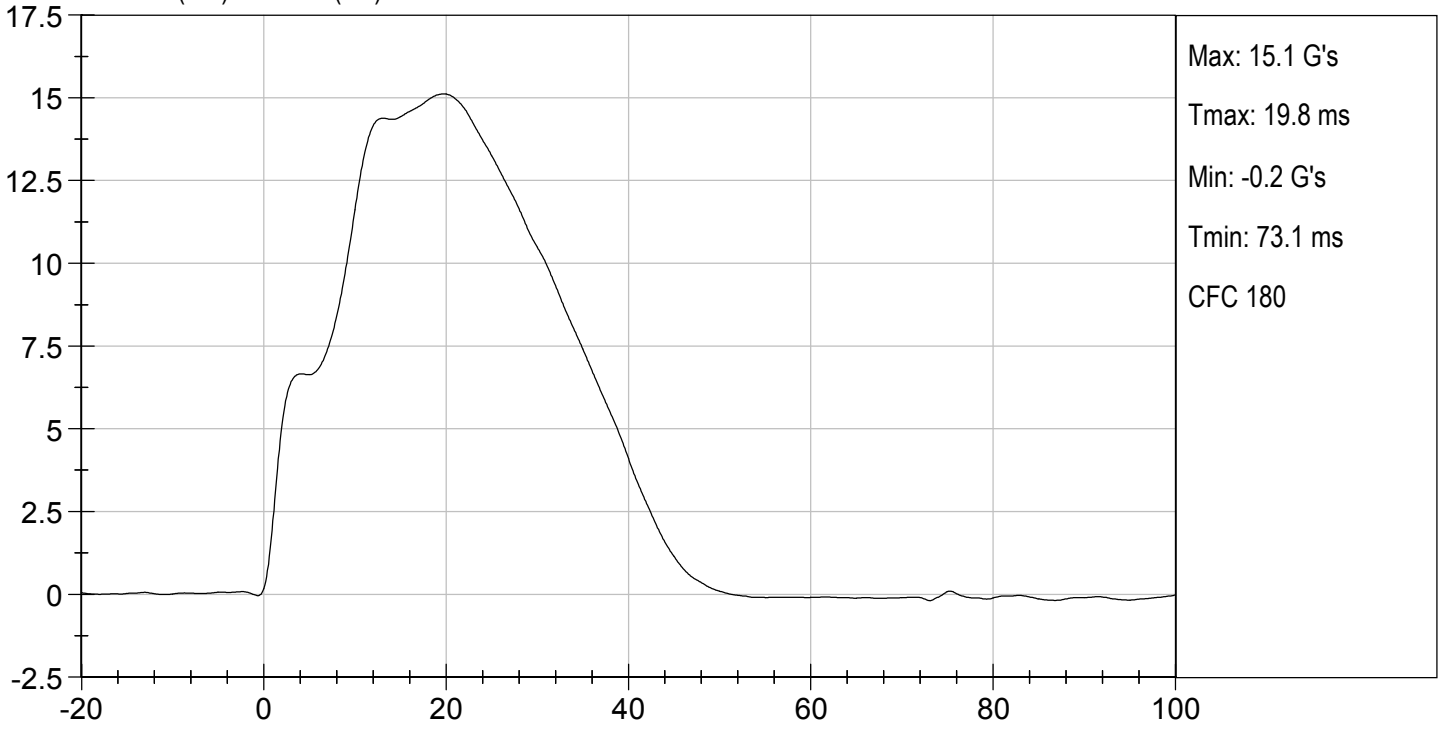
Test Date

Approved By

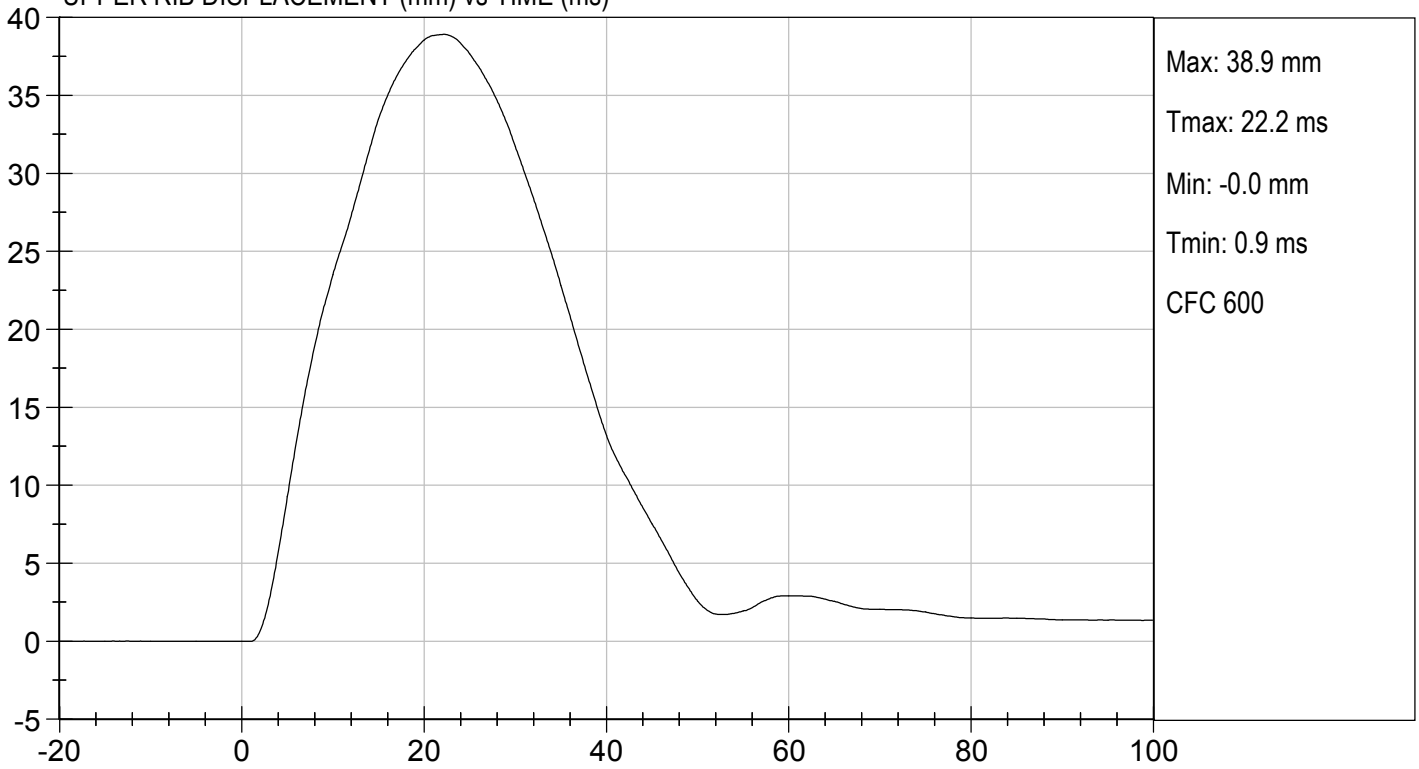
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/19/2019
TEST #: D192215

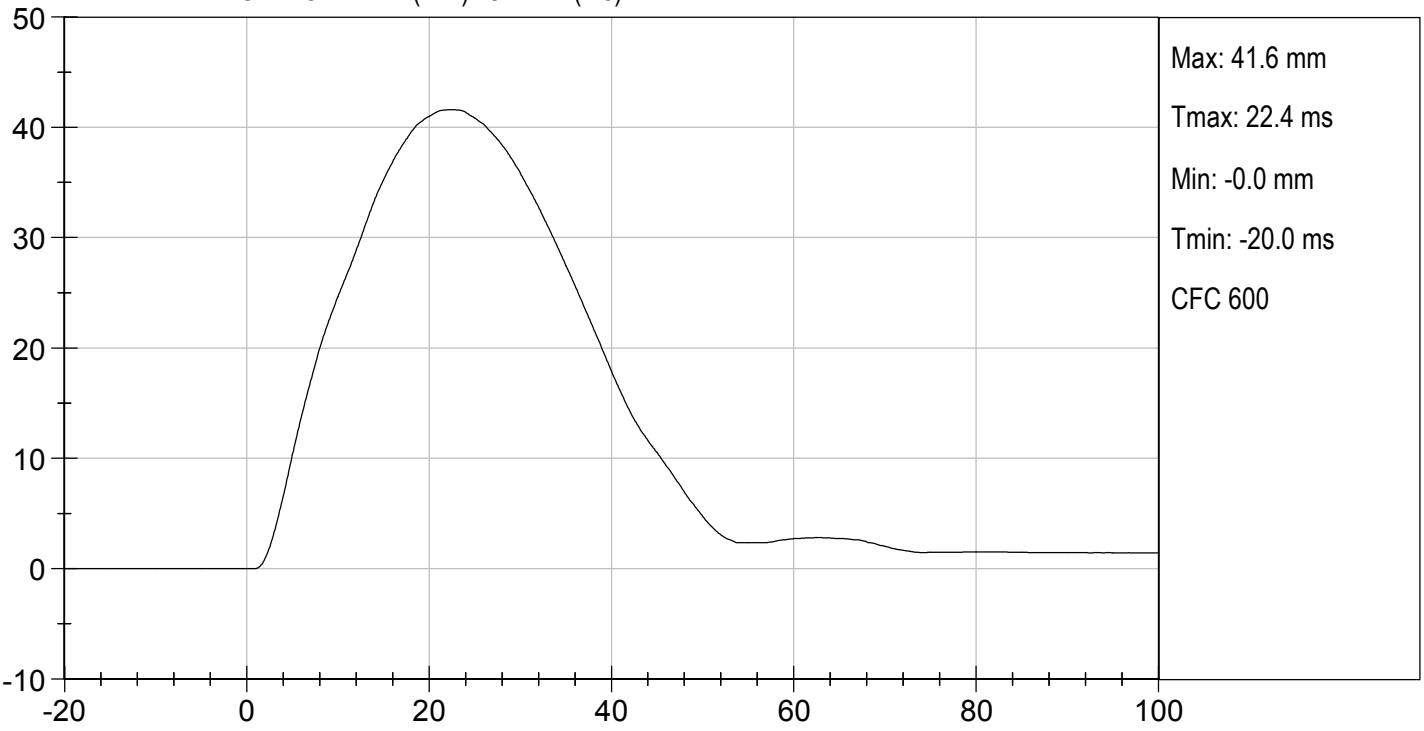
PROBE (G's) vs TIME (ms)



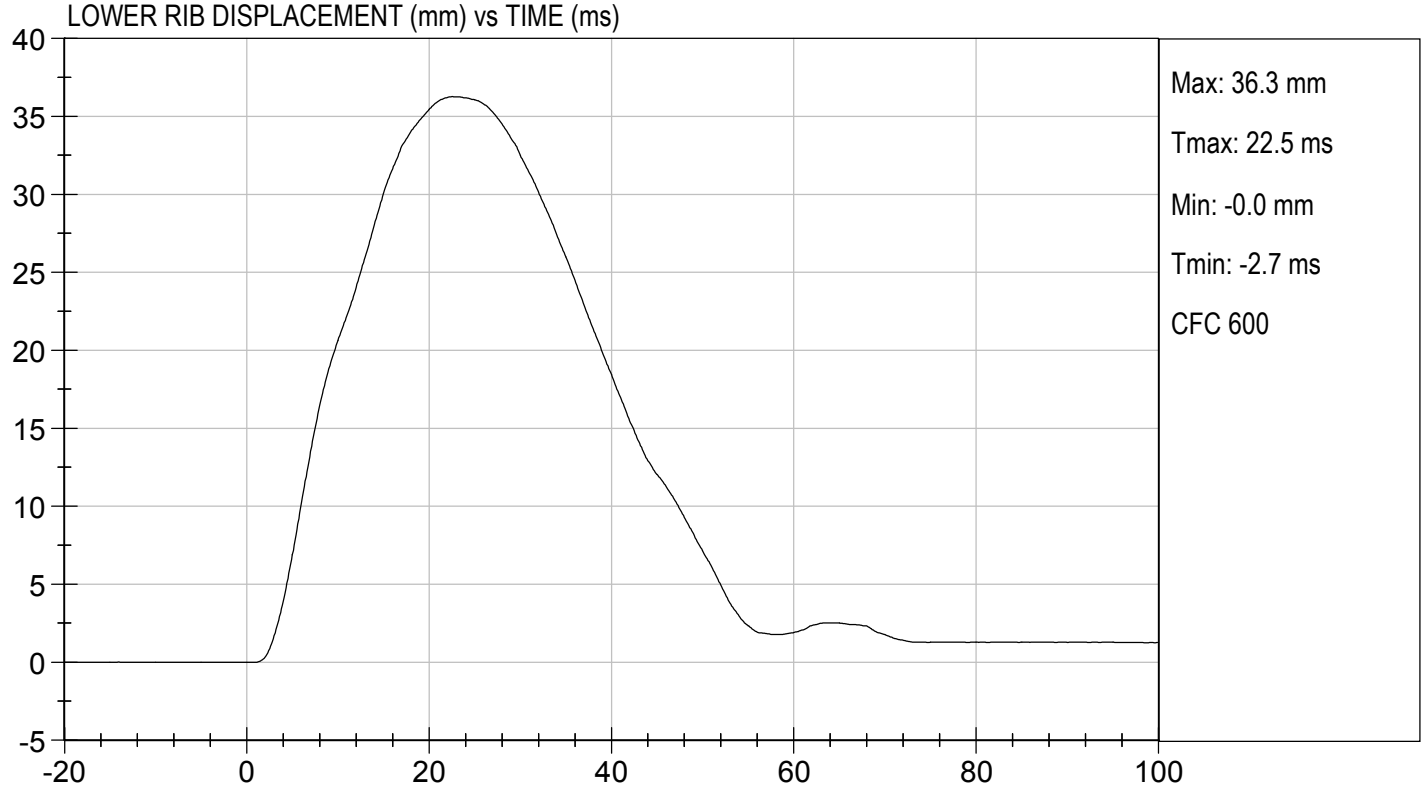

UPPER RIB DISPLACEMENT (mm) vs TIME (ms)



MIDDLE RIB DISPLACEMENT (mm) vs TIME (ms)



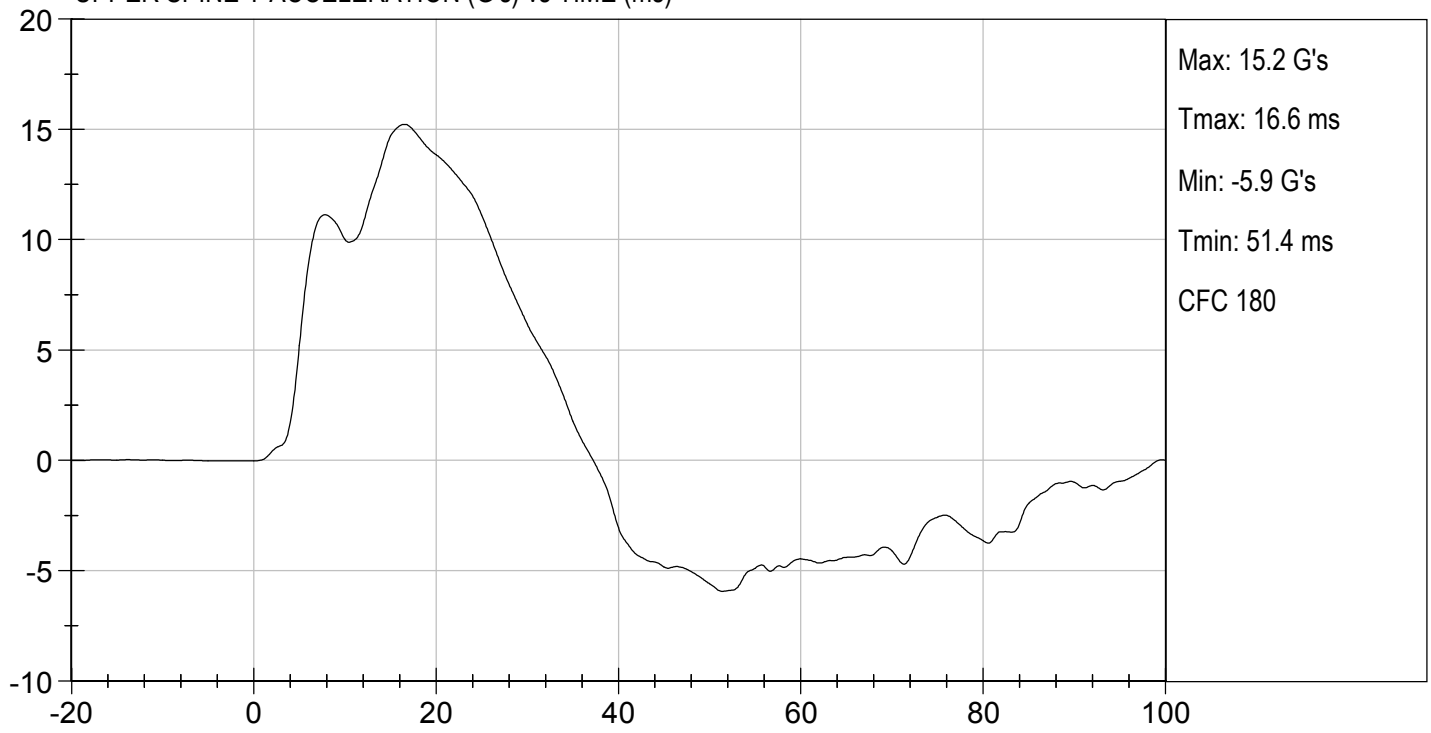

LOWER RIB DISPLACEMENT (mm) vs TIME (ms)



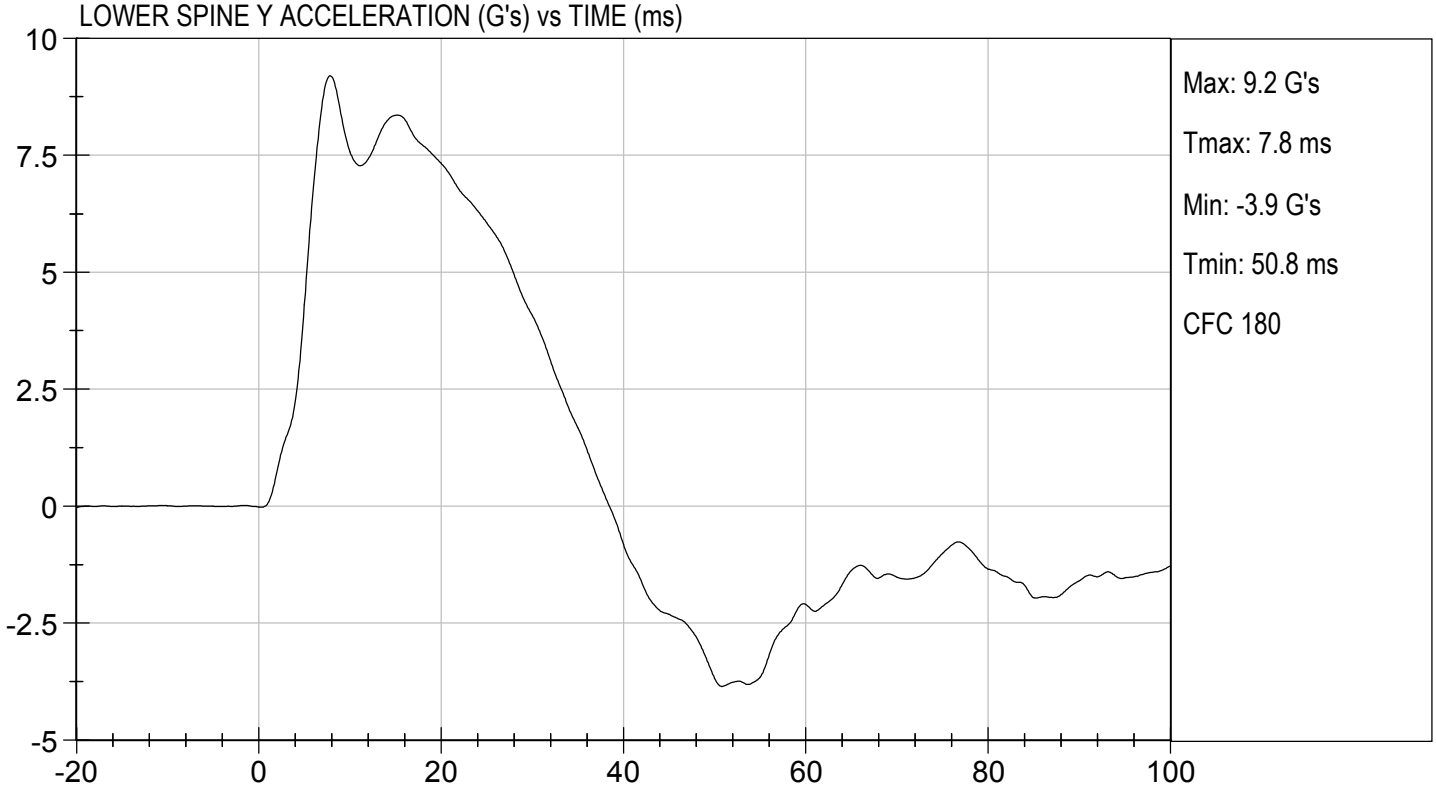
TEST DESC: THORAX IMPACT WITHOUT ARM
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/19/2019
TEST #: D192215

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:** D192216

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.5 | Pass |
| Humidity | % | 10 to 70 | 45 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.30 | Pass |
| Maximum Probe Acceleration | G's | 12 to 16 | 14 | Pass |
| Upper Abdomen Rib Displacement | mm | 36 to 47 | 40 | Pass |
| Lower Abdomen Rib Displacement | mm | 33 to 44 | 39 | Pass |
| Lower Spine (T12) Y Acceleration | G's | 9 to 14 | 12 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor

Laboratory Technician

07/18/2019

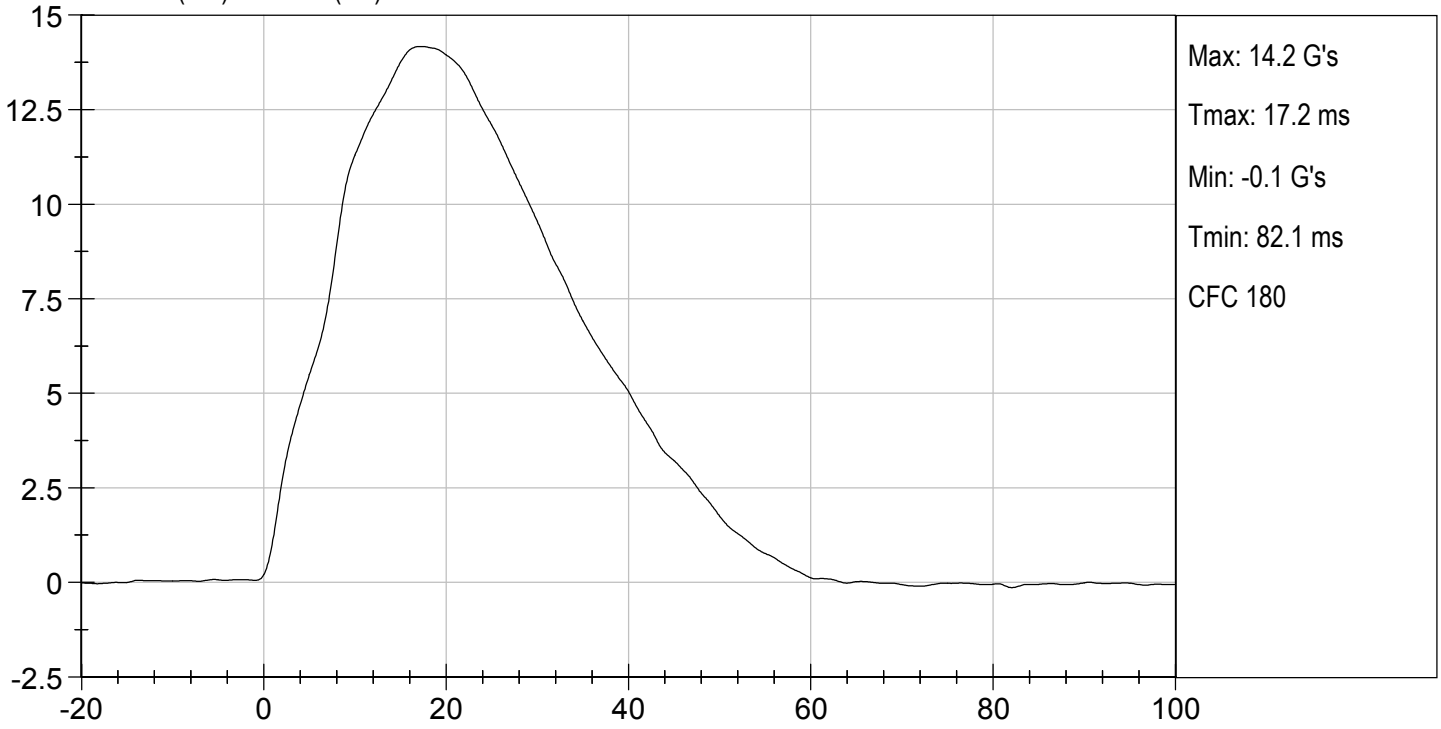
Test Date

Approved By

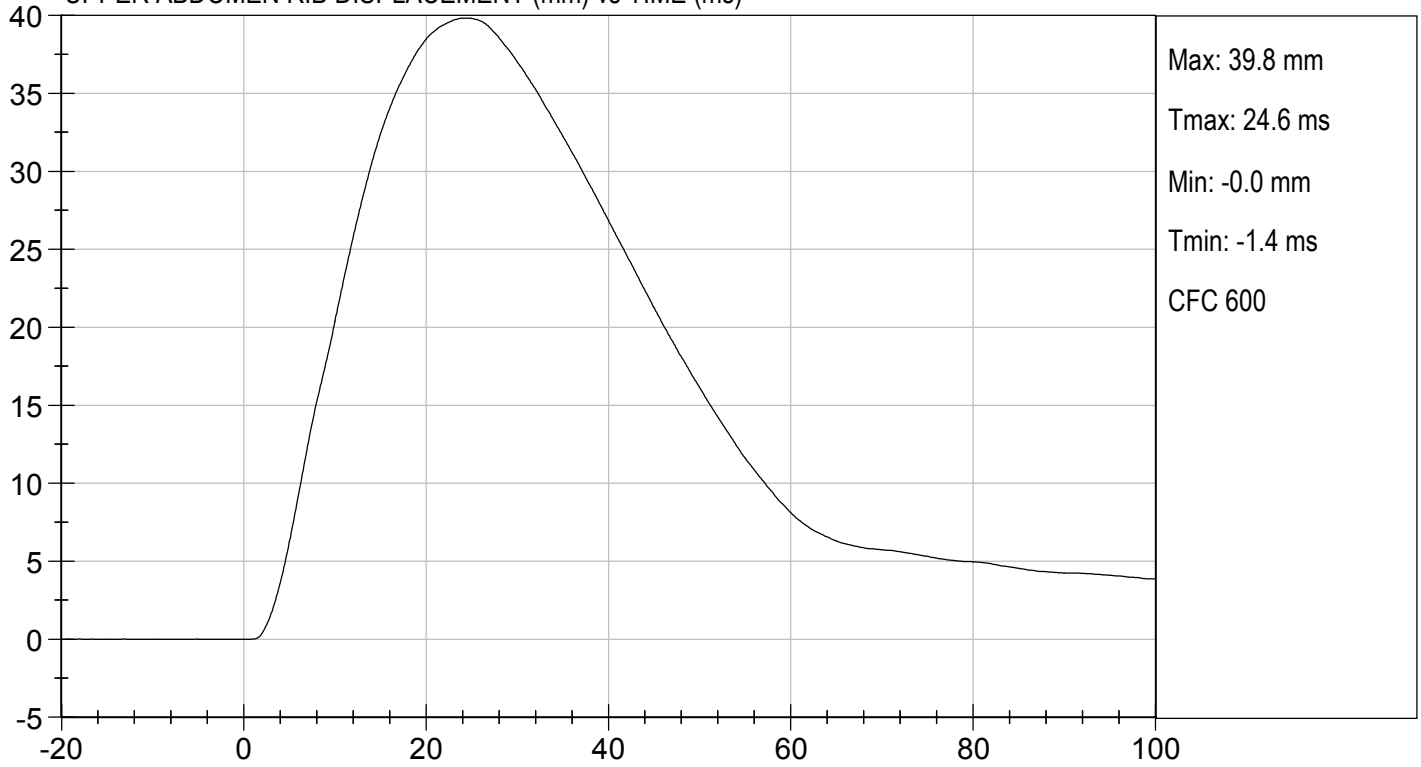
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/18/2019
TEST #: D192216

PROBE (G's) vs TIME (ms)



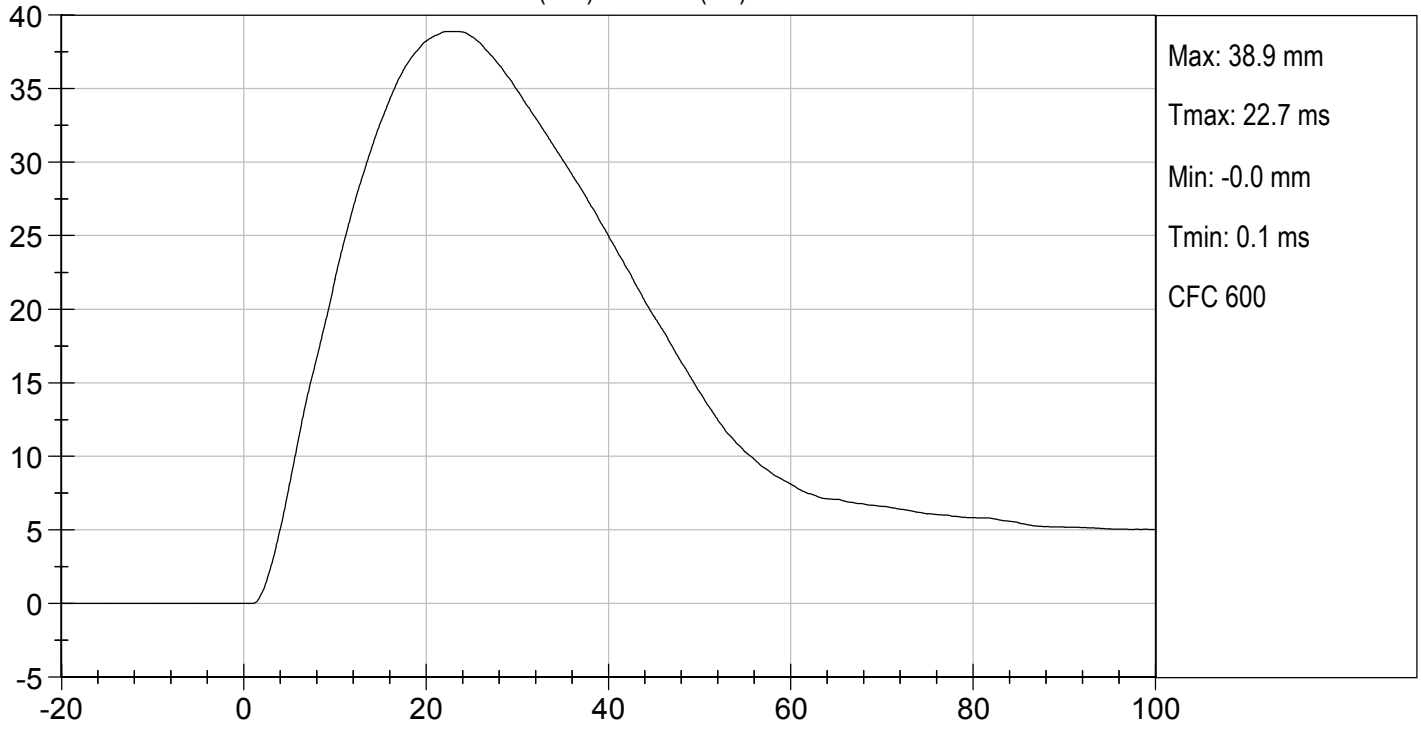

UPPER ABDOMEN RIB DISPLACEMENT (mm) vs TIME (ms)



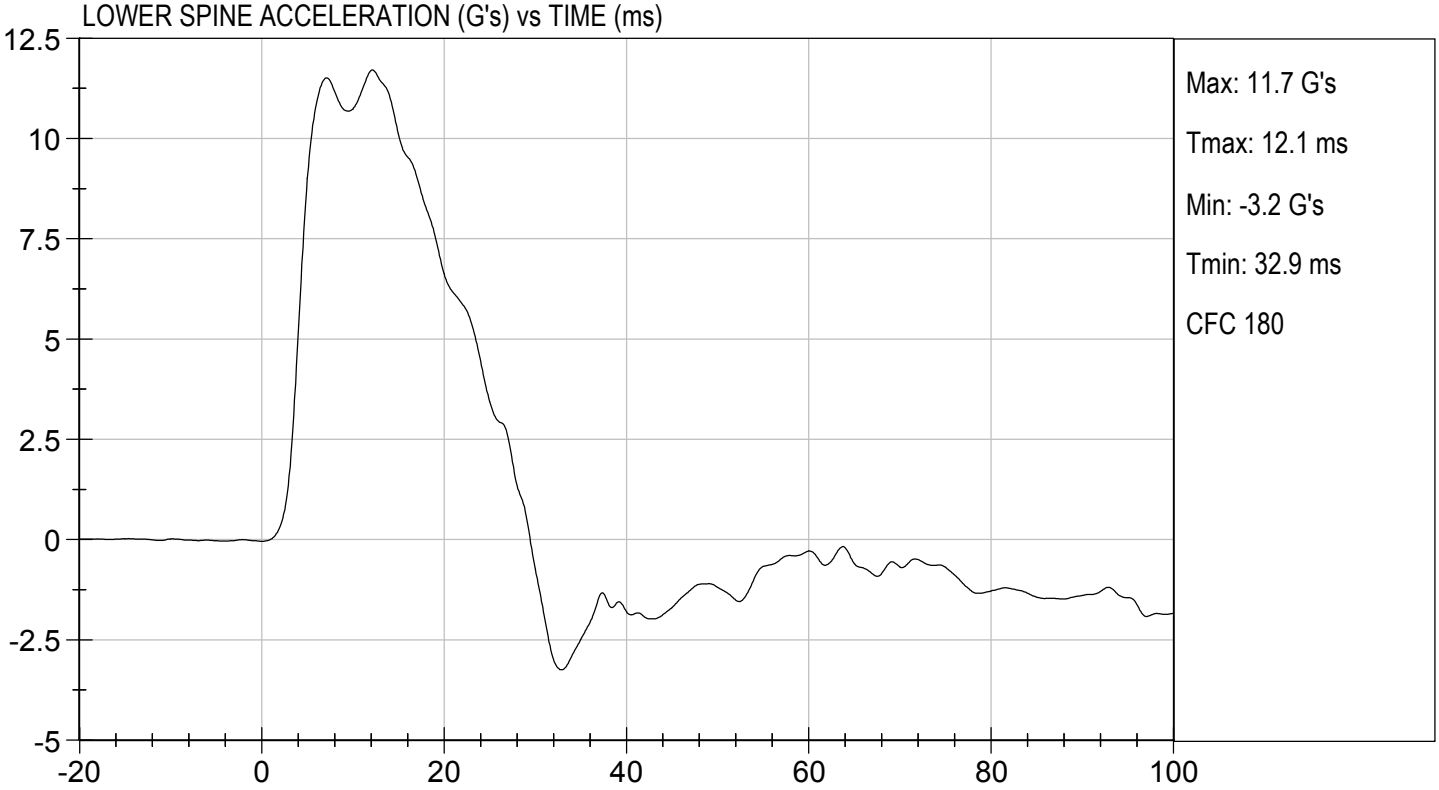
TEST DESC: ABDOMEN IMPACT
VELOCITY: 14.12 ft/s, 4.30 m/s

TEST DATE: 07/18/2019
TEST #: D192216

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:** D192217

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.3 | Pass |
| Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 6.60 to 6.80 | 6.68 | Pass |
| Maximum Probe Acceleration | G's | 38 to 47 | 42 | Pass |
| Pelvis Y Acceleration After 6 ms | G's | 34 to 42 | 40 | Pass |
| Peak Acetabulum Force | N | 3600 to 4300 | 3,624 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor

Laboratory Technician

07/19/2019

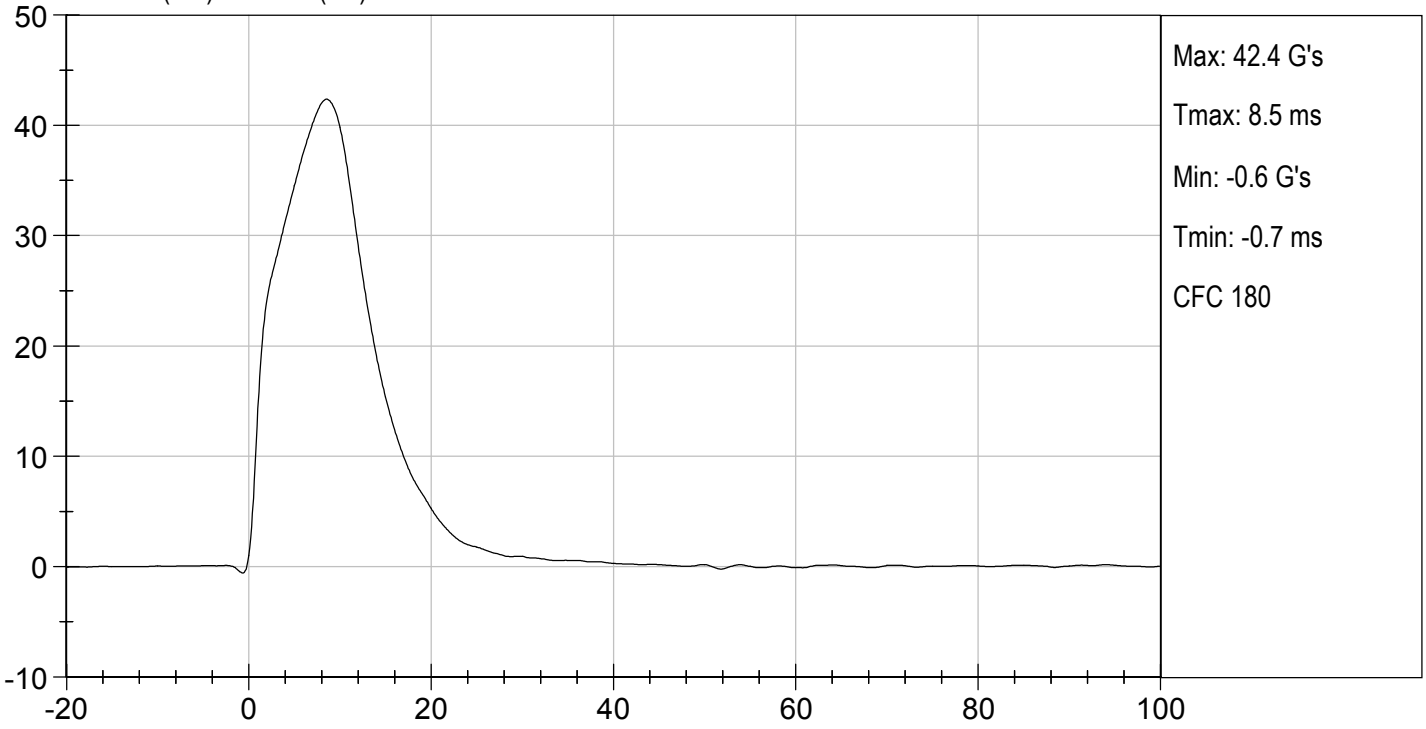
Test Date

Approved By

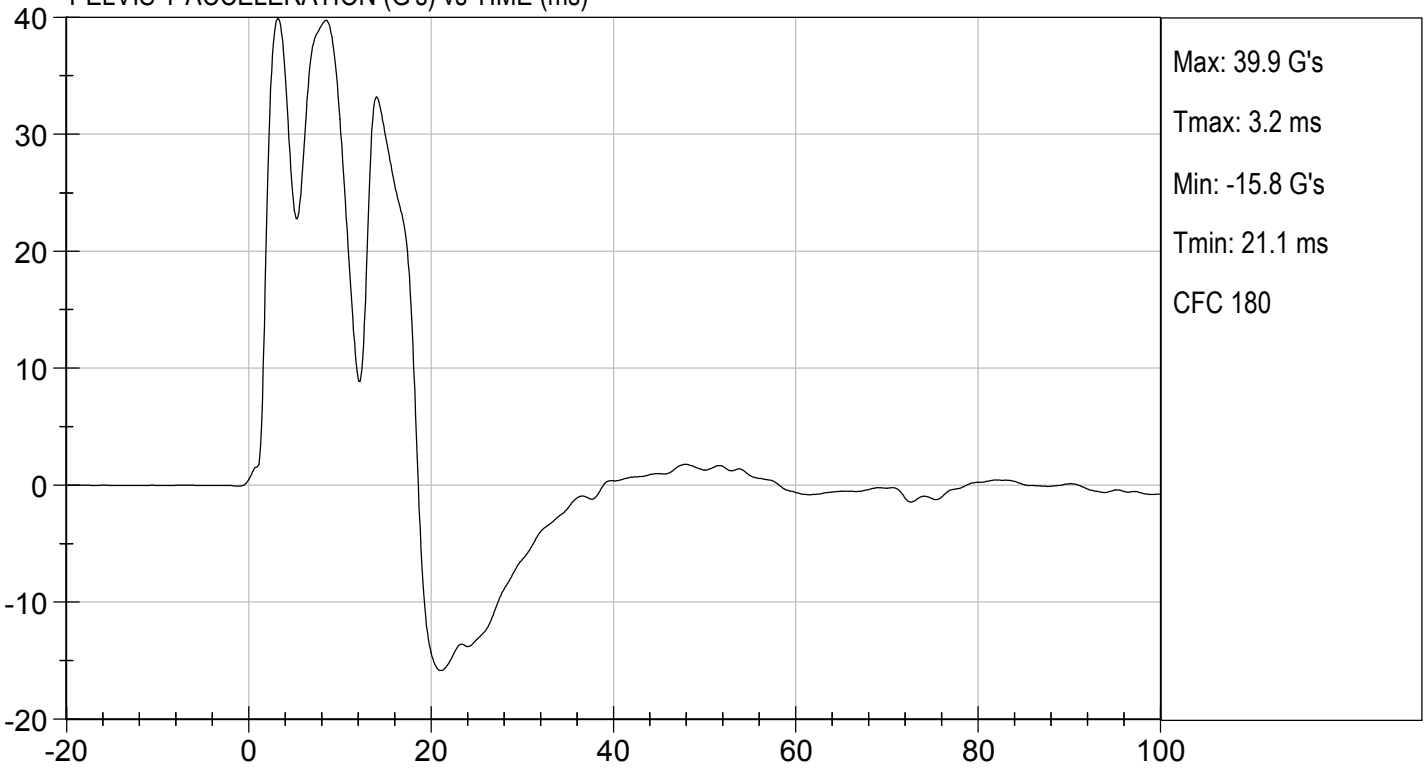
TEST DESC: PELVIS IMPACT
VELOCITY: 21.93 ft/s, 6.68 m/s

TEST DATE: 07/19/2019
TEST #: D192217

PROBE (G's) vs TIME (ms)

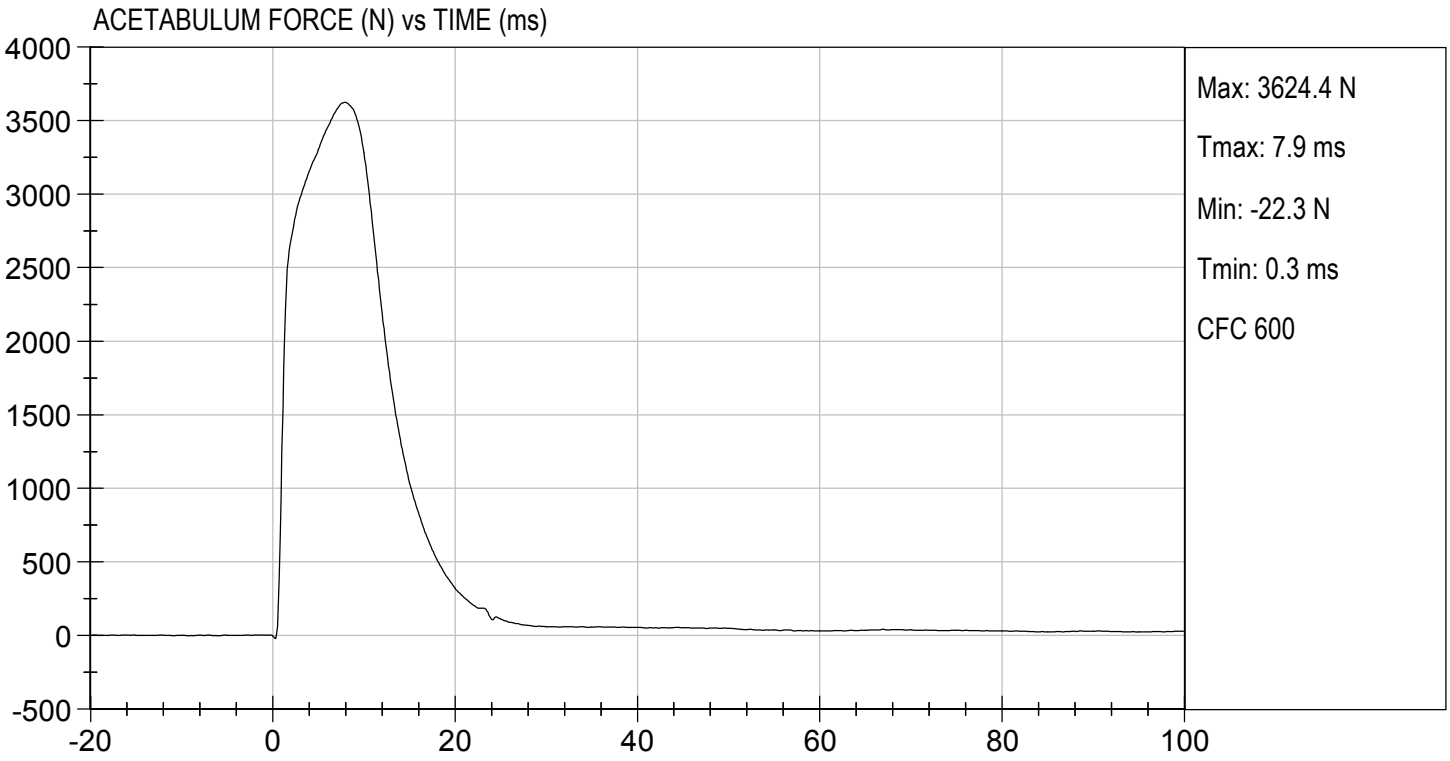



PELVIS Y ACCELERATION (G's) vs TIME (ms)



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

TEST DATE: 07/19/2019
TEST #: D192217



**MGA RESEARCH CORPORATION**

**ILIAC IMPACT TEST**

**SID-IIs BUILD LEVEL D DUMMY**

**ATD Serial No:** 306 **Test I.D:** D192218

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|---|---|---|---|
| Temperature | deg C | 20.6 to 22.2 | 21.3 | Pass |
| Humidity | % | 10 to 70 | 48 | Pass |
| Impact Velocity | m/s | 4.20 to 4.40 | 4.38 | Pass |
| Maximum Probe Acceleration | G's | 36 to 45 | 42 | Pass |
| Pelvis Y Acceleration | G's | 28 to 39 | 36 | Pass |
| Peak Pelvis Iliac Force | N | 4100 to 5100 | 4,774 | Pass |
| | | Overall Test Results | | Pass |

Jacob D Taylor

Laboratory Technician

07/19/2019

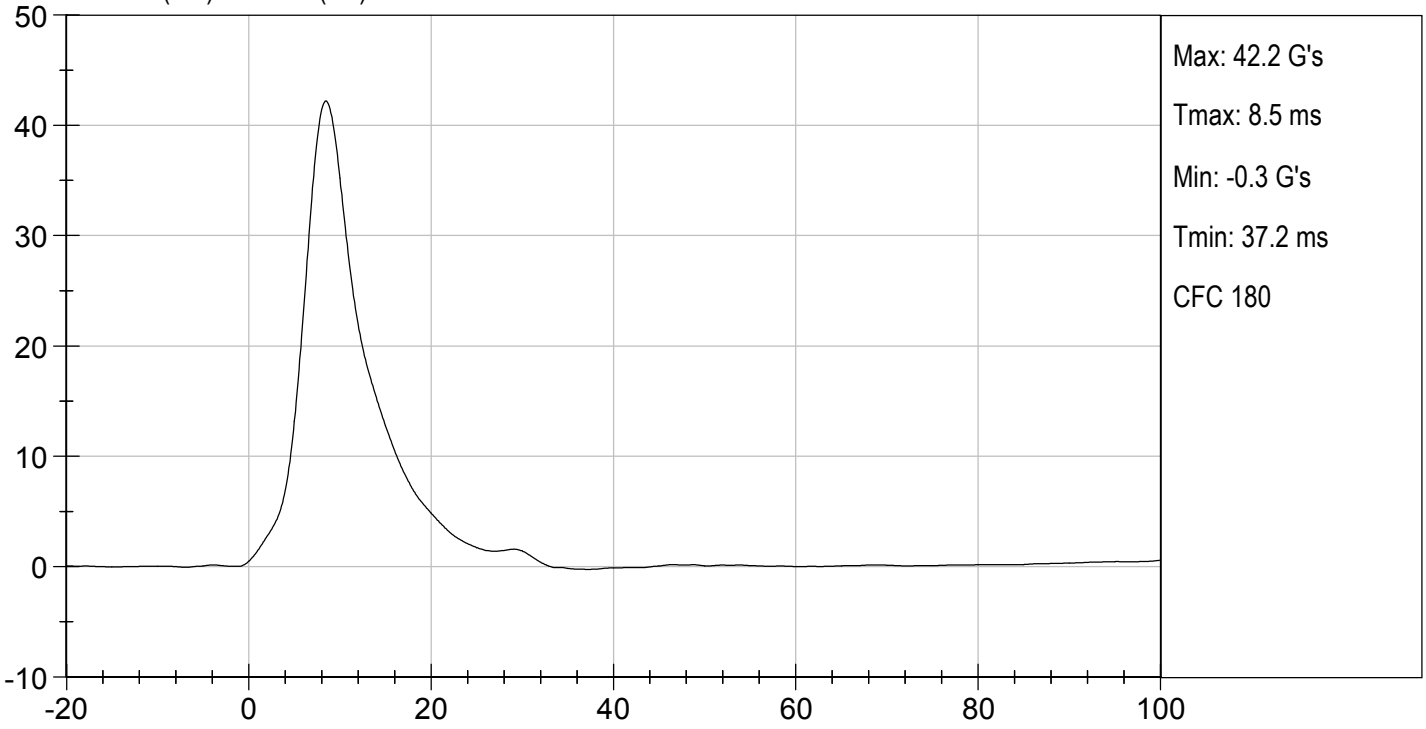
Test Date

Approved By

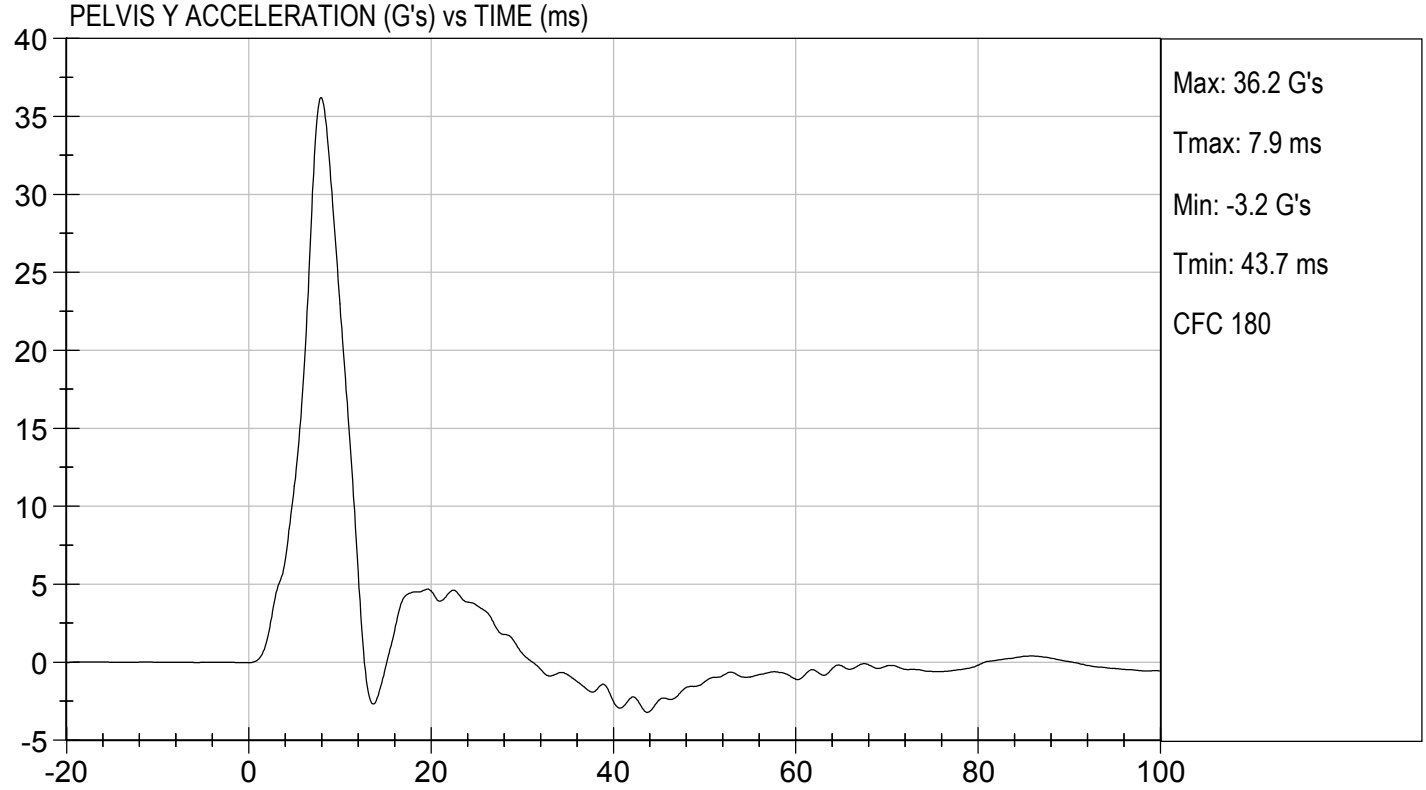
TEST DESC: ILLIAC
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 07/19/2019
TEST #: D192218

PROBE (G's) vs TIME (ms)

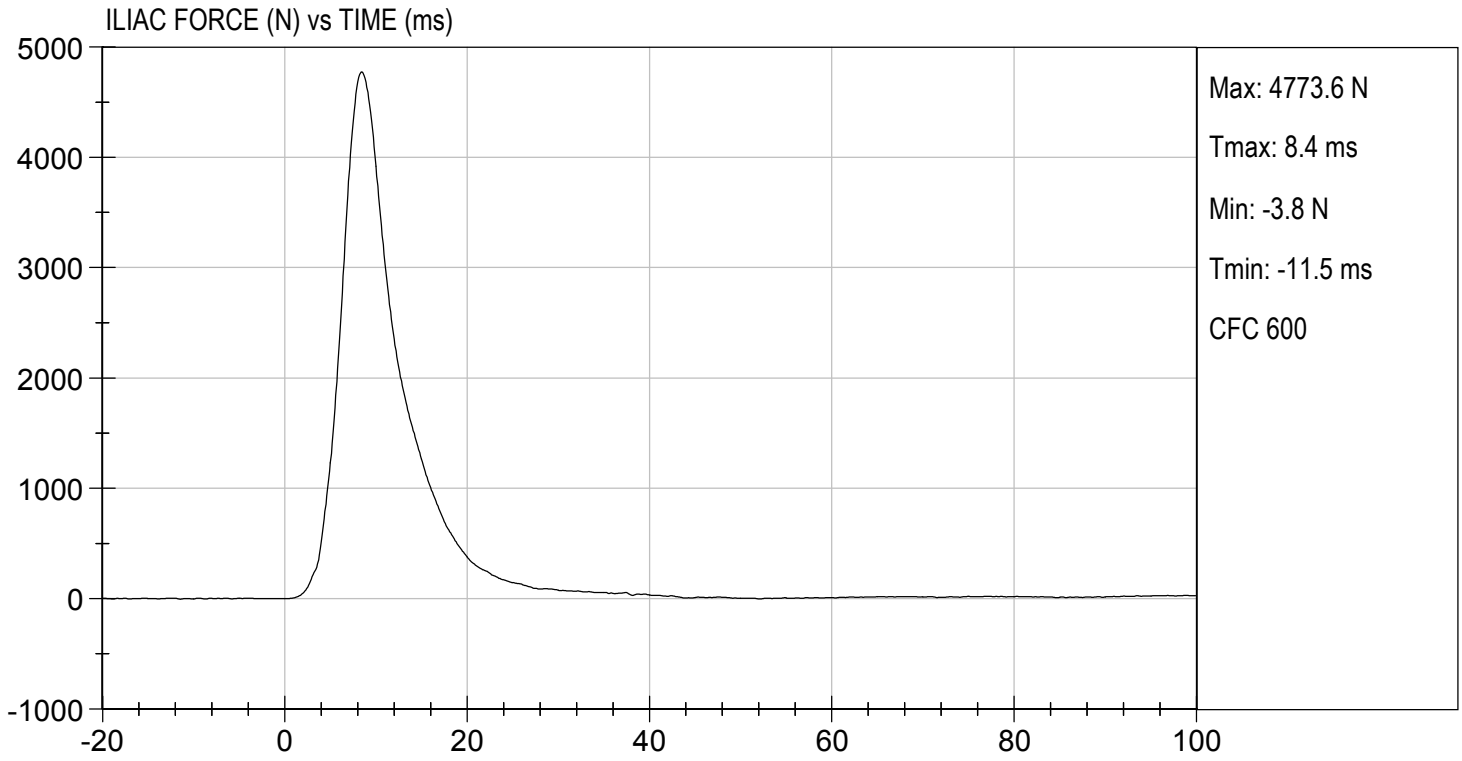



PELVIS Y ACCELERATION (G's) vs TIME (ms)



TEST DESC: ILLIAC
VELOCITY: 14.37 ft/s, 4.38 m/s

TEST DATE: 07/19/2019
TEST #: D192218



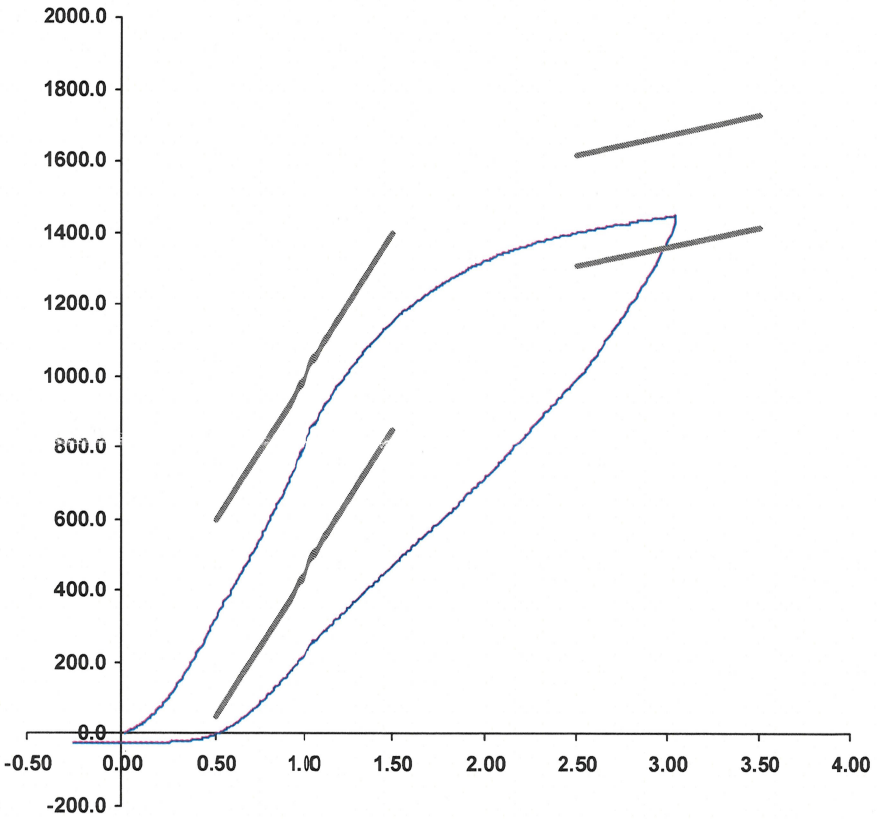
SACO RESEARCH

## SID-IIs Pelvis Plug Certification Test

Plug S/N 12303
Test Number 6688
Report Number 6703
Test Date 3/15/2018 12:10:33 PM

| | Test Results | Spec Min | Spec Max |
|---|---|---|---|
| Force @ 0.5 mm (N) | 323.10 | 50.00 | 600.00 |
| Force @ 1.5 mm (N) | 1,158.04 | 850.00 | 1,400.00 |
| Force @ 2.5 mm (N) | 1,401.09 | 1,306.00 | 1,618.00 |
| Force @ 3.0 mm (N) | 1,447.03 | 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** **15-Mar-18**
SACO Research

By : DC Date : 3/15/18

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 12513
Test Number 7440
Report Number 7454
Test Date 10/2/2018 8:19:09 AM

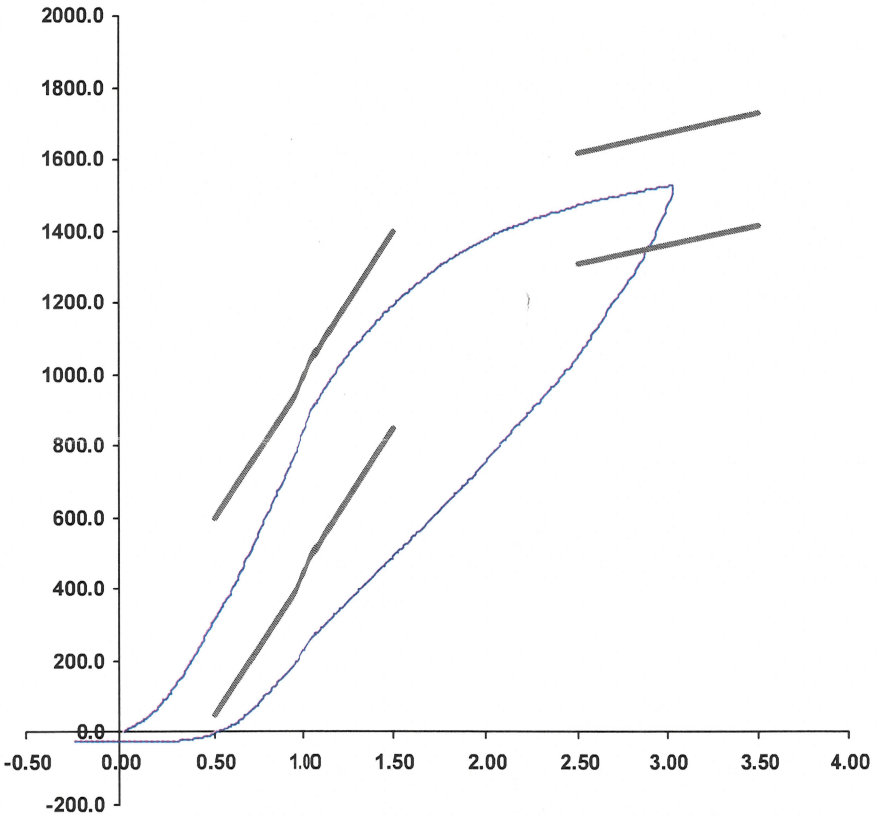
| | Test Results | Spec Min | Spec Max |
|---|---|---|---|
| Force @ 0.5 mm (N) | 319.56 | 50.00 | 600.00 |
| Force @ 1.5 mm (N) | 1,196.17 | 850.00 | 1,400.00 |
| Force @ 2.5 mm (N) | 1,470.22 | 1,306.00 | 1,618.00 |
| Force @ 3.0 mm (N) | 1,524.65 | 1,361.00 | 1,673.00 |

**Testing Machine STM-20 5965542**
**Load Cell S/N (FI360947), Units (LBS )** 1000

**Crosshead Speed ( mm / min ) or Rate** 12.7
**Extension or Position Measured by** XHD_100 ( XHD100 )

Notes:

Force (-N) vs Extension (-mm)




**Operator** DC

**Part Number** 180-4450

**Template No 107** **02-Oct-18**
SACO Research

By : DC Date : 10/2/18

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

# APPENDIX D
# TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

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

| | | | ES-2re S/N 032 | | |
|---|---|---|---|---|---|
| | | | Serial Number | Manufacturer | Calibration Date |
| Head CG Accelerometers | | X | P79711 | Endevco | 01/18/19 |
| | | Y | P79712 | Endevco | 01/18/19 |
| | | Z | P88170 | Endevco | 01/18/19 |
| | | Xr | P79750 | Endevco | 01/18/19 |
| | | Yr | P79751 | Endevco | 01/18/19 |
| | | Zr | P79753 | Endevco | 01/18/19 |
| Thorax Rib Displacement Potentiometers | Upper | Y | G176 | Honeywell | 01/18/19 |
| | Middle | Y | G169 | Honeywell | 01/18/19 |
| | Lower | Y | G164 | Honeywell | 01/18/19 |
| Abdomen Load Cells | Forward | Y | ABG1513 | Denton | 09/12/18 |
| | Middle | Y | ABG1531 | Denton | 09/12/18 |
| | Rear | Y | ABG1536 | Denton | 09/12/18 |
| Lower Spine Accelerometers (T12) | | X | P79574 | Endevco | 01/18/19 |
| | | Y | P82097 | Endevco | 01/18/19 |
| | | Z | P82603 | Endevco | 01/18/19 |
| Public Symphysis Load Cell | | Y | PG462 | Denton | 09/12/18 |

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

| | | | | SID-IIs S/N 306 | | |
|---|---|---|---|---|---|---|
| | | | | Serial Number | Manufacturer | Calibration Date |
| Head CG Accelerometers | | | X | P79445 | Endevco | 07/12/19 |
| | | | Y | P79721 | Endevco | 07/12/19 |
| | | | Z | P79724 | Endevco | 07/12/19 |
| | | | Xr | P84999 | Endevco | 07/12/19 |
| | | | Yr | P85000 | Endevco | 07/12/19 |
| | | | Zr | P85001 | Endevco | 07/12/19 |
| Head Angular Rate Sensors | | | X | | | |
| | | | Y | | | |
| | | | Z | | | |
| Displacement Potentiometers | Thoracic Rib | Upper | Y | G033 | FTSS | 07/12/19 |
| | | Middle | Y | G1261 | FTSS | 07/12/19 |
| | | Lower | Y | G1270 | FTSS | 07/12/19 |
| | Abdominal Rib | Upper | Y | G032 | FTSS | 07/12/19 |
| | | Lower | Y | G1304 | FTSS | 07/12/19 |
| Lower Spine Accelerometers (T12) | | | X | P96332 | Endevco | 07/12/19 |
| | | | Y | P96335 | Endevco | 07/12/19 |
| | | | Z | P96341 | Endevco | 07/12/19 |
| Acetabulum Load Cell | | | Y | ACG268 | Denton | 12/04/18 |
| Iliac Wing Load Cell | | | Y | IWG273 | Denton | 12/04/18 |
| Pelvis Plug (struck side) | | | | 12303 | SACO | 03/15/18 |
| Pelvis Plug (non-struck side) | | | | 12513 | SACO | 10/02/18 |

**Table 3 – Vehicle Instrumentation**

| | | | Serial Number | Manufacturer | Calibration Date |
|---|---|---|---|---|---|
| 1 | Vehicle Center of Gravity | X | P92951 | Endevco | 07/10/19 |
| | Vehicle Center of Gravity | Y | P88698 | Endevco | 07/10/19 |
| | Vehicle Center of Gravity | Z | P97405 | Endevco | 07/10/19 |
| 2 | Right Sill at Front Seat | X | T17965 | Endevco | 07/10/19 |
| | Right Sill at Front Seat | Y | T18987 | Endevco | 01/24/19 |
| | Right Sill at Front Seat | Z | T18979 | Endevco | 01/24/19 |
| 3 | Right Sill at Rear Seat | X | PCB1020 | PCB | 04/08/19 |
| | Right Sill at Rear Seat | Y | PCB1109 | PCB | 04/08/19 |
| | Right Sill at Rear Seat | Z | PCB1053 | PCB | 04/08/19 |
| 4 | Left Sill at Front Door | Y | PCB1231 | PCB | 07/11/19 |
| 5 | Left Sill at Rear Door | Y | PCB1257 | PCB | 07/11/19 |
| 6 | Left A-Post Lower | Y | PCB1255 | PCB | 07/11/19 |
| 7 | Left A-Post Middle | Y | PCB1253 | PCB | 07/11/19 |
| 8 | Left B-Post Lower | Y | | | |
| 9 | Left B-Post Middle | Y | | | |
| 10 | Front Seat Track | Y | PCB1293 | PCB | 07/11/19 |
| 11 | Rear Seat Track or Structure | Y | PCB1275 | PCB | 07/11/19 |
| 12 | Right Rear Occ. Compartment | Y | PCB1282 | PCB | 07/11/19 |
| 13 | Engine Block | X | PCB1159 | PCB | 07/11/19 |
| | Engine Block | Y | PCB1239 | PCB | 07/11/19 |
| 14 | Rear Floorpan Above Axle | X | P88717 | Endevco | 07/10/19 |
| | Rear Floorpan Above Axle | Y | P92964 | Endevco | 07/10/19 |
| | Rear Floorpan Above Axle | Z | P84455 | Endevco | 07/10/19 |

**Table 4 – MDB Instrumentation**

| | | Serial Number | Manufacturer | Calibration Date |
|---|---|---|---|---|
| MDB Center of Gravity | X | PCB753D | PCB | 03/21/19 |
| MDB Center of Gravity | Y | PCB557D | PCB | 03/21/19 |
| MDB Center of Gravity | Z | PCB511D | PCB | 03/21/19 |
| Left Frame at Rear Axle Centerline | X | PCB660D | PCB | 03/21/19 |
| Left Frame at Rear Axle Centerline | Y | PCB661D | PCB | 03/21/19 |