

REPORT NUMBER: NCAP-MGA-22-023

**NEW CAR ASSESSMENT PROGRAM (NCAP)
Frontal Barrier Impact Test**

**FORD MOTOR CO.
2022 Ford Escape SEL PHEV 5-Door SUV
NHTSA No.: M20220200**

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



Test Date: March 29, 2022

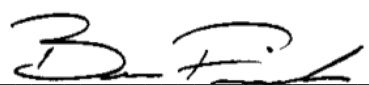
Final Report Date: April 27, 2023

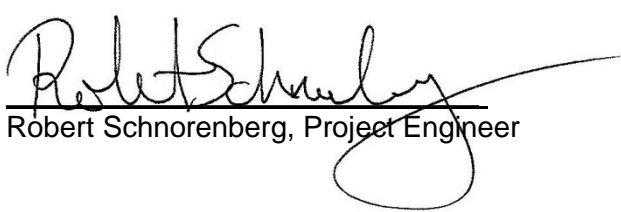
FINAL REPORT

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

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Approval Date: April 27, 2023

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 Final Report of New Car Assessment Program Frontal Impact Testing and FMVSS No. 305 Indicant Testing of a 2022 Ford Escape SEL PHEV 5-Door SUV, NHTSA No.: M20220200 | | 5. Report Date April 27, 2023 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 15. Supplementary Notes | | 13. Type of Report and Period Covered Final Test Report March 29, 2022 to April 27, 2023 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 16. Abstract A 56.3 km/h NCAP Frontal Rigid Barrier Impact Test was conducted on a 2022 Ford Escape SEL PHEV 5-Door SUV in accordance with the specifications of the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. The test was conducted at MGA Research Corporation in Burlington, Wisconsin on March 29, 2022. The impact velocity of the vehicle was 56.15 km/h and the ambient temperature at the barrier face at the time of impact was 21.6°C. The target vehicle post-test maximum crush was 627 mm located to the left of the vehicle centerline. The test vehicle's performance was as follows: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th rowspan="2">Units</th> <th colspan="2">Driver ATD</th> <th colspan="2">Passenger ATD</th> </tr> <tr> <th>Threshold</th> <th>Result</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC₁₅)</td> <td></td> <td>700</td> <td>157</td> <td>700</td> <td>194</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>29</td> <td>52</td> <td>12</td> </tr> <tr> <td>Nij</td> <td></td> <td>1</td> <td>0.26</td> <td>1</td> <td>0.40</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>642</td> <td>2620</td> <td>899</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>189</td> <td>2520</td> <td>219</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>1218</td> <td>6805</td> <td>913</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>789</td> <td>6805</td> <td>855</td> </tr> </tbody> </table> | | | | | | Measurement Description | Units | Driver ATD | | Passenger ATD | | Threshold | Result | Threshold | Result | Head Injury Criteria (HIC ₁₅) | | 700 | 157 | 700 | 194 | Maximum Chest Compression | mm | 63 | 29 | 52 | 12 | Nij | | 1 | 0.26 | 1 | 0.40 | Neck Tension | N | 4170 | 642 | 2620 | 899 | Neck Compression | N | 4000 | 189 | 2520 | 219 | Left Femur Force | N | 10008 | 1218 | 6805 | 913 | Right Femur Force | N | 10008 | 789 | 6805 | 855 |
| Measurement Description | Units | Driver ATD | | Passenger ATD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Threshold | Result | Threshold | Result | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Head Injury Criteria (HIC ₁₅) | | 700 | 157 | 700 | 194 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maximum Chest Compression | mm | 63 | 29 | 52 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nij | | 1 | 0.26 | 1 | 0.40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Neck Tension | N | 4170 | 642 | 2620 | 899 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Neck Compression | N | 4000 | 189 | 2520 | 219 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Left Femur Force | N | 10008 | 1218 | 6805 | 913 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Right Femur Force | N | 10008 | 789 | 6805 | 855 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17. Key Words 56.3 km/h (35 mph) Full Frontal Rigid Barrier Impact Test New Car Assessment Program (NCAP) | | | 18. Distribution Statement Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division 1200 New Jersey Ave, SE Washington, DC 20590 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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SECTION 1 PURPOSE AND SUMMARY OF TEST

PURPOSE

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number 693JJ919D000006. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact was conducted in accordance with the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2022 Ford Escape SEL PHEV 5-Door SUV at a velocity of 56.15 km/h. The test was performed at MGA Research Corporation on March 29, 2022. Pre-test and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two (2) real-time cameras and sixteen (16) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E 50th percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5th percentile female test device (ATD) was placed in the right-front passenger seating position according to dummy placement instructions specified in the Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation.

The driver (position 1) ATD (Serial No. 351) and the right-front passenger (position 2) ATD (Serial No. 142) were qualified previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 630 channels of data were recorded on a data acquisition system. Appendix B contains the dummy response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent or battery electrolyte leakage and no loss of high-voltage battery isolation after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 627 mm located to the left of the vehicle centerline and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver's head contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee airbag.

The passenger's visible contact points were as follows: The passenger's head contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the glove box.

The occupant data is summarized below:

| ATD position | HIC₁₅ | Nij | Neck Tension (N) | Neck Comp. (N) | 3ms Chest Clip (g) | Chest Disp. (mm) | Left Femur (N) | Right Femur (N) |
|------------------------------|-------------------------|------------|-------------------------|-----------------------|---------------------------|-------------------------|-----------------------|------------------------|
| Driver (50 th) | 157 | 0.26 | 642 | 189 | 37.9 | 29 | 1218 | 789 |
| Passenger (5 th) | 194 | 0.40 | 899 | 219 | 44.5 | 12 | 913 | 855 |

The test data can be found on the NHTSA website at www.nhtsa.gov

TEST NOTES

Driver Shoulder Belt load cell was not installed.

Driver Lap Belt load cell was not installed.

Passenger Shoulder Belt load cell was not installed.

Passenger Lap Belt load cell was not installed.

Barrier I-05 My recorded no valid data.

Barrier K-15 My recorded no valid data.

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

SECTION 2
OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

TEST VEHICLE INFORMATION AND OPTIONS

| | | | |
|-----------------------------|-------------------|---------------------------------|-----|
| NHTSA No. | M20220200 | Traction Control System (TCS) | Yes |
| Model Year | 2022 | Power Steering | Yes |
| Make | Ford | Power Window Auto-Reverse | Yes |
| Model | Escape SEL PHEV | Driver Frontal Airbag | Yes |
| Body Style | 5-Door SUV | Driver Curtain Airbag | Yes |
| VIN | 1FMCU0KZ9NUA18828 | Driver Head/Torso Airbag | No |
| Body Color | Oxford White | Driver Torso Airbag | No |
| Odometer (km/mi) | 8 km / 5 mi | Driver Torso/Pelvis Airbag | No |
| Engine Displacement (L) | 2.5 L | Driver Pelvis Airbag | No |
| Type/No. Cylinders | Inline 4 | Driver Knee Airbag | Yes |
| Engine Placement | Lateral | Front Pass. Frontal Airbag | Yes |
| Transmission Type | Automatic | Front Pass. Curtain Airbag | Yes |
| Transmission Speeds | CVT | Front Pass. Head/Torso Airbag | No |
| Overdrive | Yes | Front Pass. Torso Airbag | Yes |
| Final Drive | FWD | Front Pass. Torso/Pelvis Airbag | No |
| Roof Rack | No | Front Pass. Pelvis Airbag | No |
| Sunroof/T-Top | No | Front Pass. Knee Airbag | No |
| Running Boards | No | Driver Pretensioner | Yes |
| Tilt Steering Wheel | Yes | Driver Load Limiter | Yes |
| Power Seats | Yes | Front Pass. Pretensioner | Yes |
| Anti-Lock Brakes (ABS) | Yes | Front Pass. Load Limiter | Yes |
| Automatic Door Locks (ADLs) | Yes | Other | N/A |

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

DATA FROM CERTIFICATION LABEL

| | | | |
|---------------------|----------------|-----------------|------|
| Manufactured By | FORD MOTOR CO. | GVWR (kg) | 2232 |
| Date of Manufacture | 01/22 | GAWR Front (kg) | 1175 |
| | | GAWR Rear (kg) | 1093 |

VEHICLE SEATING AND WEIGHT CAPACITY DATA

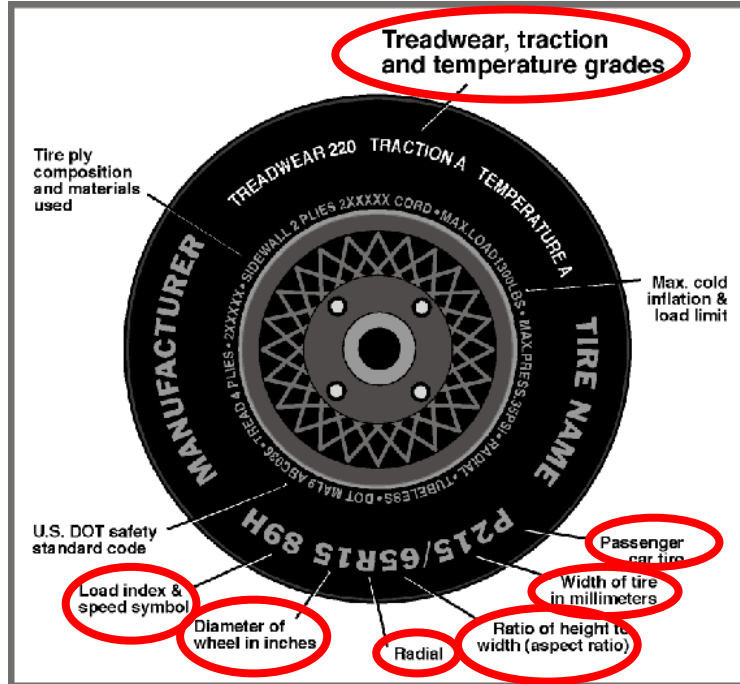
| Measured Parameter | Front | Rear | Third | Total |
|-----------------------------------|--------|-------------|-------|-------|
| Type of Seats | Bucket | Split Bench | | |
| Designated Seating Capacity (DSC) | 2 | 3 | | 5 |
| Capacity Weight (VCW) (kg) | | | | 422 |
| Cargo Weight (RCLW) (kg) | | | | 82 |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

VEHICLE TIRE INFORMATION



| Measured Parameter | Front | Rear |
|--------------------------|-----------------------------------|-----------------------------------|
| Max. Tire Pressure (kPa) | 300 | 300 |
| Cold Pressure (kPa) | 230 | 230 |
| Recommended Tire Size | 225/60R18 | 225/60R18 |
| Tire Size on Vehicle | 225/60R18 | 225/60R18 |
| Tire Manufacturer | Michelin | Michelin |
| Tire Model | Primacy | Primacy |
| Treadwear | 540 | 540 |
| Traction | A | A |
| Temperature Grade | A | A |
| Tire Plies Sidewall | 2 Polyester | 2 Polyester |
| Tire Plies Body | 2 Polyester, 2 Steel, 1 Polyamide | 2 Polyester, 2 Steel, 1 Polyamide |
| Load Index/Speed Symbol | 100H | 100H |
| Tire Material | Rubber | Rubber |
| DOT Safety Code Left | 03L14 027X 3521 | 03L14 027X 3521 |
| DOT Safety Code Right | 03L14 027X 3521 | 03L14 027X 3521 |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

TEST VEHICLE WEIGHTS

| | Units | As Delivered (UVW) | | | As Tested (ATW) | | |
|--------|-------|--------------------|-------|--------|-----------------|-------|--------|
| | | Front | Rear | Total | Front | Rear | Total |
| Left | kg | 503.5 | 387.5 | | 537.5 | 469.5 | |
| Right | kg | 532.0 | 352.5 | | 558.0 | 426.0 | |
| Ratio | % | 58.3% | 41.7% | | 55.0% | 45.0% | |
| Totals | kg | 1035.5 | 740.0 | 1775.5 | 1095.5 | 895.5 | 1991.0 |

TARGET TEST WEIGHT CALCULATION

| Measured Parameter | Units | Value |
|--|-------|--------|
| Total Delivered Weight (UVW) | kg | 1775.5 |
| Weight of 1 P572E ATD & 1 P572O ATD | kg | 141 |
| Rated Cargo/Luggage Weight (RCLW) | kg | 82 |
| Calculated Test Vehicle Target Weight (TVTW) | kg | 1998.5 |

TEST VEHICLE ATTITUDES AND CG

| | Units | LF | RF | LR | RR | CG (aft of front axle) |
|--------------|-------|-----|-----|-----|-----|------------------------|
| As Delivered | mm | 840 | 800 | 814 | 819 | 1131 |
| As Tested | mm | 782 | 781 | 788 | 794 | 1220 |
| Post Test | mm | 885 | 850 | 799 | 771 | |

GENERAL TEST VEHICLE DATA

| Measurement Description | Units | Value |
|---|-------|-------|
| Total Vehicle Wheel Base | mm | 2713 |
| Total Vehicle Length at Left Side | mm | 4475 |
| Total Vehicle Length at Centerline | mm | 4551 |
| Total Vehicle Length at Right Side | mm | 4475 |
| Weight of Ballast in Cargo Area | kg | 13 |
| Weight of Vehicle Components Removed | kg | 8 |
| Amount of Stoddard Solvent in Fuel Tank | L | 42.8 |

List of components removed to meet test weight: None.

List of components removed for instrumentation, data box, and equipment installation: Cargo area carpet/trim/divider, RR taillight, jack and tools.

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

TARGET VEHICLE STRUCTURAL MEASUREMENT

| | Elements | Pre-Test (mm) |
|----|---------------------------------------|---------------|
| 1 | Total Length | 4551 |
| 2 | Total Width | 1924 |
| 3 | Bumper Top Height | 569 |
| 4 | Bumper Bottom Height | 445 |
| 5 | Longitudinal Member Top Height | 632 |
| 6 | Distance between Longitudinal Members | 911 |
| 7 | Longitudinal Member Width | 80 |
| 8 | Engine Top Height | 862 |
| 9 | Engine Bottom Height | 250 |
| 10 | Engine and Gearbox Width | 890 |
| 11 | Front Bumper-Engine Distance | 271 |
| 12 | Front Shock Absorber Fixing Height | 925 |
| 13 | Bonnet Leading Edge Height | 909 |
| 14 | Front Shock Absorber Fixing Width | 1213 |
| 15 | Front Bumper – Front Axle Distance | 800 |
| 16 | Front Axle – A-Pillar Distance | 485 |
| 17 | A-Pillar – B-Pillar Distance | 1035 |
| 18 | B-Pillar – Rear Axle Distance | 1164 |
| 19 | B-Pillar – C-Pillar Distance | 700 |
| 20 | Roof Sill Bottom Height | 1602 |
| 21 | Roof Sill Top Height | 1653 |
| 22 | Floor Sill Bottom Height | 330 |
| 23 | Floor Sill Top Height | 422 |

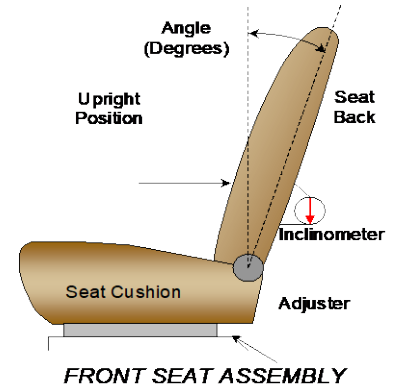
**DATA SHEET NO. 2
SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

NOMINAL DESIGN RIDING POSITION

The driver seat back is positioned as close as possible to the manufacturer’s design angle. For the passenger seat back, seat back is adjusted following Appendix F, “Driver & Passenger Dummy Seating & Positioning Procedures” in the NCAP Test Procedure dated May 2018.



| | Degrees |
|---------------------------|---------------------------------|
| Driver Seat Back Angle | 3.1° on outboard headrest post |
| Passenger Seat Back Angle | -4.0° on outboard headrest post |

SEAT FORE/AFT POSITIONS

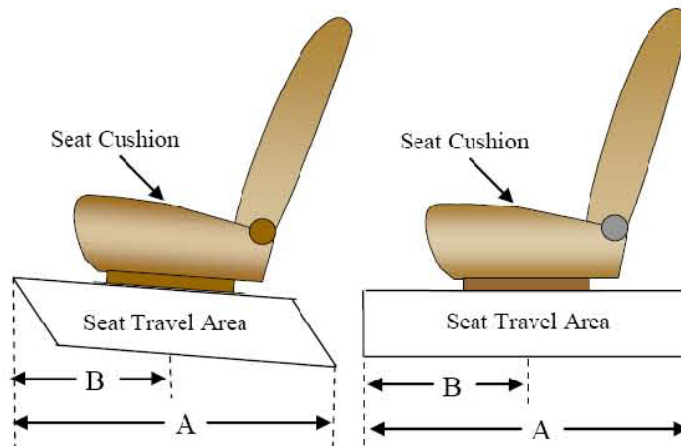
The driver and passenger seat fore/aft positions are adjusted following Appendix F, “Driver & Passenger Dummy Seating & Positioning Procedures” in the NCAP Test Procedure dated May 2018.

| | Total Fore/Aft Travel | Placed in Position # |
|----------------|--|--|
| Driver Seat | 300 mm | 150 mm |
| Passenger Seat | 254 mm / 38 detents (1 st as 1) | 0 mm / 0 th detent (1 st as 0) |

SEAT BELT UPPER ANCHORAGES

The seat belt upper anchorages are set following the manufacturer’s specified position as listed in Form 1.

| | Total # of Positions | Placed in Position # |
|----------------|--------------------------|--------------------------|
| Driver Seat | 4 (1 st as 1) | 0 (1 st as 0) |
| Passenger Seat | 4 (1 st as 1) | 0 (1 st as 0) |



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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

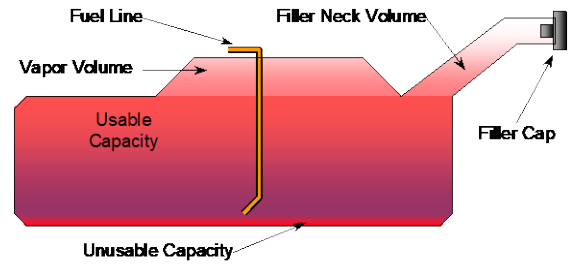
NHTSA No.: M20220200
 Test Date: 3/29/2022

FUEL TANK CAPACITY DATA

| | Liters |
|------------------------------------|---------------|
| Usable Capacity of "Standard Tank" | 46.2 |
| Usable Capacity of "Optional Tank" | |
| 92-94% of Usable Capacity | 42.5 to 43.4 |
| Actual Amount of Solvent used | 42.8 |
| 1/3 of Usable Capacity | 15.4 |

FUEL PUMP

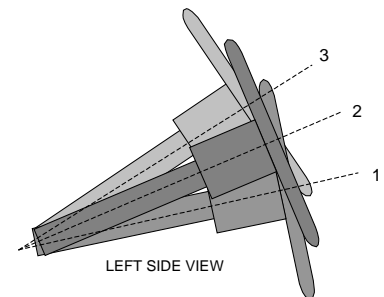
The vehicle is equipped with an electronic fuel pump. Fuel pump cycles for a brief period when key is moved to on position but does not pump fuel unless engine is running. The filler neck is located on the driver's side.



VEHICLE FUEL TANK ASSEMBLY

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

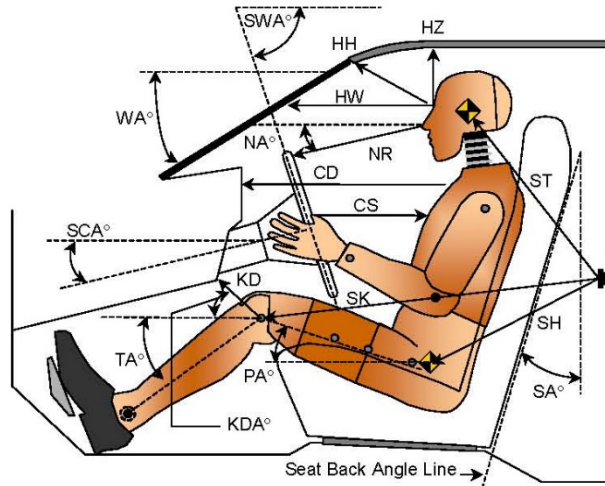
STEERING COLUMN POSITION

| | Degrees | Fore/Aft Position (mm) |
|-----------------------------------|----------------|-------------------------------|
| Lowermost Position 1 | 67.3 | |
| Geometric Center Position 2 | 65.2 | |
| Uppermost Position 3 | 63.0 | |
| Telescoping Steering Wheel Travel | | 55 |
| Test Position | 65.2 | 28 |

DATA SHEET NO. 3
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
Test Date: 3/29/2022



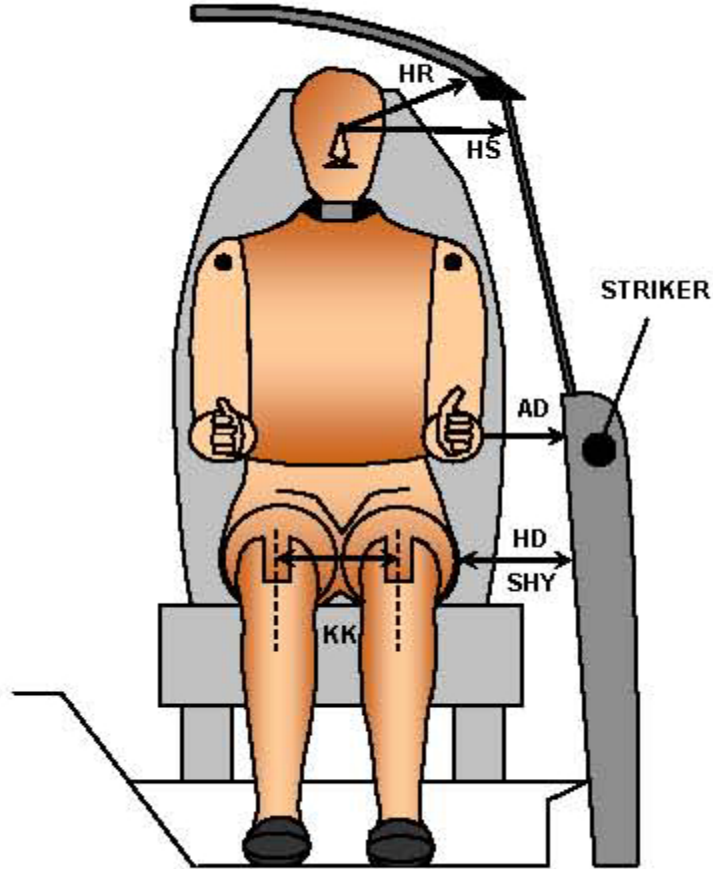
LEFT SIDE VIEW

| Code | Measurement Description | Driver | | Passenger | |
|------|-------------------------|-------------|-----------|-------------|-----------|
| | | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| WA° | Windshield Angle | | 24.0 | | |
| SWA° | Steering Wheel Angle | | 65.2 | | |
| SCA° | Steering Column Angle | | 24.8 | | |
| SA° | Seat Back Angle | | 3.1 | | -4.0 |
| HZ | Head to Roof (Z) | 220 | 90 | 208 | 90 |
| HH | Head to Header | 310 | 28.2 | 270 | 48.7 |
| HW | Head to Windshield | 670 | 0 | 614 | 0 |
| NR | Nose to Rim | 377 | 10.4 | | |
| CD | Chest to Dash | 520 | | 360 | |
| CS | Chest to Steering Hub | 299 | 0.4 | | |
| RA | Rim to Abdomen | 171 | 0 | | |
| KDL | Left Knee to Dash | 195 | 46.1 | 93 | 31.4 |
| KDR | Right Knee to Dash | 202 | 30.9 | 88 | 32.0 |
| PA° | Pelvic Angle | | 24.3 | | 21.0 |
| TA° | Tibia Angle | | 56.2 | | 73.2 |
| SK | Striker to Knee | 584 | 91.5 | 685 | 95.5 |
| ST | Striker to Head | 526 | 9.0 | 529 | 27.1 |
| SH | Striker to H-Point | 228 | 121.4 | 354 | 100.6 |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022



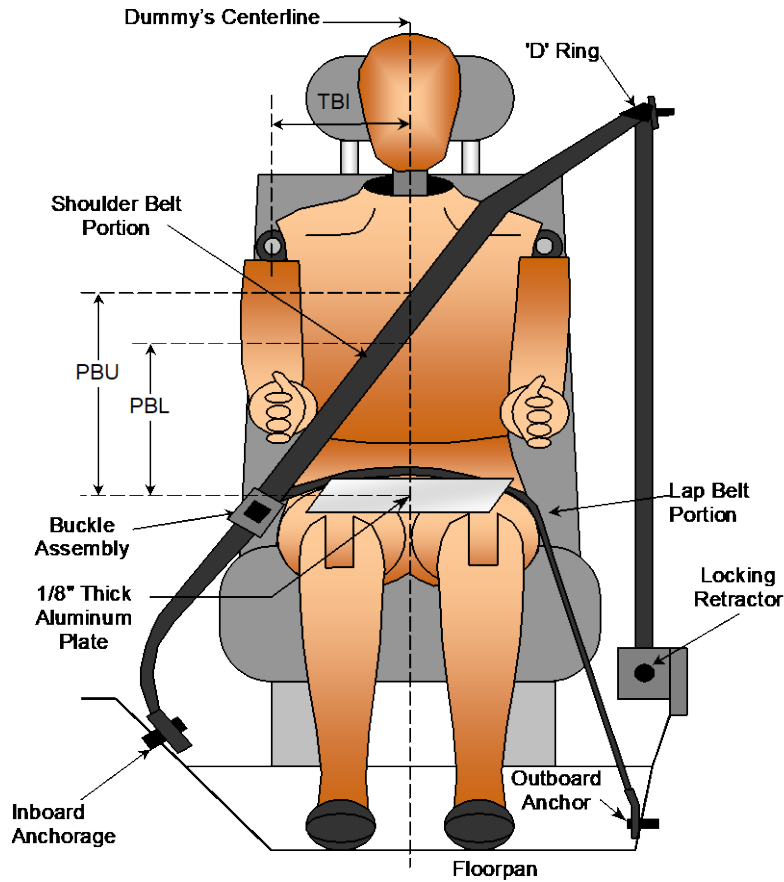
FRONT VIEW OF DUMMY

| Code | Measurement Description | Driver | Passenger |
|------|----------------------------------|-------------|-----------|
| | | Length (mm) | |
| AD | Arm to Door | 115 | 96 |
| HD | H-Point to Door | 143 | 181 |
| HR | Head to Side Header | 251 | 265 |
| HS | Head to Side Window | 359 | 370 |
| KK | Knee to Knee | 360 | 230 |
| SHY | Striker to H-Point (Y Direction) | 304 | 313 |
| AA | Ankle to Ankle | 353 | 180 |

**DATA SHEET NO. 5
SEAT BELT POSITIONING DATA**

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022



FRONT VIEW OF DUMMY

SEAT BELT POSITIONING MEASUREMENTS

| Measurement Description | Units | Driver | Passenger |
|---|-------|--------|-----------|
| PBU - Top surface of reference to belt upper edge | mm | 335 | 340 |
| PBL - Top surface of reference to belt lower edge | mm | 250 | 245 |

BELT LENGTH DATA

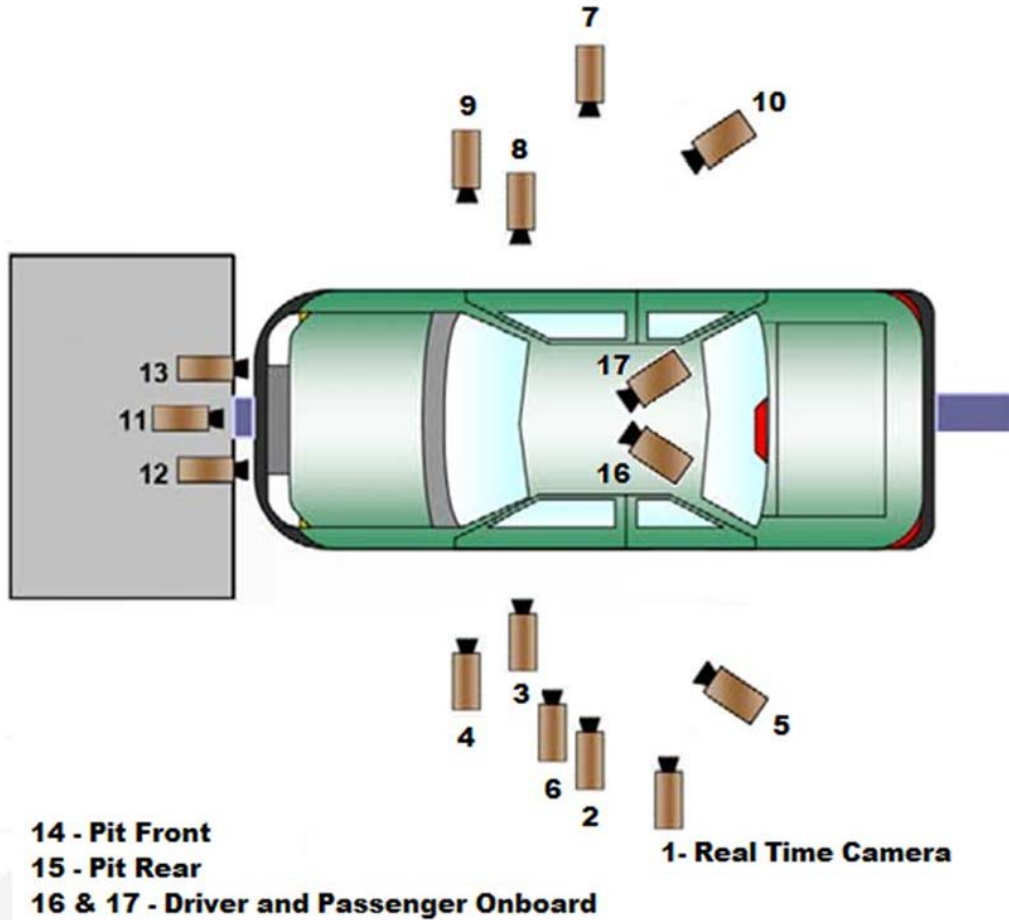
| Measurement Description | Units | Driver | Passenger |
|--|-------|--------|-----------|
| Shoulder Belt Length as measured on ATD | mm | 835 | 920 |
| Lap Belt Length as measured on ATD | mm | 995 | 770 |
| Remainder of belt on reel | mm | 520 | 660 |
| Total Belt Length for Continuous Webbing Systems | mm | 3100 | 3100 |

**DATA SHEET NO. 6
HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
Test Date: 3/29/2022

CAMERA POSITIONS FOR FRONTAL IMPACTS



***Camera locations are approximate and not to scale*

DATA SHEET NO. 6 (CONTINUED)
HIGH-SPEED CAMERA LOCATIONS AND DATA

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

CAMERA LOCATIONS

| No. | Camera View | Coordinates* (mm) | | | Lens (mm) | Speed (fps) |
|-----|------------------------|-------------------|-------|-------|-----------|-------------|
| | | X | Y | Z | | |
| 1 | Real-Time Left Overall | | | | | 30 |
| 2 | Left Overall | -2190 | -5720 | -1450 | 12 | 1000 |
| 3 | Driver Close-Up | -1900 | -6970 | -2060 | 50 | 1000 |
| 4 | Left Front Half | -1380 | -5420 | -1490 | 24 | 1000 |
| 5 | Left Angle | -7270 | -5870 | -1940 | 75 | 1000 |
| 6 | Steering Column | -920 | -5650 | -1250 | 50 | 1000 |
| 7 | Right Overall | -2180 | 5650 | -1400 | 12 | 1000 |
| 8 | Passenger Close-Up | -1830 | 6700 | -2070 | 50 | 1000 |
| 9 | Right Front Half | -1100 | 5400 | -1430 | 24 | 1000 |
| 10 | Right Angle | -7440 | 5510 | -2040 | 75 | 1000 |
| 11 | Windshield | 180 | 0 | -2310 | 12 | 1000 |
| 12 | Driver Windshield | 230 | -370 | 0 | 25 | 1000 |
| 13 | Passenger Windshield | 230 | 370 | -2230 | 25 | 1000 |
| 14 | Pit Front | -1090 | 0 | 3340 | 24 | 1000 |
| 15 | Pit Rear | -2910 | 0 | 3340 | 24 | 1000 |
| 16 | Driver Onboard | | | | 12 | 1000 |
| 17 | Passenger Onboard | | | | 12 | 1000 |
| 18 | Real-Time Pan View | | | | | 30 |

*COORDINATES:

+X = forward of impact plane

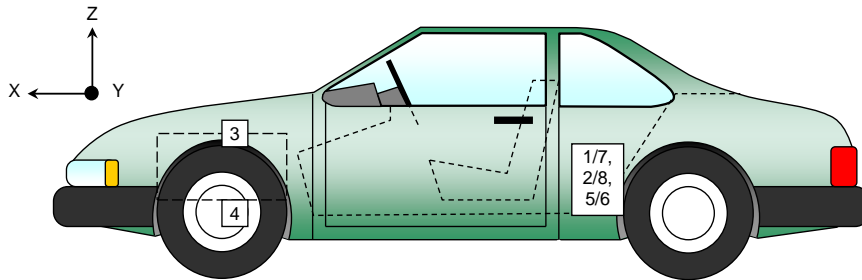
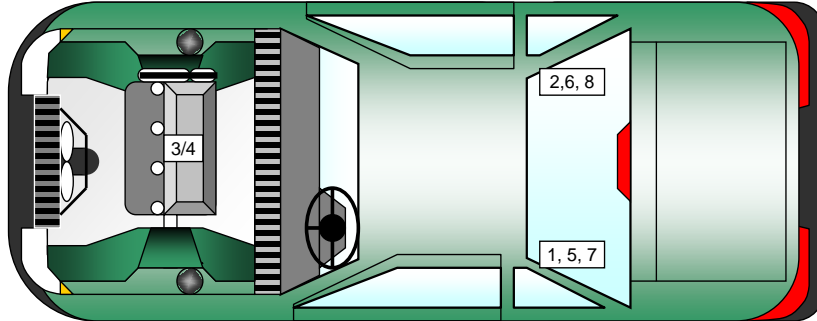
+Y = right of monorail centerline

+Z = below ground level

DATA SHEET NO. 7
VEHICLE ACCELEROMETER LOCATIONS

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
Test Date: 3/29/2022



VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

| No. | Accelerometer Location | Measurements (mm) | | |
|-----|--|-------------------|------|------|
| | | X | Y | Z |
| 1 | Left Rear Crossmember Accelerometer – X Direction | 1745 | -385 | -415 |
| 2 | Right Rear Crossmember Accelerometer – X Direction | 1745 | 385 | -415 |
| 3 | Engine Top X | 3844 | 0 | -833 |
| 4 | Engine Bottom X | 3863 | 62 | -226 |
| 5 | Left Rear Crossmember Accelerometer – Z Direction | 1745 | -385 | -415 |
| 6 | Right Rear Crossmember Accelerometer – Z Direction | 1745 | 385 | -415 |
| 7 | Left Rear Crossmember Accelerometer Redundant – X Direction | 1745 | -305 | -415 |
| 8 | Right Rear Crossmember Accelerometer Redundant – X Direction | 1745 | 305 | -415 |

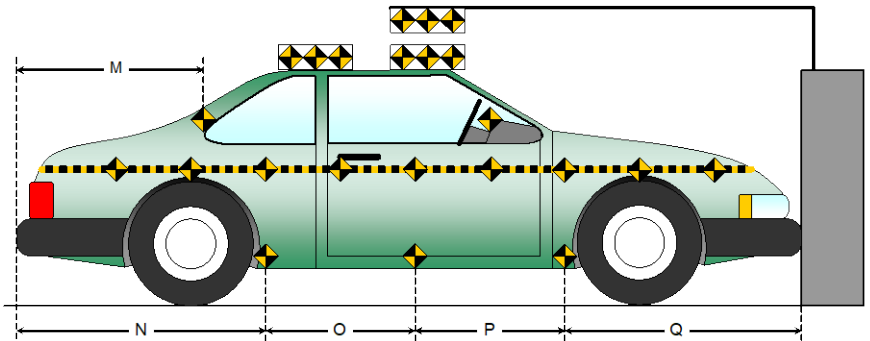
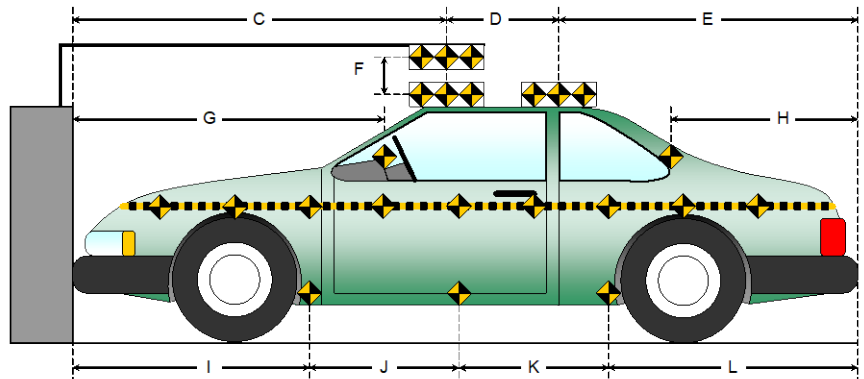
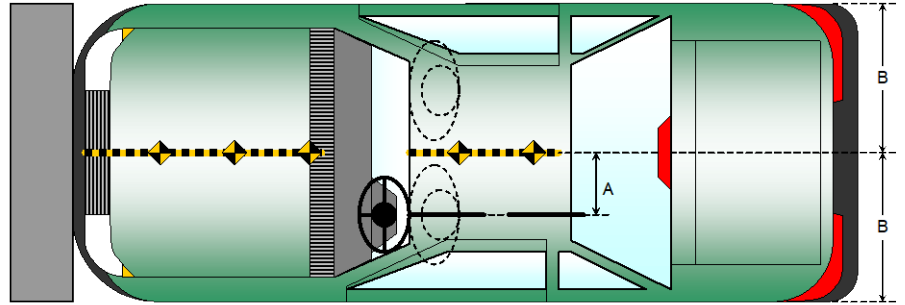
Reference Points: X - Rear Surface of Vehicle (+ forward)
Y - Vehicle Centerline (+ to right)
Z - Ground Plane (+ down)

DATA SHEET NO. 8
PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

| Item | Value (mm) |
|------|------------|
| A | 390 |
| B | 962 |
| C | 2300 |
| D | 610 |
| E | 1641 |
| F | 70 |
| G | |
| H | 799 |
| I | 1426 |
| J | 865 |
| K | 865 |
| L | 1395 |
| M | 799 |
| N | 1395 |
| O | 865 |
| P | 865 |
| Q | 1426 |



**DATA SHEET NO. 9
LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

ADVANCED RESEARCH LOAD CELL BARRIER

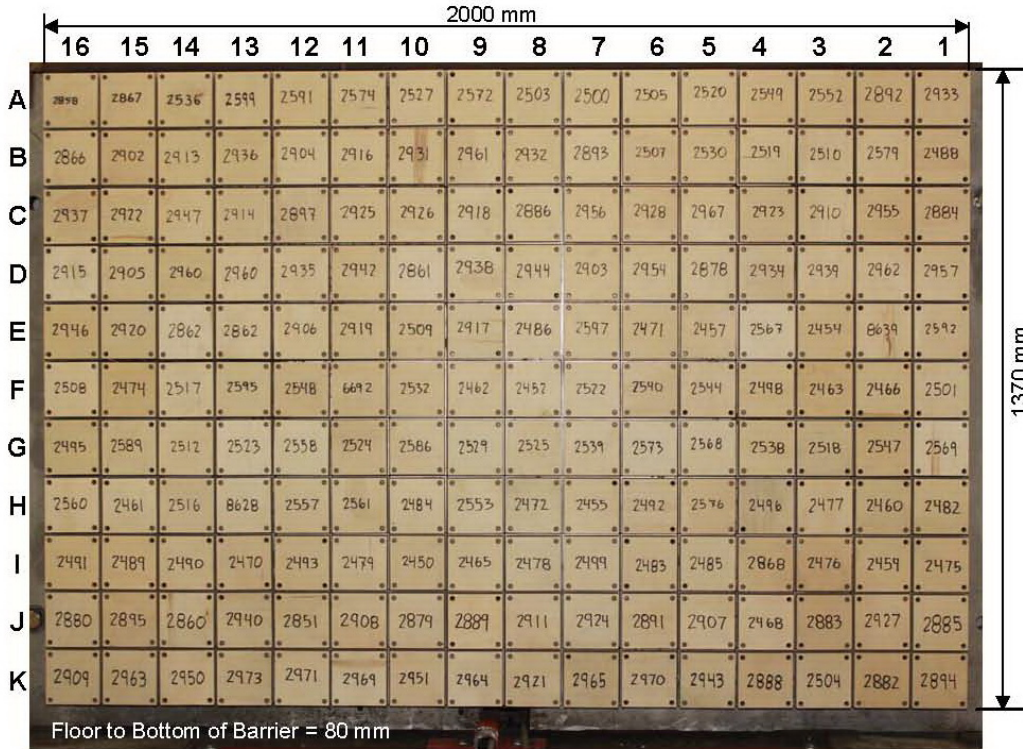


Photo for Reference Only

Centerline

| | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| A-16 | A-15 | A-14 | A-13 | A-12 | A-11 | A-10 | A-09 | A-08 | A-07 | A-06 | A-05 | A-04 | A-03 | A-02 | A-01 |
| B-16 | B-15 | B-14 | B-13 | B-12 | B-11 | B-10 | B-09 | B-08 | B-07 | B-06 | B-05 | B-04 | B-03 | B-02 | B-01 |
| C-16 | C-15 | C-14 | C-13 | C-12 | C-11 | C-10 | C-09 | C-08 | C-07 | C-06 | C-05 | C-04 | C-03 | C-02 | C-01 |
| D-16 | D-15 | D-14 | D-13 | D-12 | D-11 | D-10 | D-09 | D-08 | D-07 | D-06 | D-05 | D-04 | D-03 | D-02 | D-01 |
| E-16 | E-15 | E-14 | E-13 | E-12 | E-11 | E-10 | E-09 | E-08 | E-07 | E-06 | E-05 | E-04 | E-03 | E-02 | E-01 |
| F-16 | F-15 | F-14 | F-13 | F-12 | F-11 | F-10 | F-09 | F-08 | F-07 | F-06 | F-05 | F-04 | F-03 | F-02 | F-01 |
| G-16 | G-15 | G-14 | G-13 | G-12 | G-11 | G-10 | G-09 | G-08 | G-07 | G-06 | G-05 | G-04 | G-03 | G-02 | G-01 |
| H-16 | H-15 | H-14 | H-13 | H-12 | H-11 | H-10 | H-09 | H-08 | H-07 | H-06 | H-05 | H-04 | H-03 | H-02 | H-01 |
| I-16 | I-15 | I-14 | I-13 | I-12 | I-11 | I-10 | I-09 | I-08 | I-07 | I-06 | I-05 | I-04 | I-03 | I-02 | I-01 |
| J-16 | J-15 | J-14 | J-13 | J-12 | J-11 | J-10 | J-09 | J-08 | J-07 | J-06 | J-05 | J-04 | J-03 | J-02 | J-01 |
| K-16 | K-15 | K-14 | K-13 | K-12 | K-11 | K-10 | K-09 | K-08 | K-07 | K-06 | K-05 | K-04 | K-03 | K-02 | K-01 |

Load Cells are 121 mm x 121 mm with a 7 mm gap in between each load cell.

DATA SHEET NO. 10
TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

INSTRUMENTATION

| Instrumentation | Number of Channels Collected |
|----------------------------------|------------------------------|
| Driver Dummy Data Channels | 47 |
| Passenger Dummy Data Channels | 47 |
| Vehicle Structure Accelerometers | 8 |
| Barrier Channels | 528 |
| Total | 630 |

CAMERA COVERAGE

| Type of Camera | Number Used in this Test |
|----------------------------|--------------------------|
| High-Speed Vehicle Onboard | 2 |
| High-Speed Offboard | 14 |
| Real-Time | 2 |
| Total | 18 |

**DATA SHEET NO. 11
POST-TEST OBSERVATIONS**

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

TEST DUMMY INFORMATION AND CONTACT LOCATIONS

| Description | Driver | Passenger |
|-------------------------|--------------------------|--------------------------|
| Dummy Type / Serial No. | HIII 50% / 351 | HIII 5% / 142 |
| Head Contact | Frontal Airbag, Headrest | Frontal Airbag, Headrest |
| Upper Torso Contact | Frontal Airbag | Frontal Airbag |
| Lower Torso Contact | None | None |
| Left Knee Contact | Knee Airbag | Glove Box |
| Right Knee Contact | Knee Airbag | Glove Box |

DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

| Description | Driver | Passenger |
|------------------------------|---|---|
| Locked/Unlocked Doors | Doors were locked | Doors were locked |
| Front Door Opening | Remained closed and unlocked; opened without tools | Remained closed and unlocked; opened without tools |
| Rear Door Opening | Remained closed and unlocked; opened without tools | Remained closed and unlocked; opened without tools |
| Trunk/Hatch/Tailgate Opening | Remained closed; opened without tools | |
| Seat Track Shift (mm) | 0 | 0 |
| Seat Back Movement | None | None |

OTHER VEHICLE POST-TEST OBSERVATIONS

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

VEHICLE REBOUND FROM BARRIER

| Measured Parameter | Units | Value |
|--------------------|-------|-------|
| Left Side | mm | 1510 |
| Center | mm | 1385 |
| Right Side | mm | 1470 |
| Average | mm | 1455 |

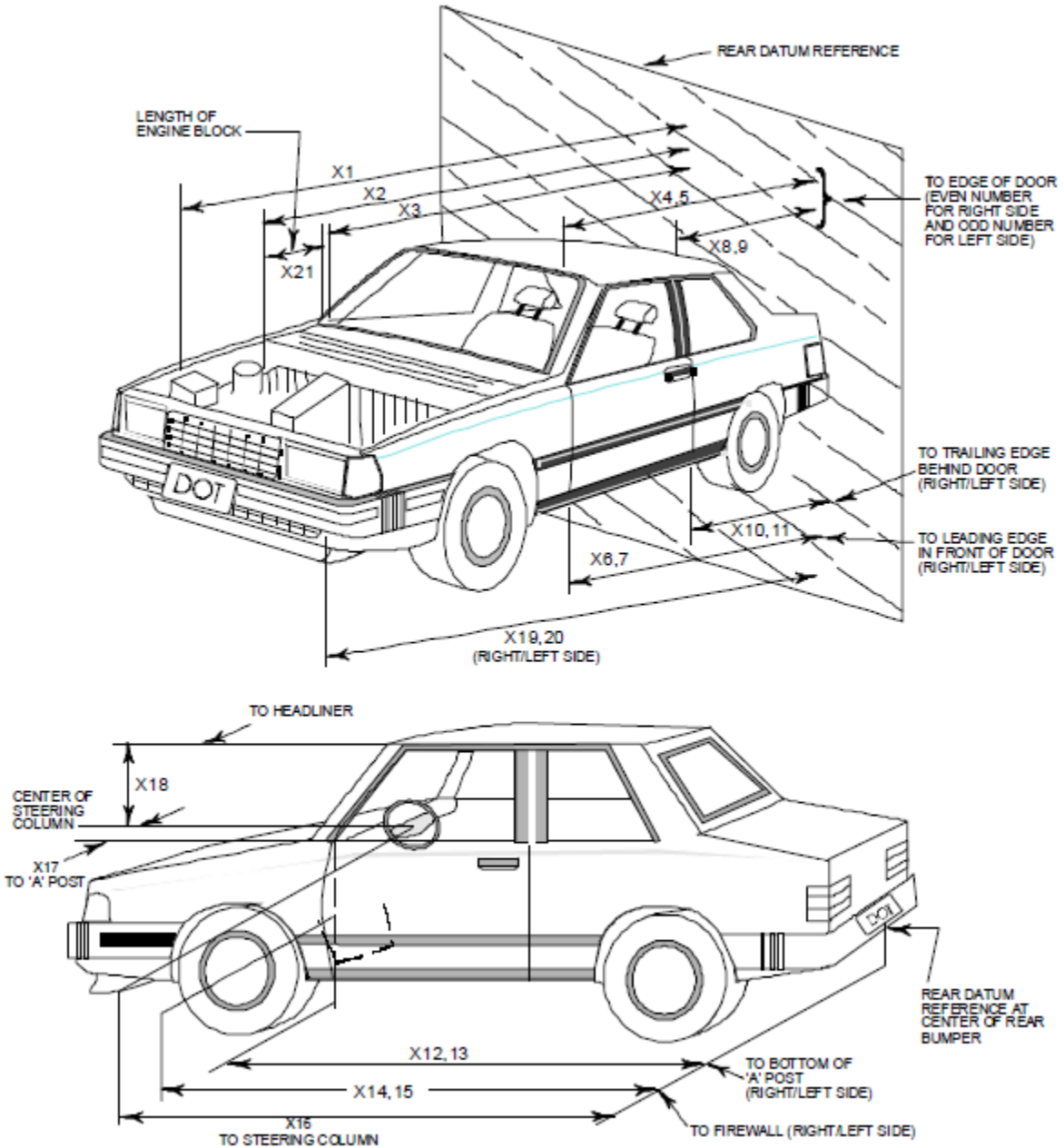
SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

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

DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022



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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
Test Date: 3/29/2022

| No. | Measurement Description | Pre-Test | Post-Test | Change |
|-----|---|----------|-----------|--------|
| 1 | Total Length of Vehicle at Centerline | 4551 | 4208 | -343 |
| 2 | RSOV to Front of Engine | 3841 | 3890 | 49 |
| 3 | RSOV to Firewall | 3479 | 3515 | 36 |
| 4 | RSOV to Upper Leading Edge of Right Door | 3145 | 3162 | 17 |
| 5 | RSOV to Upper Leading Edge of Left Door | 3145 | 3150 | 5 |
| 6 | RSOV to Lower Leading Edge of Right Door | 3089 | 3105 | 16 |
| 7 | RSOV to Lower Leading Edge of Left Door | 3089 | 3096 | 7 |
| 8 | RSOV to Upper Trailing Edge of Right Door | 2021 | 2047 | 26 |
| 9 | RSOV to Upper Trailing Edge of Left Door | 2021 | 2046 | 25 |
| 10 | RSOV to Lower Trailing Edge of Right Door | 2066 | 2074 | 8 |
| 11 | RSOV to Lower Trailing Edge of Left Door | 2066 | 2078 | 12 |
| 12 | RSOV to Bottom of "A" Post of Right Side | 3115 | 3028 | -87 |
| 13 | RSOV to Bottom of "A" Post of Left Side | 3115 | 3020 | -95 |
| 14 | RSOV to Firewall, Right Side | 3465 | 3512 | 47 |
| 15 | RSOV to Firewall, Left Side | 3465 | 3520 | 55 |
| 16 | RSOV to Steering Column | 2644 | 2696 | 52 |
| 17 | Center of Steering Column to "A" Post | 369 | 415 | 46 |
| 18 | Center of Steering Column to Headliner | 430 | 530 | 100 |
| 19 | RSOV to Right Side of Front Bumper | 4475 | 4215 | -260 |
| 20 | RSOV to Left Side of Front Bumper | 4475 | 4200 | -275 |
| 21 | Length of Engine Block | 484 | 524 | 40 |
| RD | RSOV to Right Side of Dash Panel | 2874 | 2918 | 44 |
| CD | RSOV to Center of Dash Panel | 2857 | 2871 | 14 |
| LD | RSOV to Left Side of Dash Panel | 2876 | 2873 | -3 |

All dimensions in mm

* The post-test measurements presented in this table were revised on 12/27/2023 due to the original values being affected by a measurement setup error.

DATA SHEET NO. 13
ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

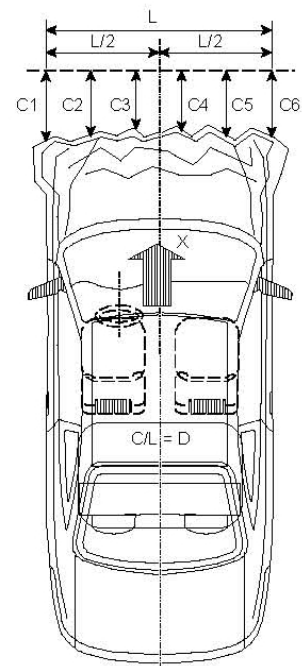
NHTSA No.: M20220200
Test Date: 3/29/2022

VEHICLE INFORMATION

| | | | |
|------------------------|--------------------------|-------------------|---------------|
| VIN: | <u>1FMCU0KZ9NUA18828</u> | Wheelbase (mm): | <u>2713</u> |
| Vehicle Size Category: | <u>MPV</u> | Test Weight (kg): | <u>1991.0</u> |

ACCELEROMETER DATA

| | |
|---------------------------|--------------------------------|
| Accelerometer Locations: | <u>As per Data Sheet No. 7</u> |
| Cal. Procedure/Interval: | <u>MGA Procedure / 6 month</u> |
| Integration Algorithm: | <u>Trapezoidal</u> |
| Linearity: | <u>> 99%</u> |
| Impact Velocity (km/h): | <u>56.15</u> |
| Velocity Change (km/h): | <u>65.6</u> |
| Time of Separation (msec) | <u>102</u> |



CRUSH PROFILE

| | |
|---------------------------------------|-------------------|
| Collision Deformation Classification: | <u>12FDEW3</u> |
| Midpoint of Damage: | <u>Centerline</u> |
| Damage Region Length (mm): | <u>1280</u> |
| Impact Mode: | <u>Frontal</u> |

| No. | Measurement Description | Units | Pre-Test | Post-Test | Exterior Crush |
|-----|----------------------------|-------|----------|-----------|----------------|
| C1 | Crush zone 1 at left side | mm | 4475 | 4200 | 275 |
| C2 | Crush zone 2 at left side | mm | 4545 | 4185 | 360 |
| C3 | Crush zone 3 at left side | mm | 4548 | 4176 | 372 |
| C4 | Crush zone 4 at right side | mm | 4548 | 4182 | 366 |
| C5 | Crush zone 5 at right side | mm | 4545 | 4177 | 368 |
| C6 | Crush zone 6 at right side | mm | 4475 | 4215 | 260 |
| L | C1 TO C6 | mm | 1280 | 1274 | 6 |

* The post-test measurements presented in this table were revised on 12/27/2023 due to the original values being affected by a measurement setup error.

**DATA SHEET NO. 14
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

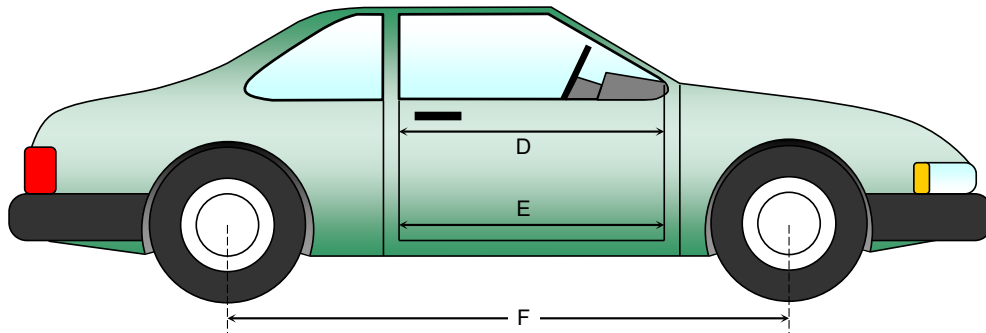
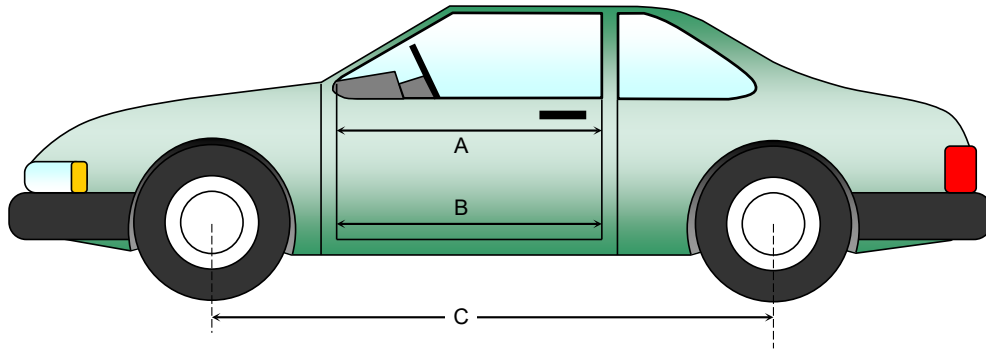
NHTSA No.: M20220200
 Test Date: 3/29/2022

DOOR OPENING WIDTH

| Item | Description | Units | Pre-Test | Post-Test | Change |
|------|------------------|-------|----------|-----------|--------|
| A | Left Side Upper | mm | 961 | 960 | -1 |
| B | Left Side Lower | mm | 825 | 825 | 0 |
| D | Right Side Upper | mm | 960 | 960 | 0 |
| E | Right Side Lower | mm | 817 | 817 | 0 |

WHEELBASE MEASUREMENTS

| Item | Description | Units | Pre-Test | Post-Test | Change |
|------|----------------------|-------|----------|-----------|--------|
| C | Left Side Wheelbase | mm | 2713 | 2619 | -94 |
| F | Right Side Wheelbase | mm | 2713 | 2627 | -86 |



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

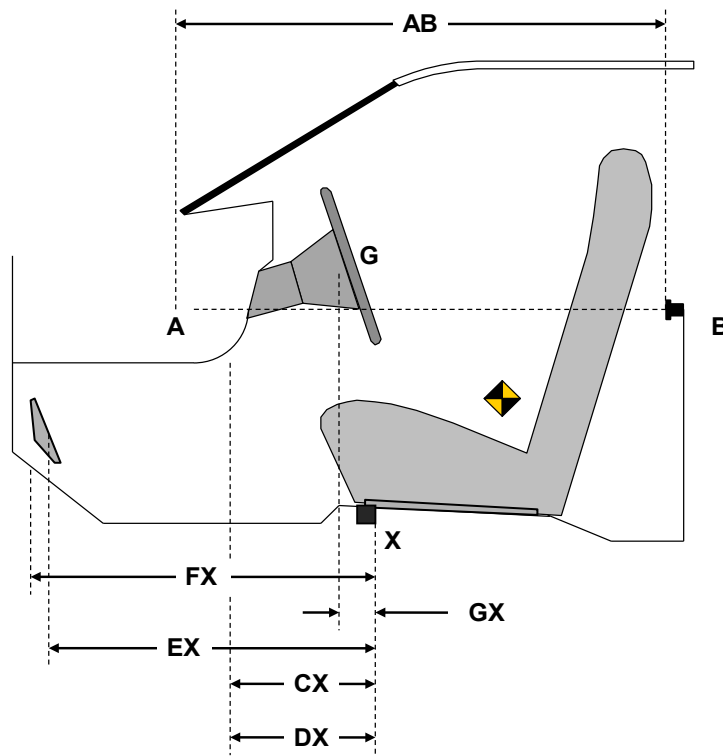
Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

DRIVER COMPARTMENT INTRUSION

| Item | Description | Units | Pre-Test | Post-Test | Change |
|------|--|-------|----------|-----------|--------|
| AB | Door Opening (Inside Window Jam) | mm | 778 | 778 | 0 |
| CX | Left Knee Bolster to X | mm | 377 | 364 | -13 |
| DX | Right Knee Bolster to X | mm | 380 | 372 | -8 |
| EX | Brake Pedal to X | mm | 551 | 530 | -21 |
| FX | Foot Rest to X | mm | 580 | 571 | -9 |
| GX | Center of Steering Column Wheel Hub to X | mm | 82 | 110 | 28 |

X = Front of Seat Track (stationary)



DRIVER COMPARTMENT

DATA SHEET NO. 15
SUMMARY OF FMVSS 212 AND FMVSS 219 (PARTIAL) DATA

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

WINDSHIELD MOUNTING DETAILS

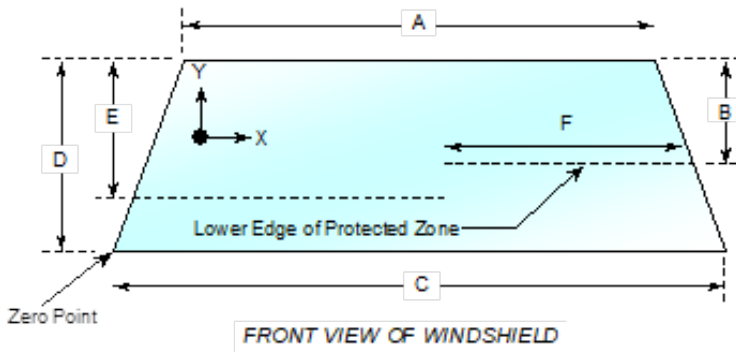
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

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

Temperature of windshield molding during test: 21.6°C.

WINDSHIELD PERIPHERY MEASUREMENTS

| Measurement | Pre-Test (mm) | Post-Test (mm) | % of Retention |
|-------------|---------------|----------------|----------------|
| Left Side | 2323 | 2323 | 100 |
| Right Side | 2323 | 2323 | 100 |
| Total | 4646 | 4646 | 100 |



| Item | Units | Value |
|------|-------|-------|
| A | mm | 1346 |
| B | mm | 465 |
| C | mm | 1540 |
| D | mm | 880 |
| E | mm | 520 |
| F | mm | 556 |

AREA OF PROTECTED ZONE FAILURES

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

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

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

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

DATA SHEET NO. 16
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

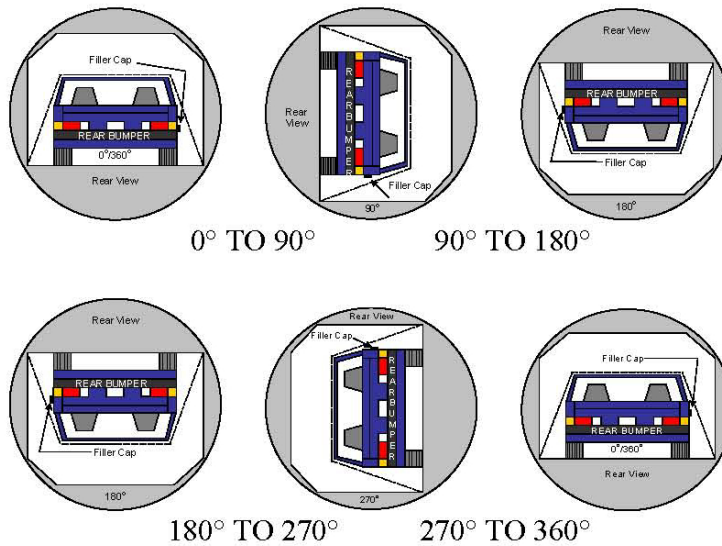
FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA

Temperature at Time of Impact: 21.6°C

Test Time: 11:36 a.m.

- 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 RESULTS



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage: **None**

SOLVENT COLLECTION TIME TABLE IN SECONDS

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

DATA SHEET NO. 16 (CONTINUED)
FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

FMVSS 301 SPILLAGE TABLE (UNITS IN OUNCES)

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

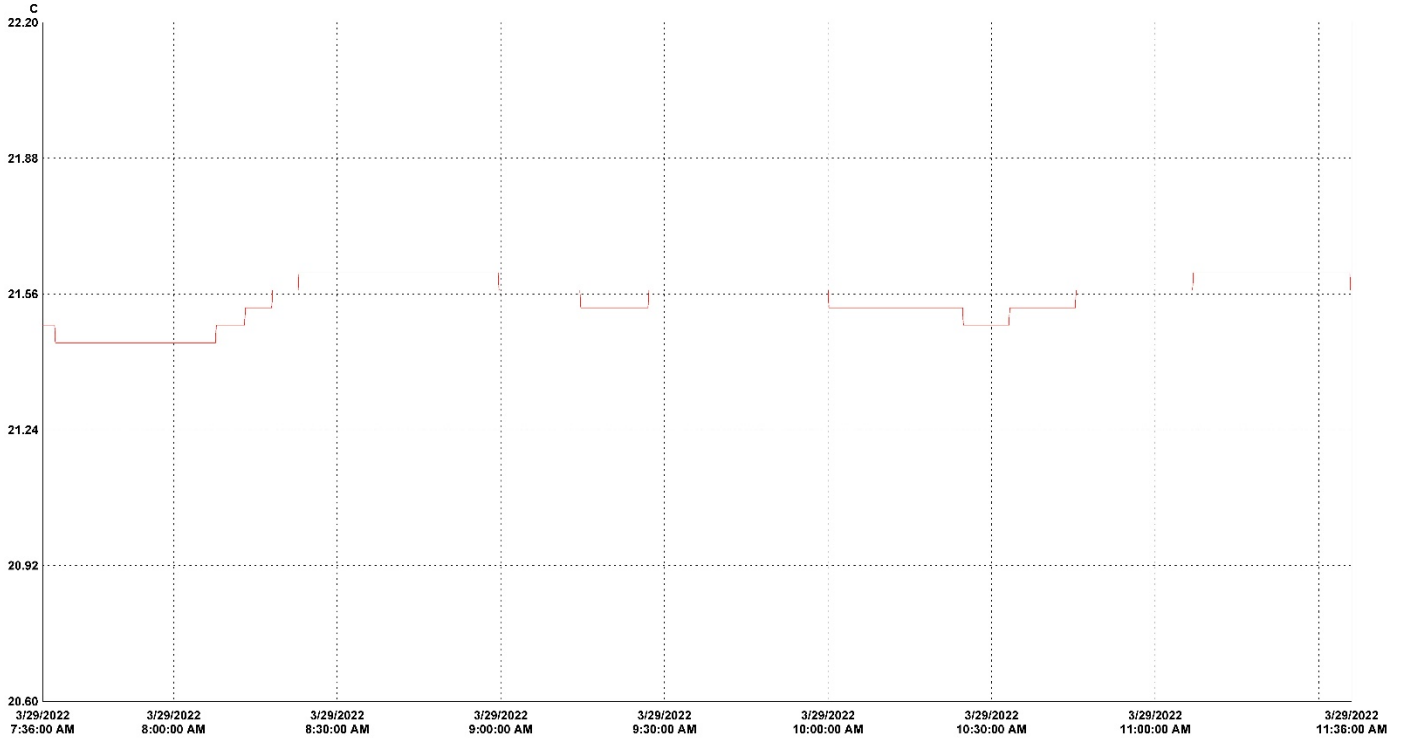
SOLVENT SPILLAGE LOCATION TABLE

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

DATA SHEET NO. 17
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022



30 minutes/div 4 hours (M/d/yyyy h:mm:ss tt) Central Time Graph file (truncated): M20220200 2022 Ford Escape SEL PHEV 5-Door SUV NCAP.spg

| LN | Serial# | Description | CH | Value | Maximum | Average | Minimum | Units | CH description | Logger file |
|----|----------|-----------------|----|-------|---------|---------|---------|-------------|---|-------------|
| 1 | 18352041 | VSC_Prep_Room 1 | | 21.61 | 21.55 | 21.45 | C | Temperature | \\WI-SERVER\Jobs\NCAP\IMY 2022 NCAP Vehicles\23 - NCAP - 2022 Ford Escape PHEV - 3-29-2022\18352041_VSC_Prep_Room.spl | |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

ELECTRIC VEHICLE PROPULSION SYSTEM

| | Units | Observations and Conclusions |
|--|-------|---|
| Type of Electric Vehicle | | Gasoline/Electric Hybrid |
| Propulsion Battery Type | | Lithium Ion |
| Nominal Voltage | V | 300.3 |
| Physical Location of Automatic Propulsion Battery Disconnect | | The battery pack uses internal contactors for automatic disconnect. |
| Auxiliary Battery Type | | 12V Lead-Acid |

PROPULSION BATTERY SYSTEM DATA

| | Units | Observations and Conclusions |
|--|-------|---|
| Electrolyte Fluid Type | | EC/EMC/DMC based |
| Electrolyte Fluid Specific Gravity | g/L | 1.22 |
| Electrolyte Fluid Kinematic Viscosity | cSt | 3.12 |
| Electrolyte Fluid Color | | Transparent White |
| Propulsion Battery Coolant Type, Color, Specific Gravity (if applicable) | | 50/50 WSS-M97B44-D (Glycol) and de-ionized water |
| Location of Battery Modules | | Inside Passenger Compartment |
| | | X Outside Passenger Compartment |
| | | The high-voltage battery is located below the occupant compartment. |

PROPULSION BATTERY STATE OF CHARGE

| | |
|---|---------|
| <i>For all battery types:</i> | |
| Voltage range corresponding to useable energy of the battery: | |
| Minimum State of Charge | 176 V |
| Maximum State of Charge | 353 V |
| 95% of Maximum State of Charge | 335 V |
| Test Voltage - No less than 95% of maximum State of Charge | 339.2 V |
| <i>For batteries that are rechargeable ONLY by an energy source on the vehicle:</i> | |
| Voltage range corresponding to useable energy of the battery: | |
| Minimum State of Charge | |
| Maximum State of Charge | |
| Test Voltage – Maximum practicable State of Charge within Normal Operating Range | |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

VEHICLE CHASSIS GROUND POINT(S) LOCATION(S)

| | |
|--|--|
| Details of Vehicle Chassis Ground Point(s) & Location(s) | Vehicle chassis underbody ground point |
|--|--|

PROPULSION BATTERY SYSTEM

| | |
|--|---|
| Details of Electric Energy Storage/Conversion System Test Points | Connected at + and – terminal ends of propulsion system |
| Additional Comments | This battery pack has three high voltage negative outputs and one high voltage positive output, ISC (+). The negative outputs are ISC (-), DC/DC Charger (-), and EAC/PTC (-). ISC (-) and EAC/PTC (-) share the same disconnect. The voltage measurements are taken by measuring the voltage between ISC (+) and each negative output. |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
Test Date: 3/29/2022

VOLTMETER INFORMATION

| | Units | Observations and Conclusions |
|--------------------------|-------|------------------------------|
| Make | | Fluke |
| Model | | 177 |
| Serial Number | | 17210161 |
| Internal Impedance Value | MΩ | > 10 MΩ < 100 pF |
| Resolution | V | 0.001 |
| Last Calibration Date | | 6/30/2021 |

PROPULSION BATTERY VOLTAGE

Measurement shall be made with Energy Storage/Conversion System connected to the vehicle propulsion system, and the vehicle in the “ready-to-drive” (propulsion system energized) position.

NOTE: If voltage measurement is not at the voltage or within the normal operating voltage range specified by the manufacturer, the battery must be charged.

| | | |
|----|---|-------|
| Vb | V | 339.2 |
|----|---|-------|

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

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

| | | |
|----|---|-------|
| V1 | V | 59.9 |
| V2 | V | 282.9 |

PROPULSION BATTERY TO VEHICLE CHASSIS ACROSS RESISTOR

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

| | | |
|-------|---|---------|
| R_o | Ω | 207,000 |
|-------|---|---------|

| | | |
|----------------|---|------|
| V1' Pre-Impact | V | 13.8 |
| V2' Pre-Impact | V | 15.5 |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

ELECTRICAL ISOLATION CALCULATIONS

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

| | | |
|--|---|-----------|
| $R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$ | | |
| Ri1 Pre-Impact | Ω | 3,957,366 |
| $R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$ | | |
| Ri2 Pre-Impact | Ω | 4,327,209 |
| Ri = The lesser of Ri1 and Ri2 | | |
| Ri Pre-Impact | Ω | 3,957,366 |
| $R_i / V_b = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$ | | |
| Ri / Vb Pre-Impact | Ω | 11,667 |

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

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

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

VOLTMETER INFORMATION

| | Units | Observations and Conclusions |
|--------------------------|-------|------------------------------|
| Make | | Fluke |
| Model | | 177 |
| Serial Number | | 17210161 |
| Internal Impedance Value | MΩ | > 10 MΩ < 100 pF |
| Resolution | V | 0.001 |
| Last Calibration Date | | 6/30/2021 |

ELECTRICAL ISOLATION MEASUREMENTS

| | | |
|----------------|---|-----|
| Vb Post-Impact | V | 0.5 |
|----------------|---|-----|

| | | | | | | | |
|-----------------|---|-----|-------------|---|---------|----|---------|
| V1 Post-Impact | V | 0.5 | Impact Time | 1 | Minutes | 19 | Seconds |
| V2 Post-Impact | V | 0.0 | | 1 | Minutes | 23 | Seconds |
| V1' Post-Impact | V | 0.5 | | 1 | Minutes | 34 | Seconds |
| V2' Post-Impact | V | 0.0 | | 1 | Minutes | 41 | Seconds |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

ELECTRICAL ISOLATION CALCULATIONS

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

| | | | | | | | |
|--|---|------------|-------------|---|---------|----|---------|
| $R_{i1} = R_o (1 + V_2/V_1) [(V_1 - V_1')/V_1']$ | | | | | | | |
| Ri1 Post-Impact | Ω | Zero Volts | Impact Time | 1 | Minutes | 41 | Seconds |
| $R_{i2} = R_o (1 + V_1/V_2) [(V_2 - V_2')/V_2']$ | | | | | | | |
| Ri2 Post-Impact | Ω | Zero Volts | Impact Time | 1 | Minutes | 34 | Seconds |
| Ri = The lesser of Ri1 and Ri2 | | | | | | | |
| Ri Post-Impact | Ω | Zero Volts | Impact Time | 1 | Minutes | 41 | Seconds |
| $R_i / V_b = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$ | | | | | | | |
| Ri / Vb Post-Impact | Ω | Zero Volts | Impact Time | 1 | Minutes | 41 | Seconds |

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

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

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

PROPULSION BATTERY SYSTEM COMPONENTS

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

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

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

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

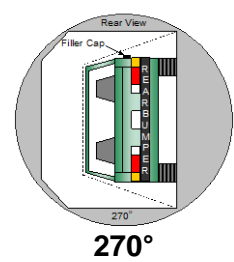
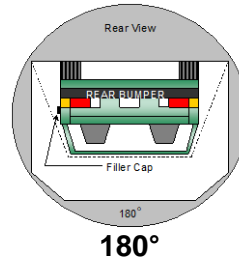
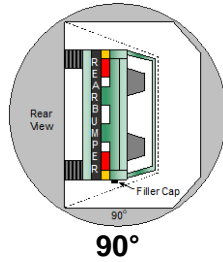
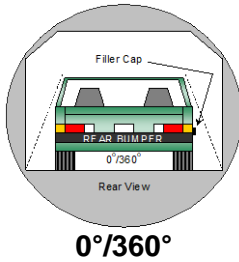
| | Yes (Fail) | No |
|--|------------|----|
| Is the Propulsion Battery Electrolyte Spillage visible in the passenger compartment? | | X |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

PROPULSION BATTERY SYSTEM COMPONENTS



PROPULSION BATTERY ELECTROLYTE COLLECTION TIME PERIOD

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

TEST VEHICLE PROPULSION BATTERY ELECTROLYTE SPILLAGE

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

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

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

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

VOLTMETER INFORMATION

| | Units | Observations and Conclusions |
|--------------------------|-------|------------------------------|
| Make | | Fluke |
| Model | | 177 |
| Serial Number | | 17210161 |
| Internal Impedance Value | MΩ | > 10 MΩ < 100 pF |
| Resolution | V | 0.001 |
| Last Calibration Date | | 6/30/2021 |

ELECTRICAL ISOLATION MEASUREMENTS

| | | |
|----------------|---|-----|
| Vb Post-Impact | V | 0.5 |
|----------------|---|-----|

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

| | Voltage | Units | Test Phase | Time | | | |
|-----|---------|-------|------------|------|----|-----|---|
| | | | | | | | |
| V1 | 0.0 | V | 0° | min | 7 | sec | |
| | 0.0 | | 90° | | | | 3 |
| | 0.0 | | 180° | | | | 3 |
| | 0.0 | | 270° | | | | 3 |
| | 0.0 | | 360° | | | | 2 |
| V2 | 0.0 | V | 0° | min | 11 | sec | |
| | 0.0 | | 90° | | | | 3 |
| | 0.0 | | 180° | | | | 3 |
| | 0.0 | | 270° | | | | 3 |
| | 0.0 | | 360° | | | | 3 |
| V1' | 0.0 | V | 0° | min | 16 | sec | |
| | 0.0 | | 90° | | | | 3 |
| | 0.0 | | 180° | | | | 3 |
| | 0.0 | | 270° | | | | 3 |
| | 0.0 | | 360° | | | | 3 |
| V2' | 0.0 | V | 0° | min | 21 | sec | |
| | 0.0 | | 90° | | | | 3 |
| | 0.0 | | 180° | | | | 3 |
| | 0.0 | | 270° | | | | 3 |
| | 0.0 | | 360° | | | | 3 |

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

Test Vehicle: 2022 Ford Escape SEL PHEV 5-Door SUV
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: M20220200
 Test Date: 3/29/2022

ELECTRICAL ISOLATION CALCULATIONS

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

| | Voltage | Units | Test Phase | Time | | |
|--|------------|-------|------------|------|-----|----|
| $Ri1 = Ro (1 + V2/V1) [(V1-V1')/V1']$ | | | | | | |
| Ri1 | Zero Volts | Ω | 0° | | min | |
| | Zero Volts | | 90° | 2 | | 32 |
| | Zero Volts | | 180° | 2 | | 27 |
| | Zero Volts | | 270° | 2 | | 34 |
| | Zero Volts | | 360° | 2 | | 29 |
| $Ri2 = Ro (1 + V1/V2) [(V2-V2')/V2']$ | | | | | | |
| Ri2 | Zero Volts | Ω | 0° | | min | |
| | Zero Volts | | 90° | 2 | | 38 |
| | Zero Volts | | 180° | 2 | | 33 |
| | Zero Volts | | 270° | 2 | | 39 |
| | Zero Volts | | 360° | 2 | | 34 |
| $Ri = \text{The lesser of } Ri1 \text{ and } Ri2$ | | | | | | |
| Ri | Zero Volts | Ω | 0° | | min | |
| | Zero Volts | | 90° | 2 | | 38 |
| | Zero Volts | | 180° | 2 | | 33 |
| | Zero Volts | | 270° | 2 | | 39 |
| | Zero Volts | | 360° | 2 | | 34 |
| $Ri / Vb = \text{Electrical Isolation Value} / \text{Nominal Battery Voltage}$ | | | | | | |
| Ri / Vb | Zero Volts | Ω/V | 0° | | min | |
| | Zero Volts | | 90° | 2 | | 16 |
| | Zero Volts | | 180° | 2 | | 14 |
| | Zero Volts | | 270° | 2 | | 19 |
| | Zero Volts | | 360° | 2 | | 16 |

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

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

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PHOTOGRAPHS**

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Photo No. 001 - Load Cell Location

PHOTOGRAPH NOT AVAILABLE

Photo No. 002 - Pre-Test Load Cell Wall



Photo No. 003 - Post-Test Load Cell Wall



Photo No. 004 - Manufacturer's Label



Photo No. 005 - Tire Placard



Photo No. 006 - 2022 Ford Escape SEL PHEV 5-Door SUV Frontal As Delivered



Photo No. 007 - Left Rear 3-4 View, As Received

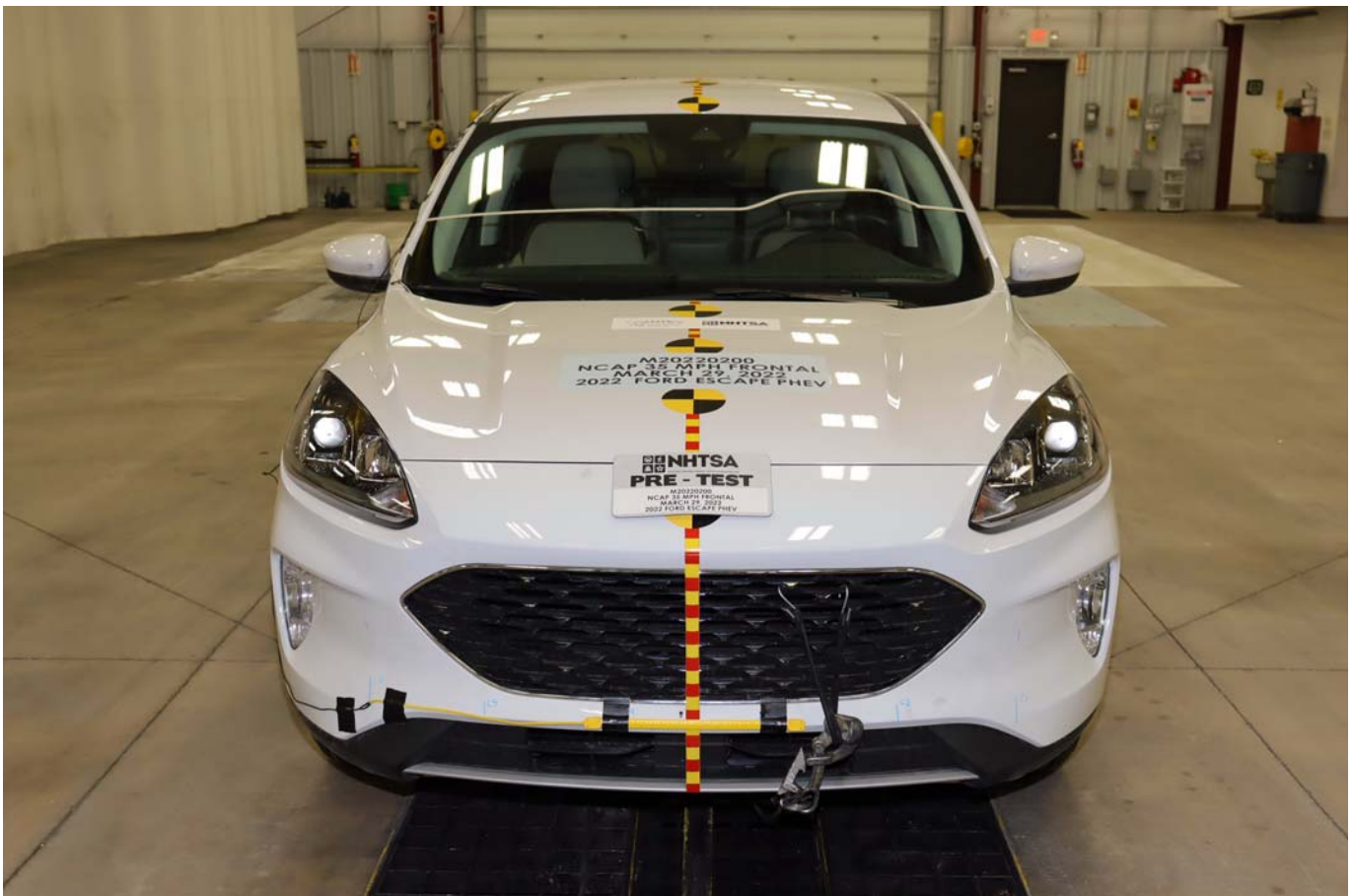


Photo No. 008 - Pre-Test Front View of Test Vehicle



Photo No. 009 - Post-Test Front View of Test Vehicle



Photo No. 010 - Pre-Test Left View of Test Vehicle



Photo No. 011 - Post-Test Left View of Test Vehicle



Photo No. 012 - Pre-Test Right View of Test Vehicle



Photo No. 013 - Post-Test Right View of Test Vehicle



Photo No. 014 - Pre-Test Right Front 3-4 View

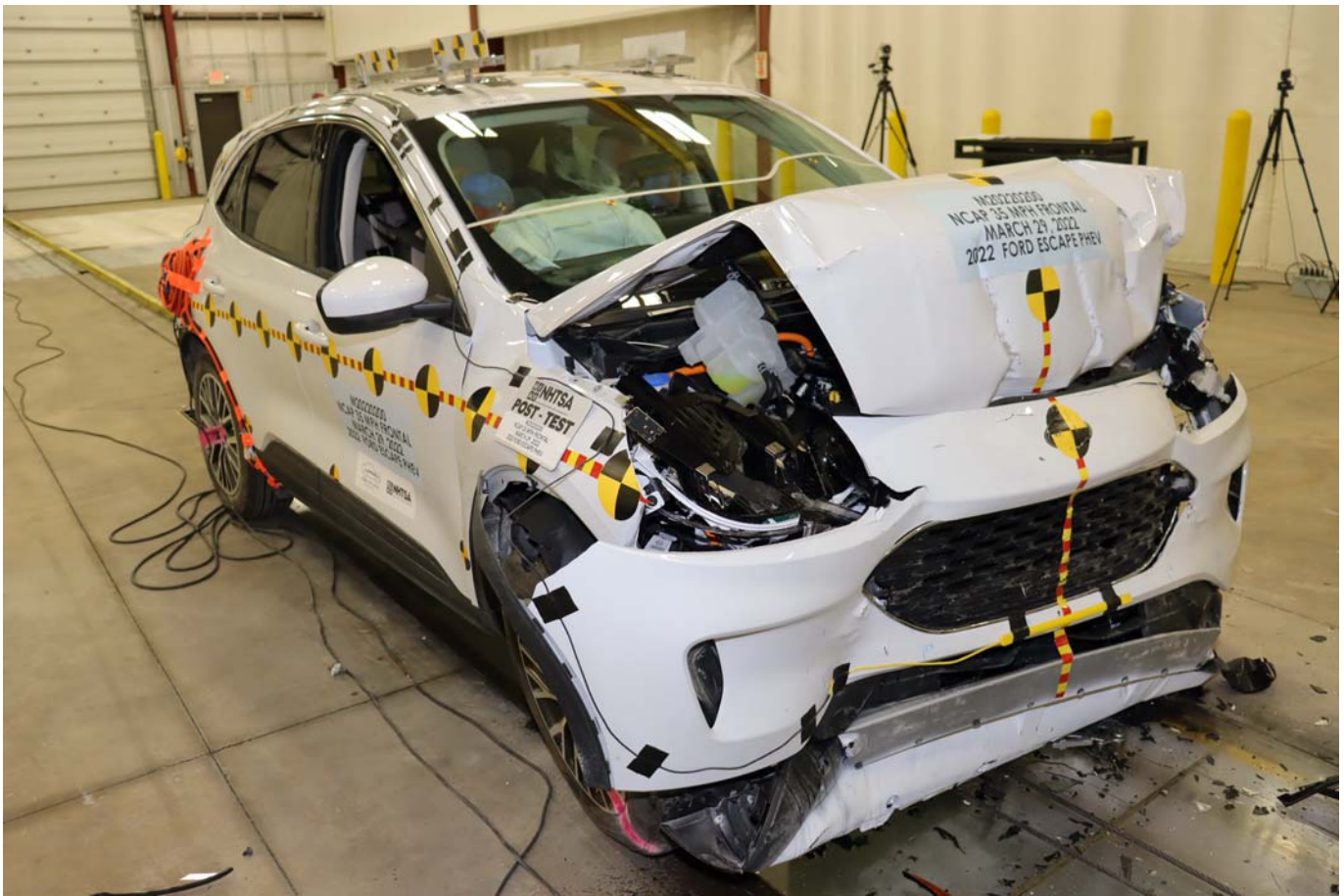


Photo No. 015 - Post-Test Right Front 3-4 View



Photo No. 016 - Pre-Test Left Rear 3-4 View



Photo No. 017 - Post-Test Left Rear 3-4 View



Photo No. 018 - Pre-Test Windshield View



Photo No. 019 - Post-Test Windshield View



Photo No. 020 - Pre-Test Engine Compartment View



Photo No. 021 - Post-Test Engine Compartment View



Photo No. 022 - Pre-Test Fuel Filler Cap View



Photo No. 023 - Post-Test Fuel Filler Cap View

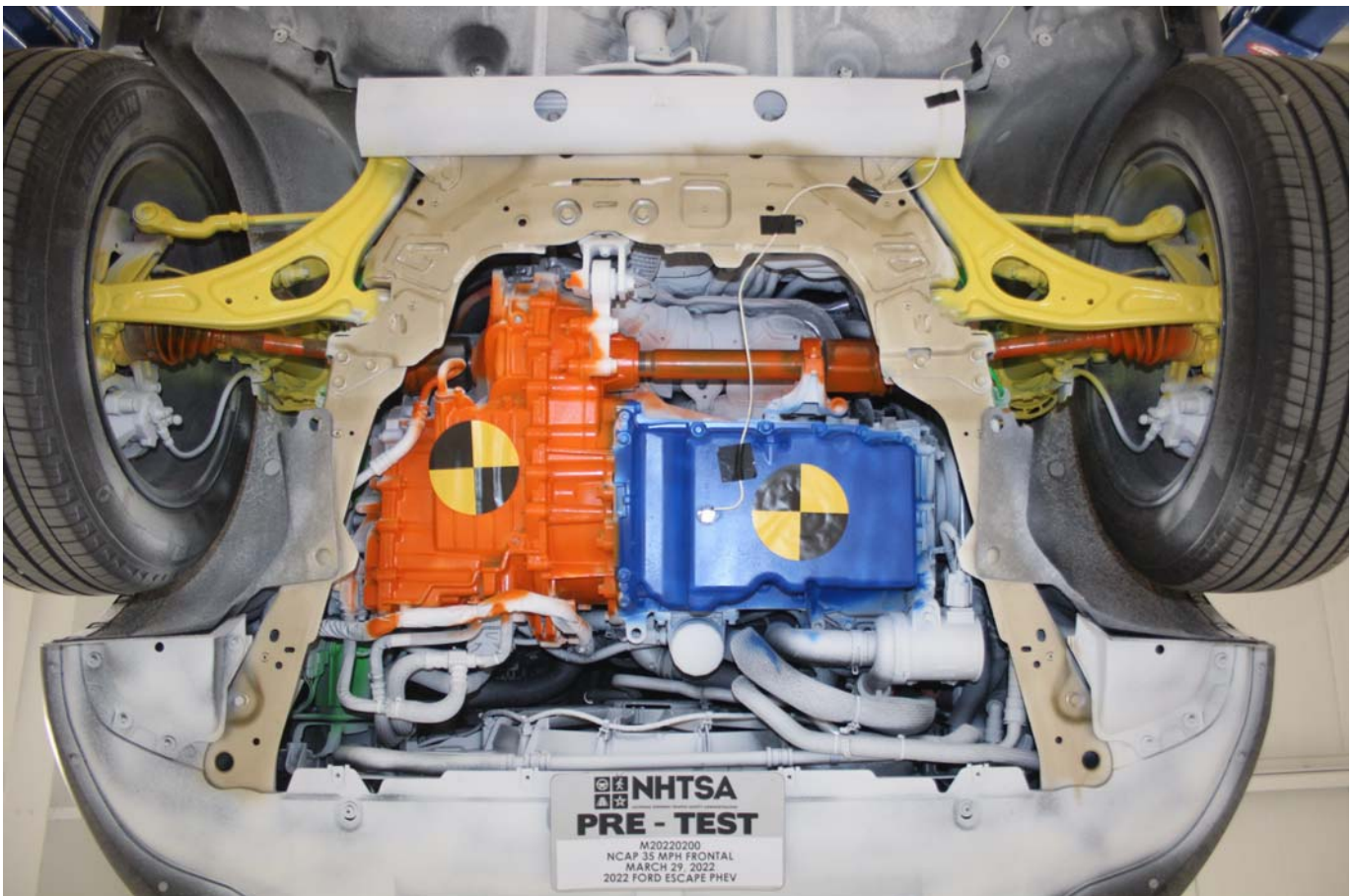


Photo No. 024 - Pre-Test Front Underbody View

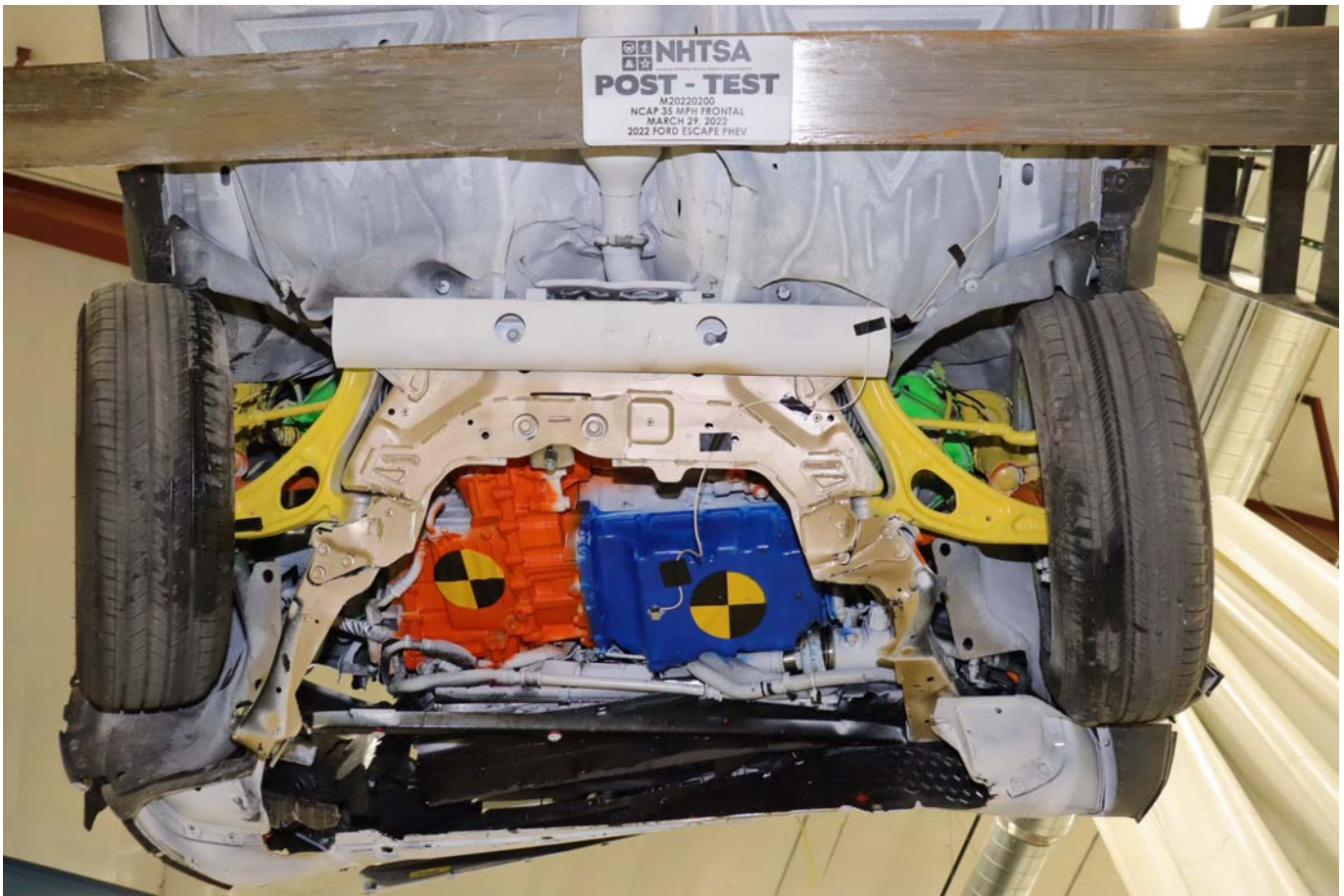


Photo No. 025 - Post-Test Front Underbody View

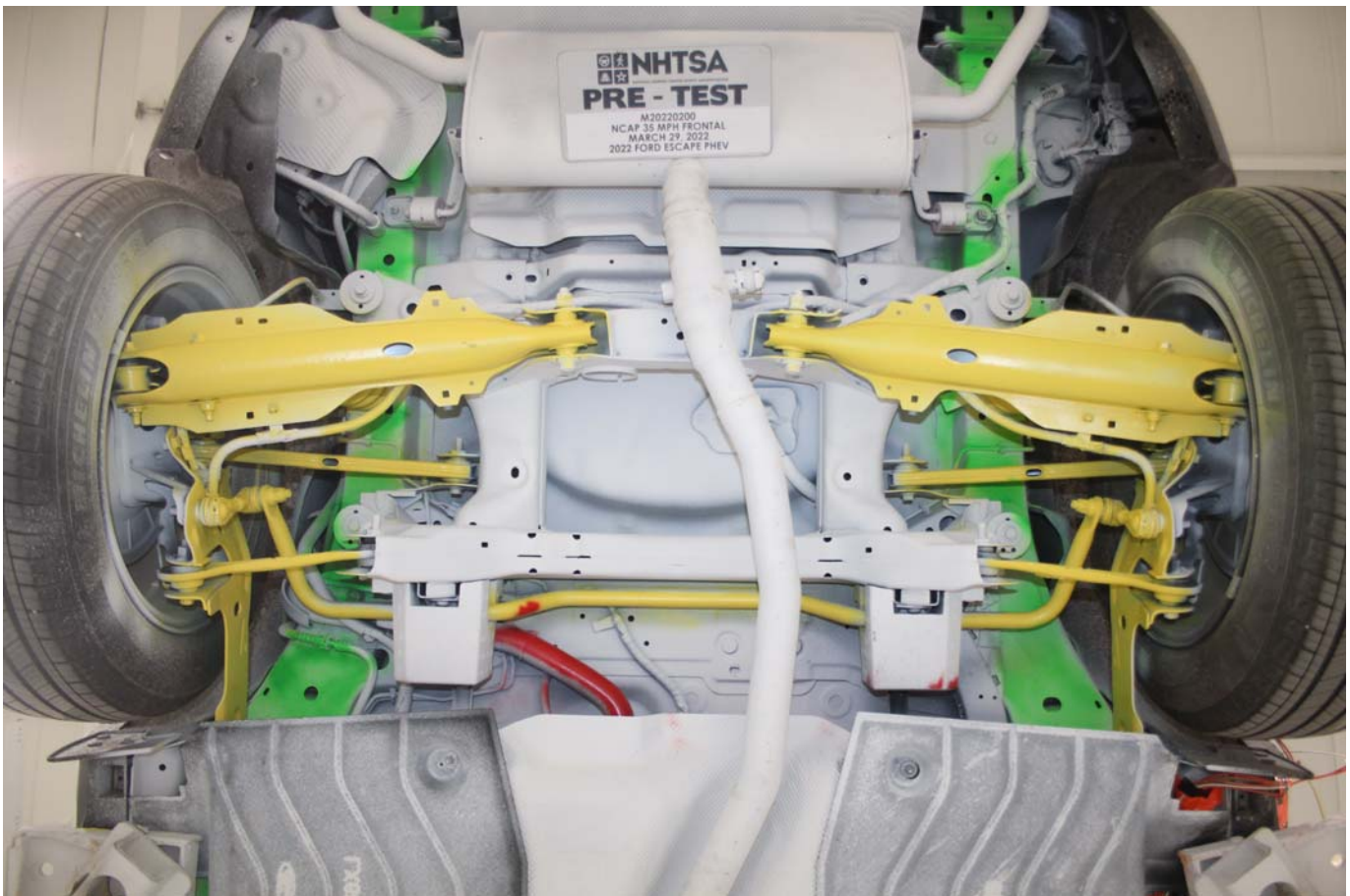


Photo No. 026 - Pre-Test Rear Underbody View

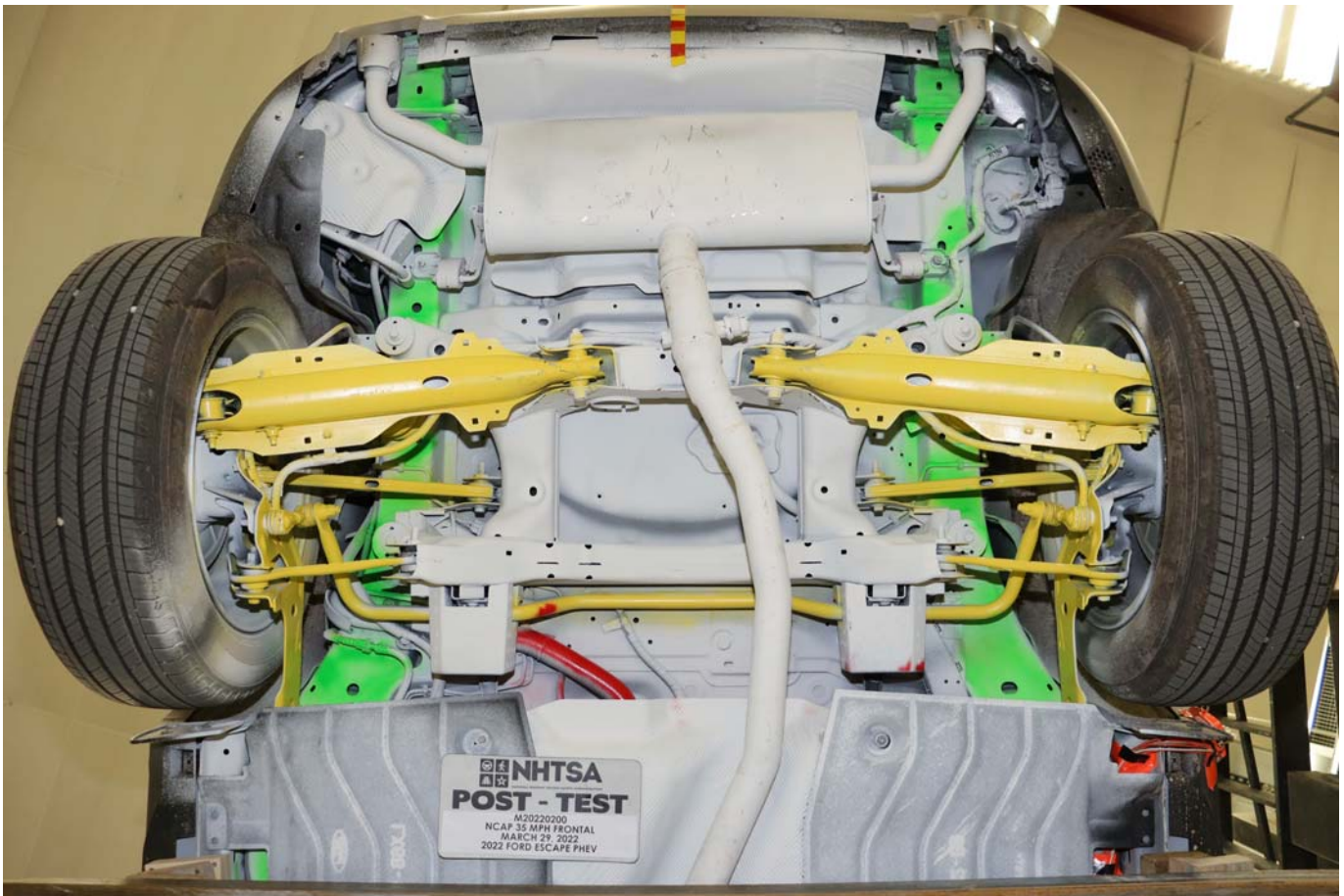


Photo No. 027 - Post-Test Rear Underbody View



Photo No. 028 - Pre-Test Dummy Cable Routing



Photo No. 029 - Post-Test Dummy Cable Routing



Photo No. 030 - Pre-Test Driver Dummy Front View



Photo No. 031 - Post-Test Driver Dummy Front View



Photo No. 032 - Pre-Test Driver Dummy Window View



Photo No. 033 - Post-Test Driver Dummy Window View



Photo No. 034 - Pre-Test Driver Dummy and Vehicle Interior View



Photo No. 035 - Post-Test Driver Dummy and Vehicle Interior View



Photo No. 036 - Pre-Test Driver's Seat Fore-Aft Markings



Photo No. 037 - Post-Test Driver's Seat Fore-Aft Markings



Photo No. 038 - Pre-Test View of Belt Anchorage for Driver Dummy



Photo No. 039 - Post-Test View of Belt Anchorage for Driver Dummy



Photo No. 040 - Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy



Photo No. 041 - Post-Test View of Belt Buckle and Latch Plate for Driver Dummy



Photo No. 042 - Pre-Test Driver Dummy Feet



Photo No. 043 - Post-Test Driver Dummy Feet



Photo No. 044 - Pre-Test Driver's Side Knee Bolster



Photo No. 045 - Post-Test Driver's Side Knee Bolster



Photo No. 046 - Pre-Test Driver's Side Floorpan



Photo No. 047 - Post-Test Driver's Side Floorpan



Photo No. 048 - Post-Test Driver Dummy Face



Photo No. 049 - Post-Test Driver Dummy Contact with Airbag



Photo No. 050 - Post-Test Driver Dummy Contact with Headrest



Photo No. 051 - Pre-Test View of the Steering Wheel



Photo No. 052 - Post-Test View of the Steering Wheel



Photo No. 053 - Pre-Test Passenger Dummy Front View



Photo No. 054 - Post-Test Passenger Dummy Front View



Photo No. 055 - Pre-Test Passenger Dummy Window View



Photo No. 056 - Post-Test Passenger Dummy Window View



Photo No. 057 - Pre-Test Passenger Dummy and Vehicle Interior View



Photo No. 058 - Post-Test Passenger Dummy and Vehicle Interior View



Photo No. 059 - Pre-Test Passenger's Seat Fore-Aft Markings

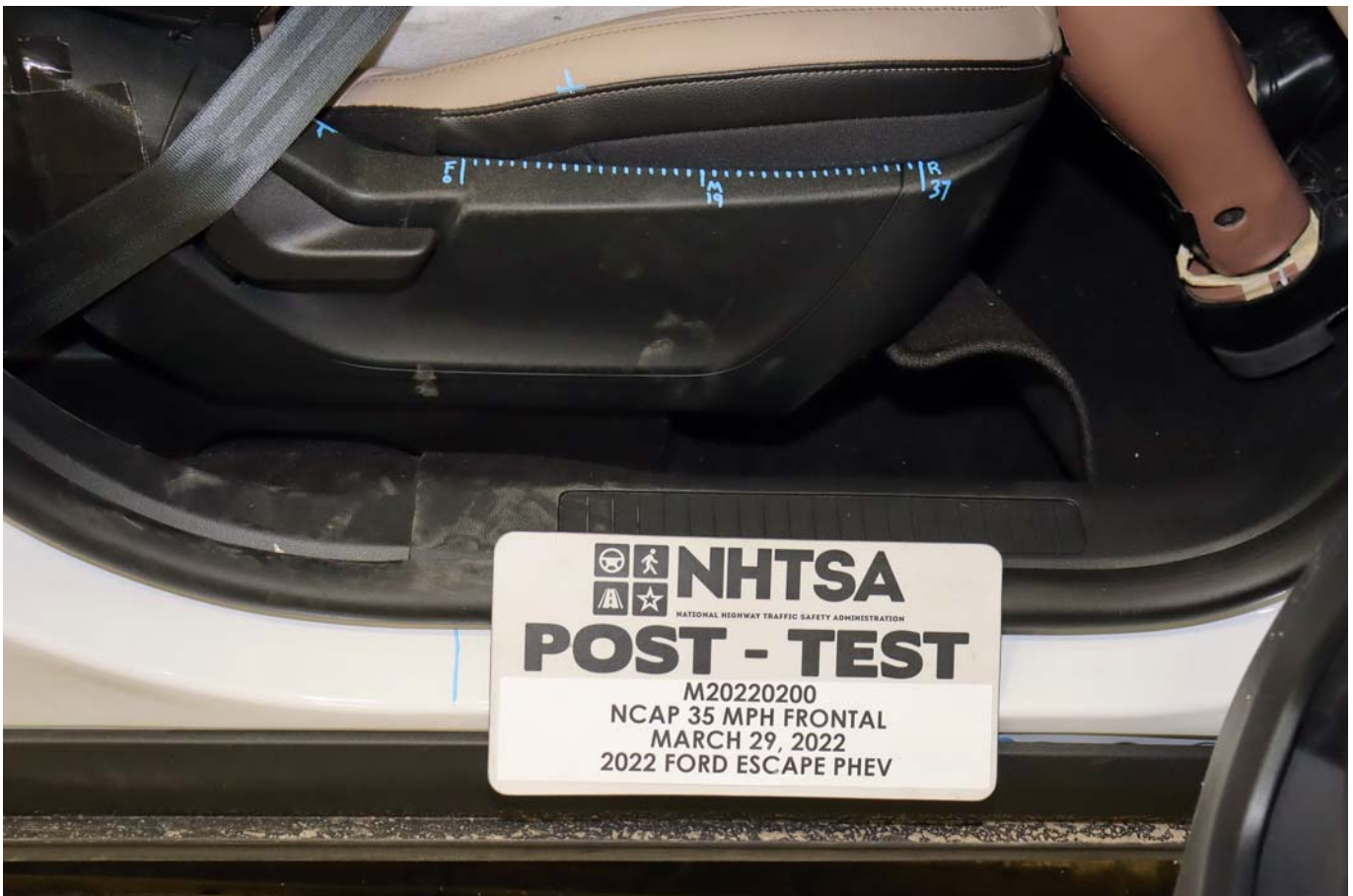


Photo No. 060 - Post-Test Passenger's Seat Fore-Aft Markings



Photo No. 061 - Pre-Test View of Belt Anchorage for Passenger Dummy



Photo No. 062 - Post-Test View of Belt Anchorage for Passenger Dummy



Photo No. 063 - Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy



Photo No. 064 - Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy



Photo No. 065 - Pre-Test Passenger Dummy Feet



Photo No. 066 - Post-Test Passenger Dummy Feet



Photo No. 067 - Pre-Test Passenger's Side Knee Bolster



Photo No. 068 - Post-Test Passenger's Side Knee Bolster



Photo No. 069 - Pre-Test Passenger's Side Floorpan

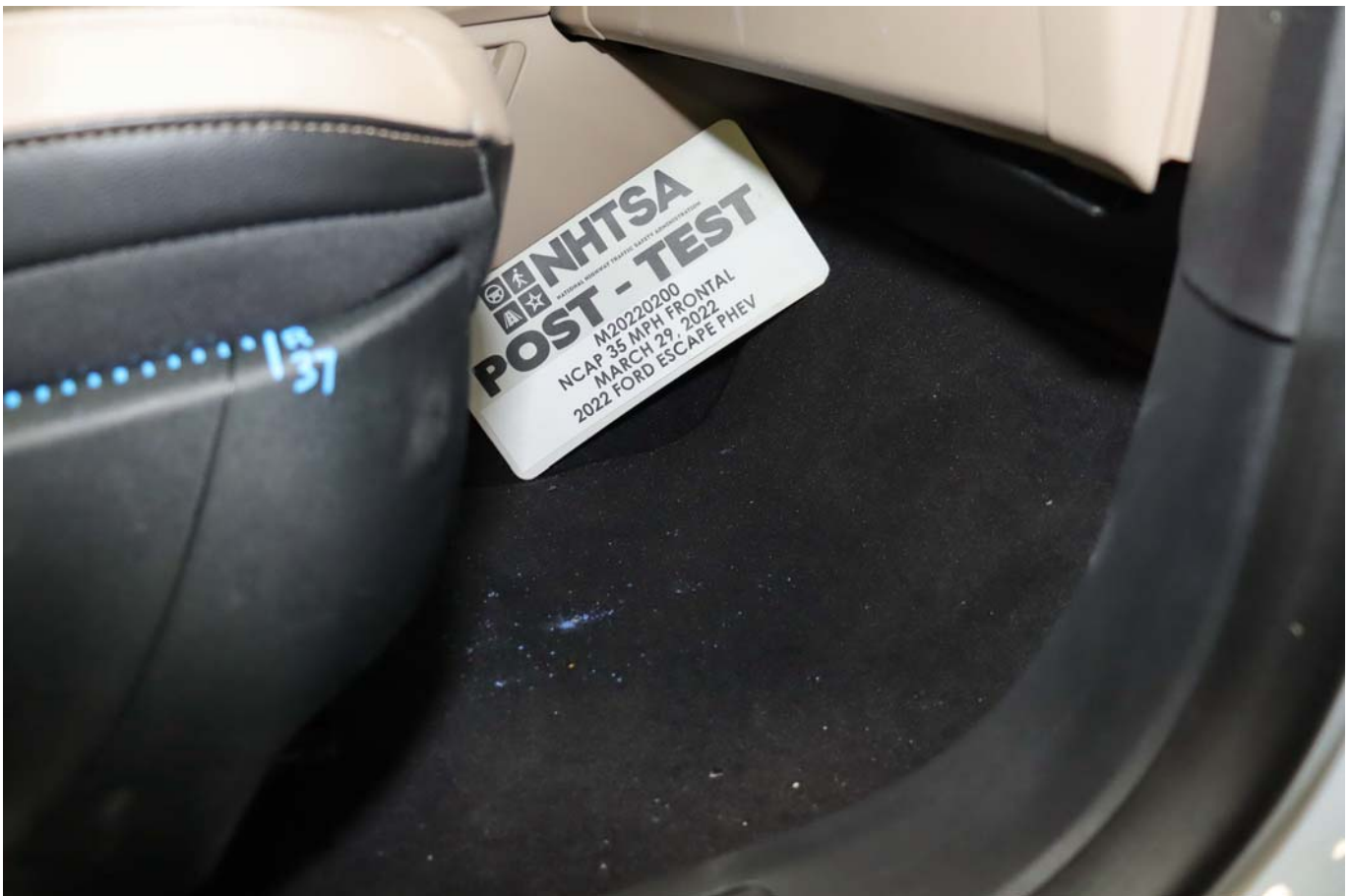


Photo No. 070 - Post-Test Passenger's Side Floorpan



Photo No. 071 - Post-Test Passenger Dummy Face



Photo No. 072 - Post-Test Passenger Dummy Contact with Airbag



Photo No. 073 - Post-Test Passenger Dummy Contact with Headrest

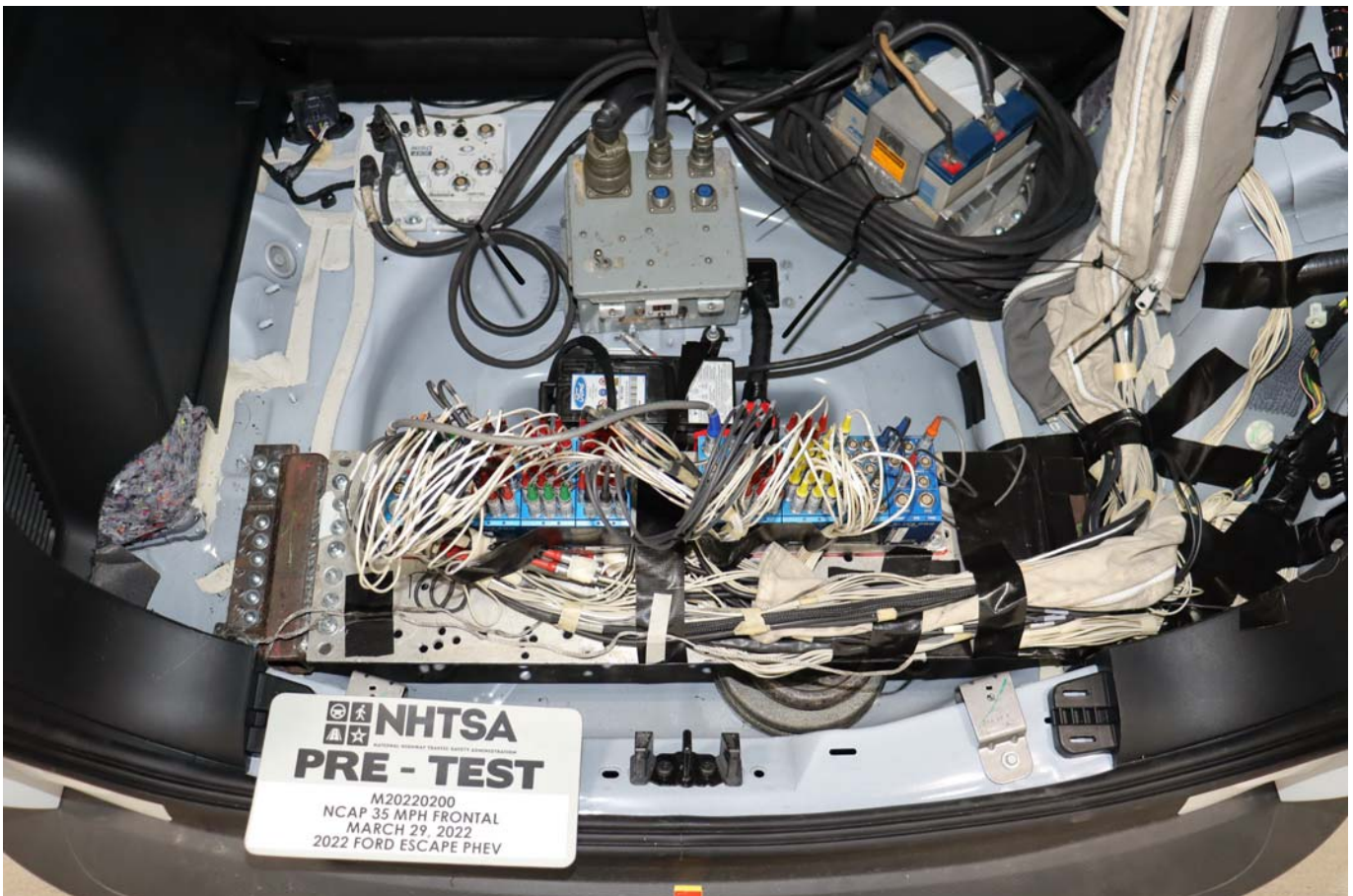


Photo No. 074 - Photograph of Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Photo No. 075 - Post-Test Stoddard Solvent Spillage Location View



Photo No. 076 - Post-Test Speed Trap Read-Out



Photo No. 077 - Vehicle at 0 Degrees on Static Rollover Device



Photo No. 078 - Vehicle at 90 Degrees on Static Rollover Device



Photo No. 079 - Vehicle at 180 Degrees on Static Rollover Device



Photo No. 080 - Vehicle at 270 Degrees on Static Rollover Device



Photo No. 081 - Vehicle at 360 Degrees on Static Rollover Device

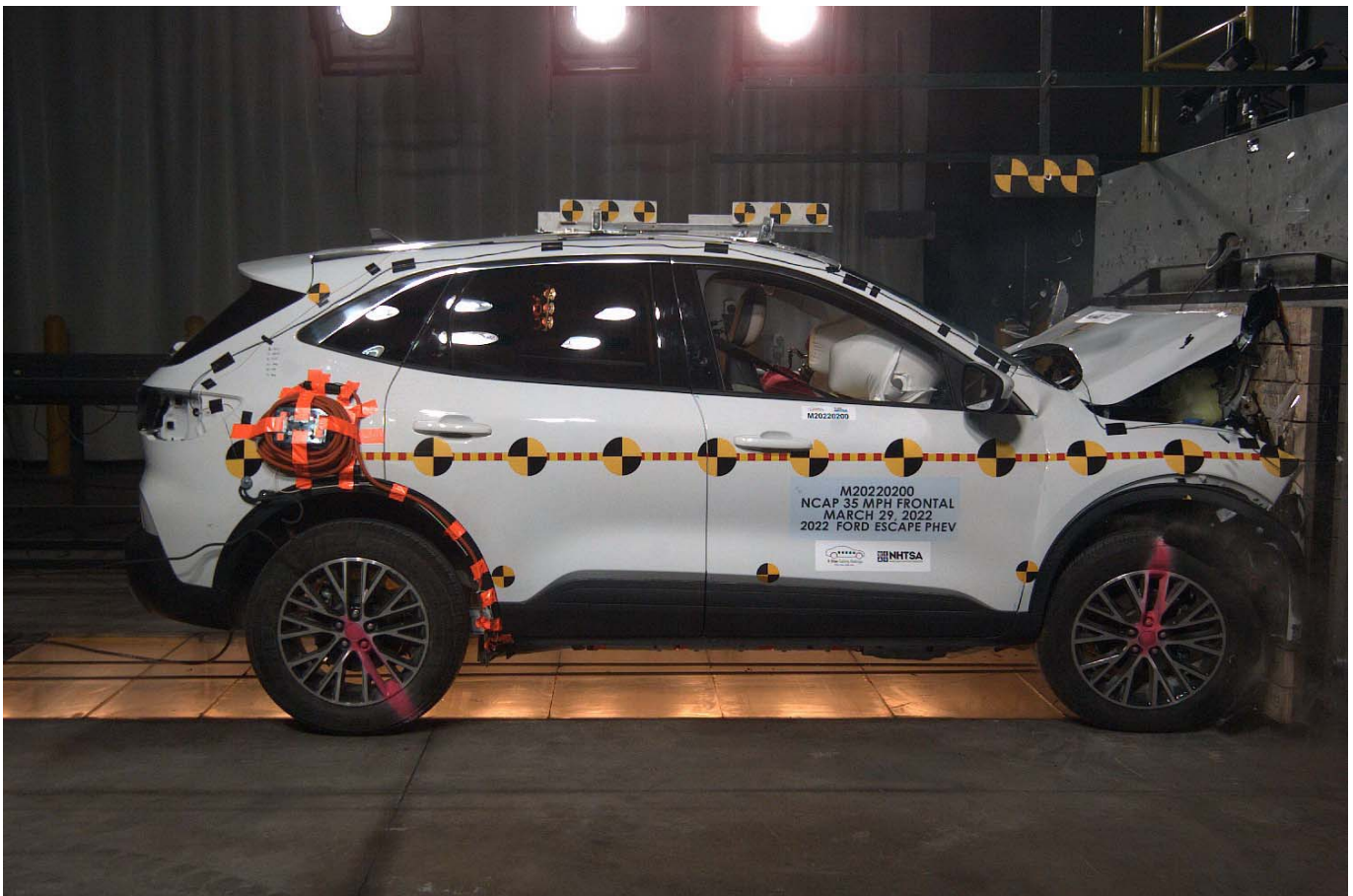



Photo No. 082 - 2022 Ford Escape SEL PHEV 5-Door SUV Frontal Impact Event



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VEHICLE DESCRIPTION
ESCAPE FWD

2022 ESCAPE SEL PHEV FWD
106.7" WHEELBASE
2.5L I-VCT ATK I-4 HYB ENG
ECVT TRANSMISSION

EXTERIOR
OXFORD WHITE
INTERIOR
SANDSTONE ACTIVEX TRIM STS

NU A18828

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

| | | |
|---|---|---|
| <p>EXTERIOR</p> <ul style="list-style-type: none"> • ACTIVE GRILLE SHUTTERS • DUAL EXHAUST CHROME TIPS • ELECTR FUEL DOOR RELEASE • FOG LAMPS • HEADLAMP COURTESY DELAY • HEADLAMPS - AUTO HALOGEN • HEADLAMPS - AUTO HIGH BEAM • LED SIGNATURE LIGHTING • MIRRORS-HTD/POWER GLASS, MANUAL FOLD • PRIVACY GLASS - REAR DOORS • REAR INT WIPER/WASH/DFRST • REAR SPOILER • TAILLAMPS-LED | <p>INTERIOR</p> <ul style="list-style-type: none"> • 1 TOUCH UP/DOWN FRT/RR WIN • DUAL ILLUM VIS VANITY MIRR • DUAL ZONE AUTO CLIMATE CTL • HTD DRVR • FRNT PASS SEATS • ILLUMINATED ENTRY SYSTEM • MAP POCKETS-PASSENGER • POWERPOINTS - 12V • REAR SEAT CUPHOLDERS AND ARMREST • ROTARY GEAR SHIFT DIAL • SPLIT FOLD/SLIDE REAR SEAT • STR WHL-HTD & PREMIUM WRPD • USB A (1) AND C (1) | <p>FUNCTIONAL</p> <ul style="list-style-type: none"> • BLIS W/CROSS-TRAFFIC ALERT • FORD CO-PILOT360™ • FORDPASS™ CONNECT 4GWI-FI • HOTSPOT TELEMATICS MODEM • INTELLIGENT ACCESS W/PUSH BUTTON START • LANE-KEEPING SYSTEM/ALERT • PEDESTRIAN ALERT SOUNDER • PRE-COLLISION ASSIST W/AEB • REAR VIEW CAMERA • REFRESH95 • REVERSE SENSING SYSTEM • SECURITYCODE KEYLESS KEYPAD • SIRIUSXM® - SVC (NA AK4H) • SYNC®3 8" SCR N/W/APPLINK® |
| <p>SAFETY/SECURITY</p> <ul style="list-style-type: none"> • ADVANCETRAC™ WITH RSC® • AIRBAG - DRIVER KNEE • AIRBAGS - DUAL STAGE FRONT • AIRBAGS - FRONT SEAT • MOUNTED SIDE IMPACT • AIRBAGS - SAFETY CANOPY® • LATCH CHILD SAFETY SYSTEM • PERSONAL SAFETY SYSTEM™ • SOS POST-CRASH ALERT SYS™ • TIRE PRESSURE MONIT SYS | | |
| <p>WARRANTY</p> <ul style="list-style-type: none"> • 5YR/50,000 BUMPER / BUMPER • 5YR/60,000 ROADSIDE ASSIST • 8YR/100,000 HYBRID • UNIQUE COMPONENTS | | |

| | |
|---|---|
| INCLUDED ON THIS VEHICLE EQUIPMENT GROUP 625A | (MSRP) |
| <p>OPTIONAL EQUIPMENT/OTHER</p> <ul style="list-style-type: none"> 18" MACHINED EDONY ALUM WHL 225/60R18 100H A/S BSW TIRES TIRE INFT/SLNT KIT NO SPR INC FORD CO-PILOT360 ASSIST+ 995.00 ADP CRZ CTRL W/STOP N GO SEL TECHNOLOGY PACKAGE 1,050.00 POWER LIFTGATE W/HANDS FREE BAS SOUND SYSTEM, 10-SPK MEMORY PACKAGE WIRELESS CHARGING 10-WAY POWER DRIVER SEAT FRONT LICENSE PLATE BRACKET NO CHARGE | <p>PRICE INFORMATION</p> <p>BASE PRICE \$36,275.00</p> <p>TOTAL OPTIONS/OTHER 2,045.00</p> <hr/> <p>TOTAL VEHICLE & OPTIONS/OTHER DESTINATION & DELIVERY \$38,320.00</p> <p>1,245.00</p> |

| | | | | | | |
|--|----------------|---------------------------------|---|--|----------------------------------|--------------------------------------|
| <p>SOLD TO Ferrario Ford 2472 Conring Road Elmira NY 14903</p> | <p>13V 529</p> | <p>RAMP ONE CS18</p> | <p>FINAL ASSEMBLY PLANT LOUISVILLE</p> | <p>METHOD OF TRANSIT CONVOY</p> | <p>ITEM #: 13-S000 O/T 2</p> | <p>TOTAL MSRP \$39,565.00</p> |
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Whether you decide to lease or finance your vehicle, you'll find the choices that are right for you. See your dealer for details or visit www.ford.com/finance.

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Whether you decide to lease or finance your vehicle, you'll find the choices that are right for you. See your dealer for details or visit www.ford.com/finance.

NA141 N RB 2X 225 002427 01 14 22

13V 529

CS18

LOUISVILLE

CONVOY

13-S000 O/T 2

TOTAL MSRP \$39,565.00

Whether you decide to lease or finance your vehicle, you'll find the choices that are right for you. See your dealer for details or visit www.ford.com/finance.

NA141 N RB 2X 225 002427 01 14 22

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13V 529

CS18

LOUISVILLE

CONVOY

13-S000 O/T 2

TOTAL MSRP \$39,565.00

Whether you decide to lease or finance your vehicle, you'll find the choices that are right for you. See your dealer for details or visit

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-02 - Power Inverter Warning Label

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-03 - First Responder Warning Label

PHOTOGRAPH NOT APPLICABLE

Photo No. 305-04 - First Responder Warning Location



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



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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



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



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



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



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

PHOTOGRAPH NOT AVAILABLE

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

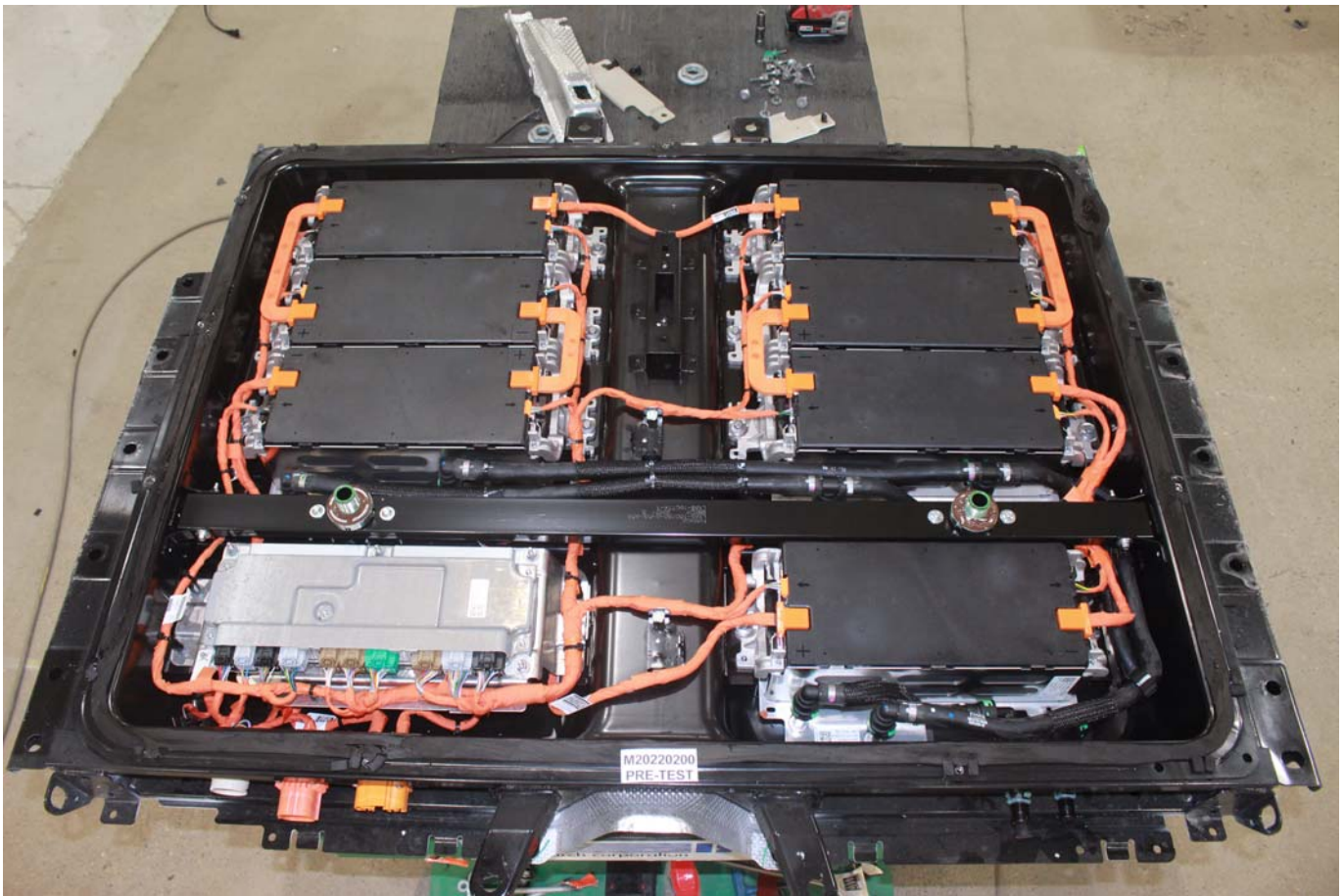


Photo No. 305-14 - Pre-Impact View of Propulsion Battery Module(s)

PHOTOGRAPH NOT AVAILABLE

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

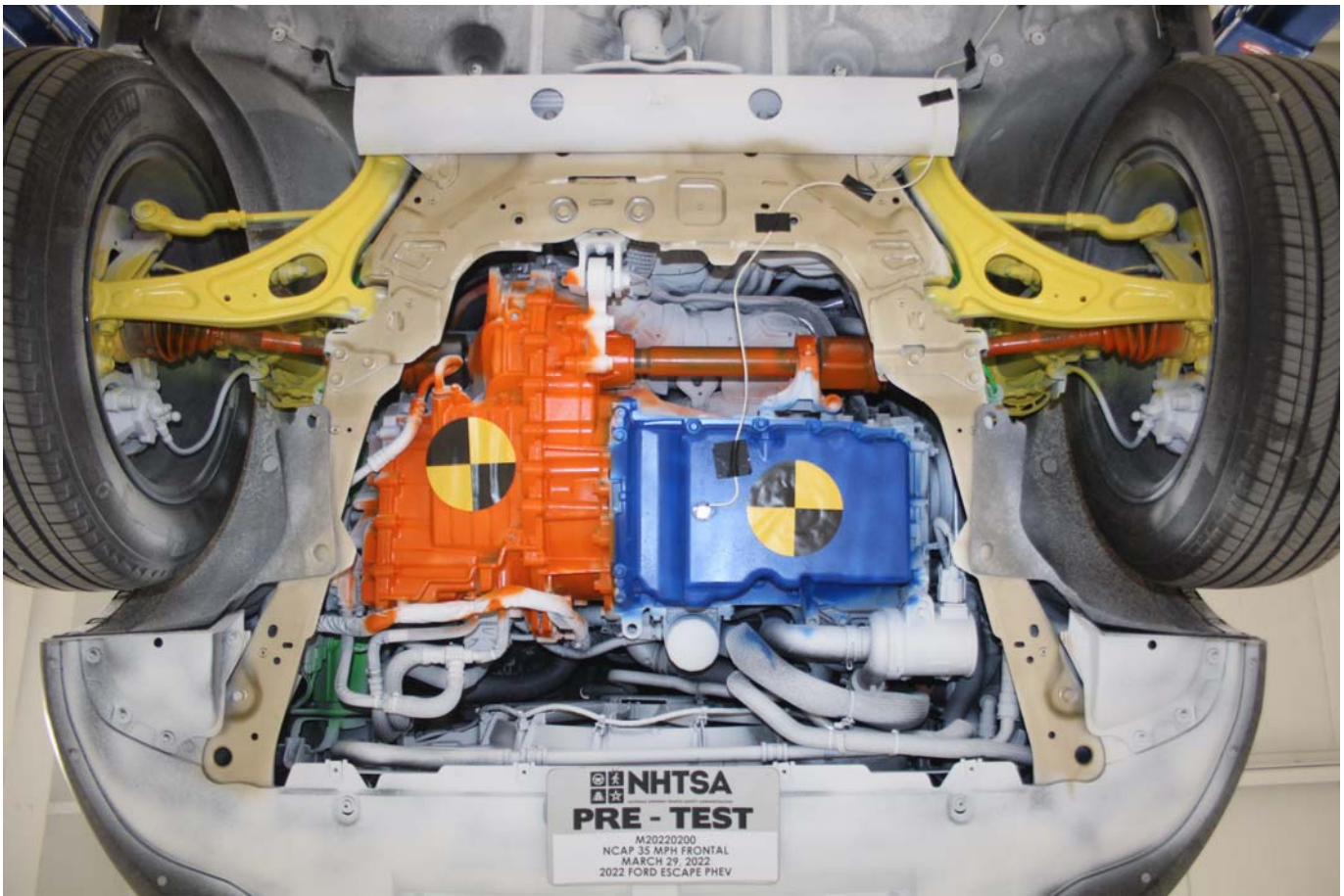


Photo No. 305-16 - Pre-Impact View of Electric Propulsion Drive



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



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

PHOTOGRAPH NOT APPLICABLE

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



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

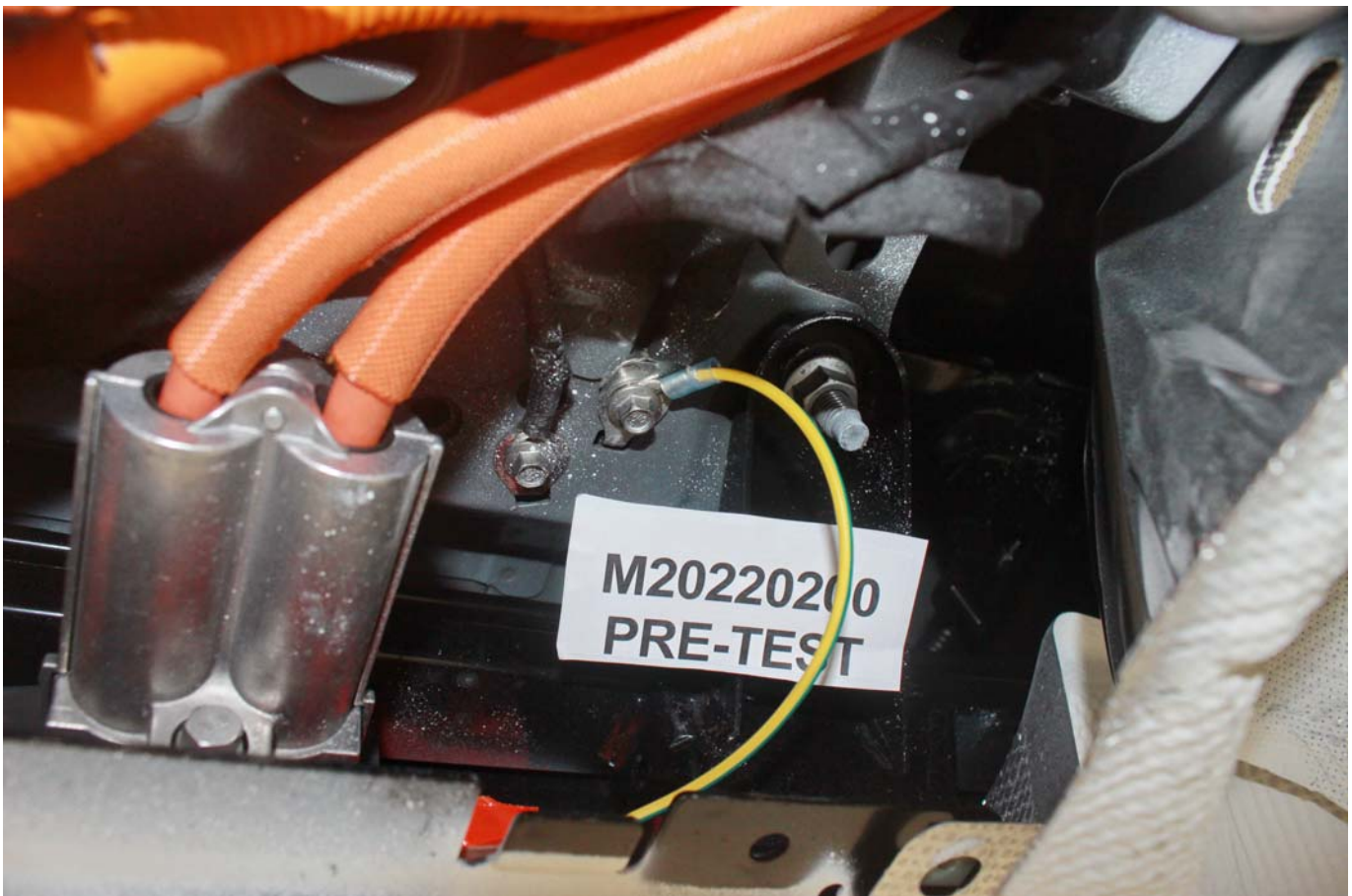


Photo No. 305-21 - Pre-Impact View of Ground Lead Attached

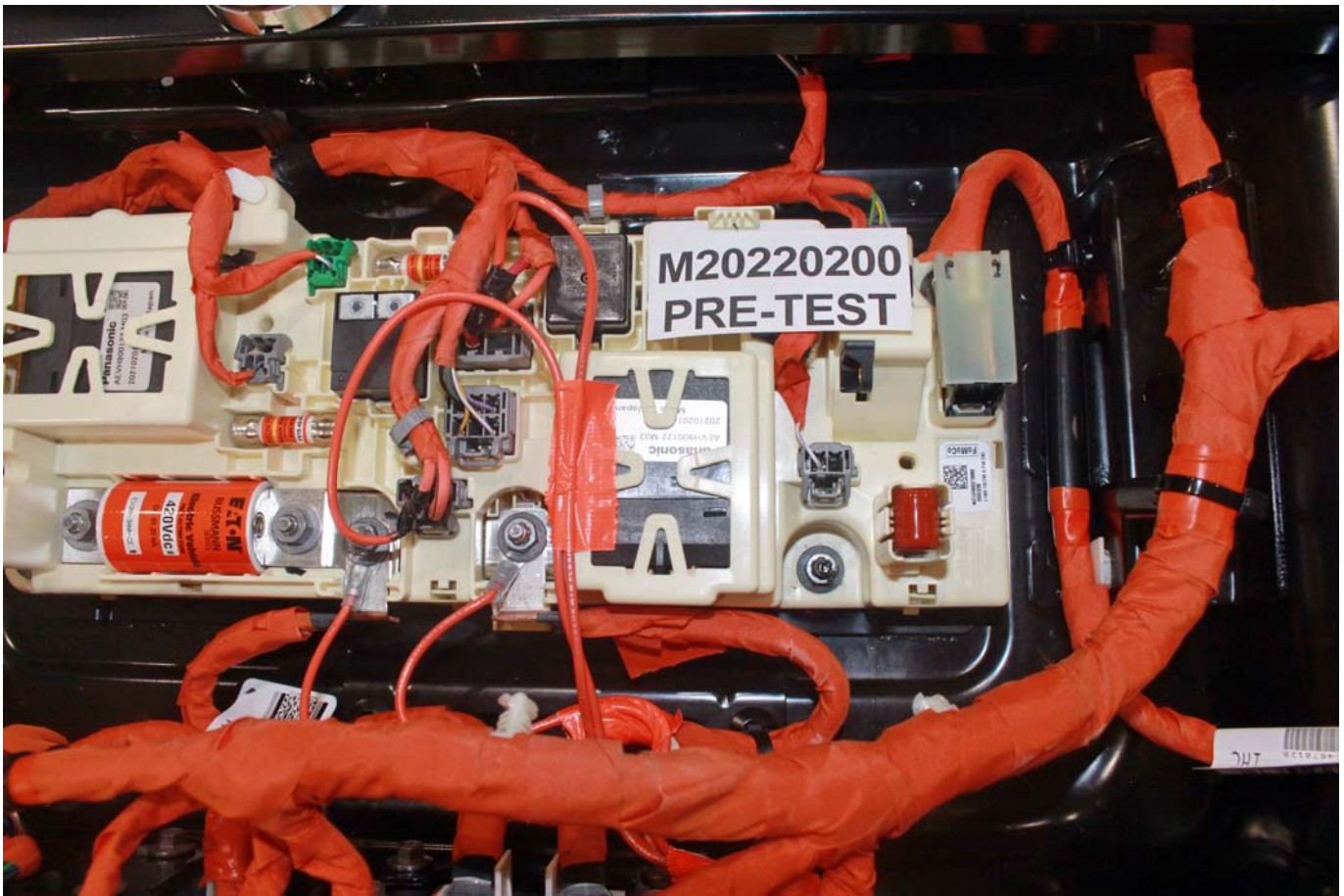


Photo No. 305-22 - Pre-Impact View of High Voltage Leads Attached

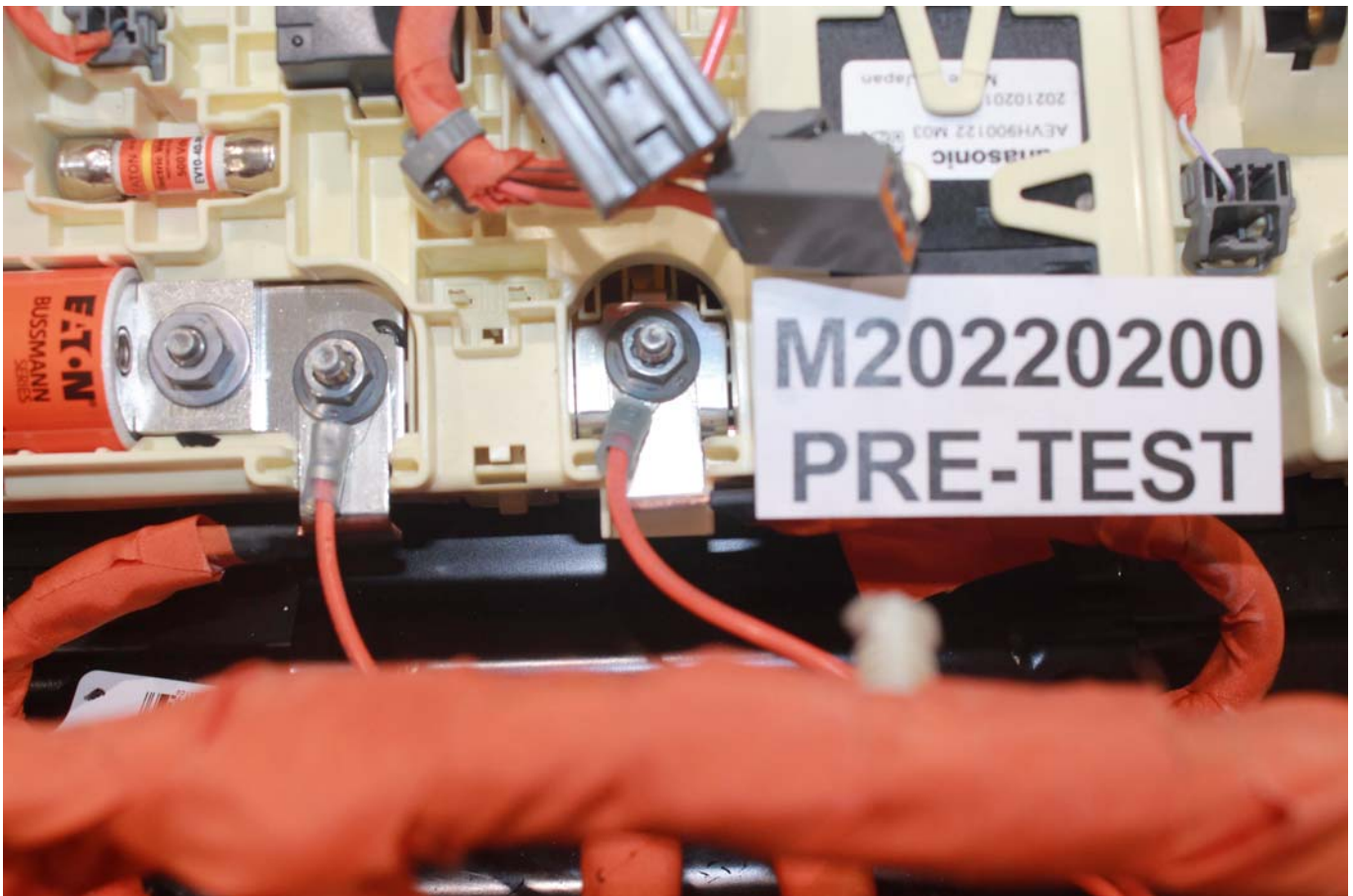


Photo No. 305-23 - Pre-Impact Close-Up View of High Voltage Leads Attached

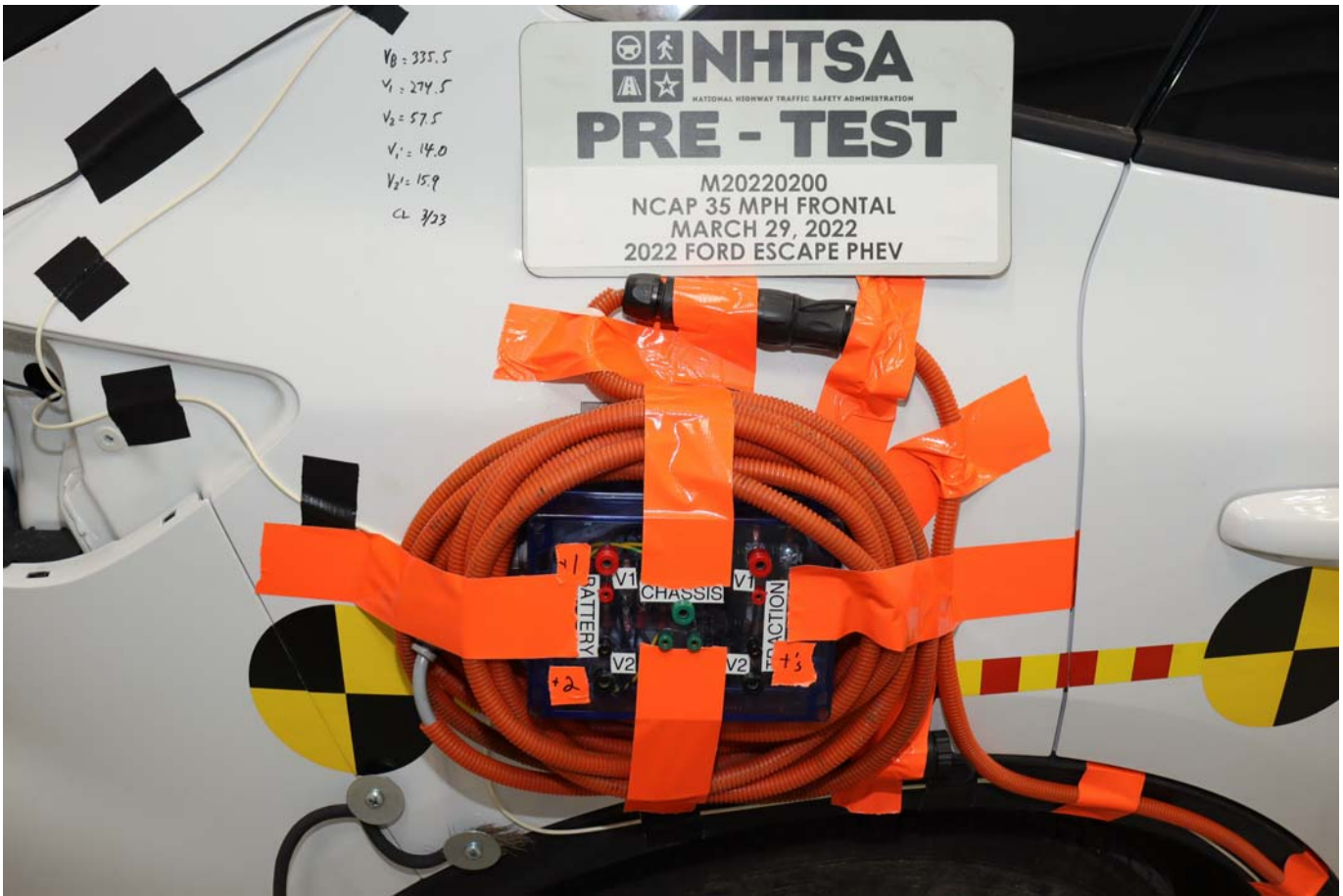


Photo No. 305-24 - Pre-Impact View of Installed Test Interface Port



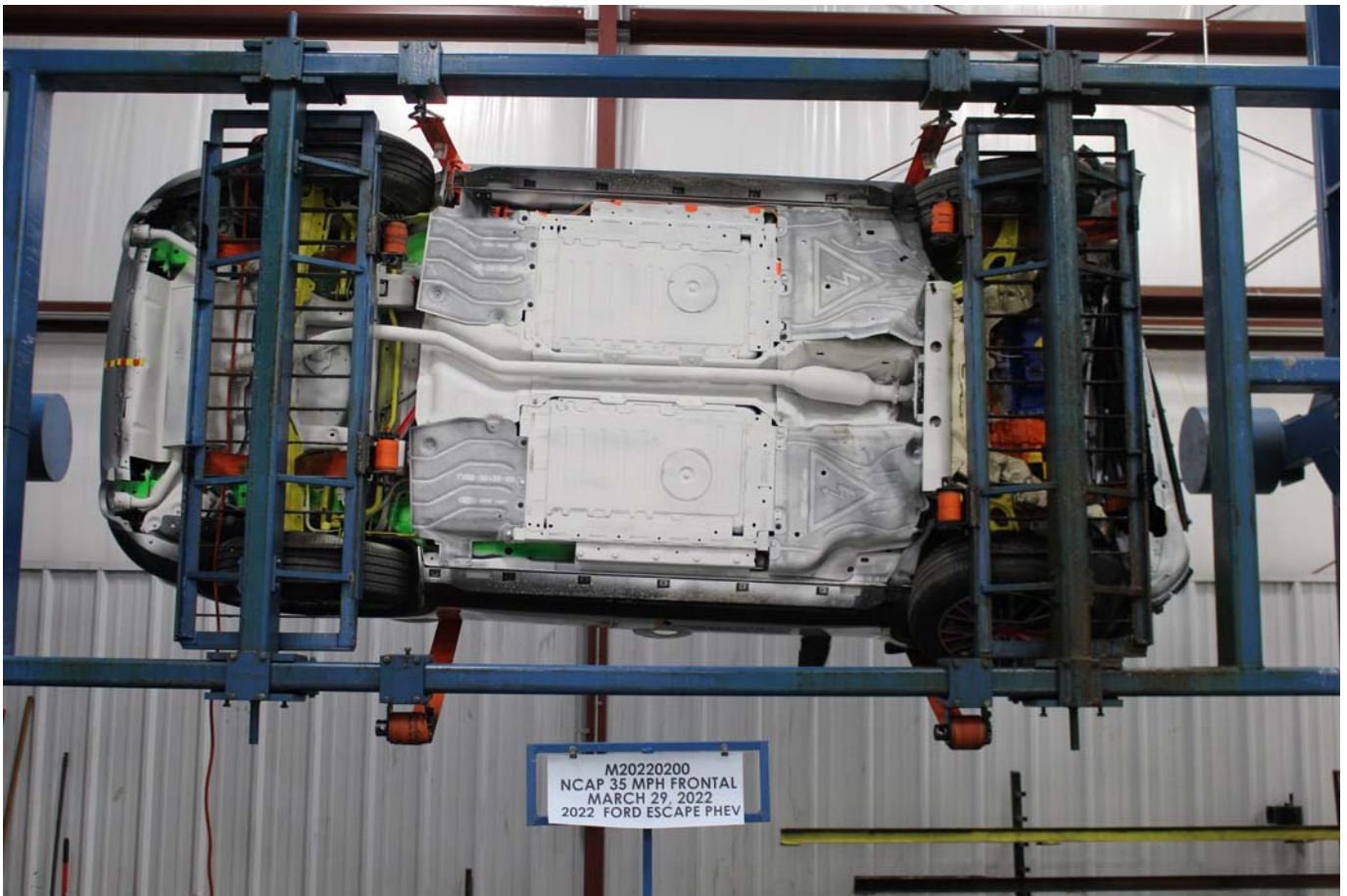
Photo No. 305-25 - Post-Impact View of Installed Test Interface Port



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



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



M20220200
NCAP 35 MPH FRONTAL
MARCH 29, 2022
2022 FORD ESCAPE PHEV

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



M20220200
NCAP 35 MPH FRONTAL
MARCH 29, 2022
2022 FORD ESCAPE PHEV

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



M20220200
NCAP 35 MPH FRONTAL
MARCH 29, 2022
2022 FORD ESCAPE PHEV

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



M20220200
NCAP 35 MPH FRONTAL
MARCH 29, 2022
2022 FORD ESCAPE PHEV

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



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



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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

PHOTOGRAPH NOT APPLICABLE

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

APPENDIX B
DUMMY RESPONSE DATA TRACES

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| Figure No. 35. Passenger Left Femur Force vs. Time | B-12 |
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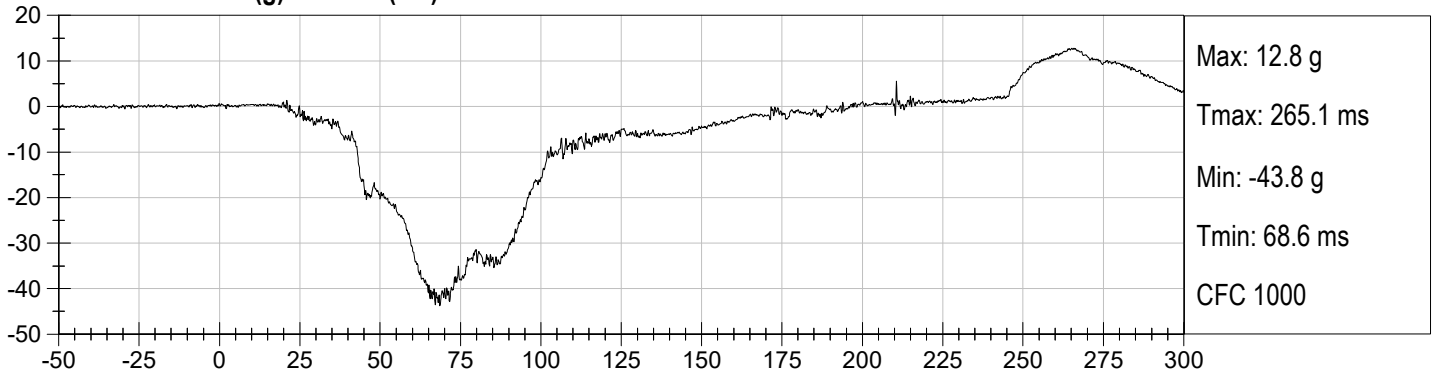
The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.gov

Driver Head X Redundant
 Driver Head Y Redundant
 Driver Head Z Redundant
 Driver Head Angular Velocity X
 Driver Head Angular Velocity Y
 Driver Head Angular Velocity Z
 Driver Upper Neck Force Y
 Driver Upper Neck Moment X
 Driver Upper Neck Moment Z
 Driver Chest X Redundant
 Driver Chest Y Redundant
 Driver Chest Z Redundant
 Driver Pelvis X
 Driver Pelvis Y
 Driver Pelvis Z
 Driver Left Femur Redundant
 Driver Right Femur Redundant
 Driver Left Upper Tibia Moment X
 Driver Left Upper Tibia Moment Y

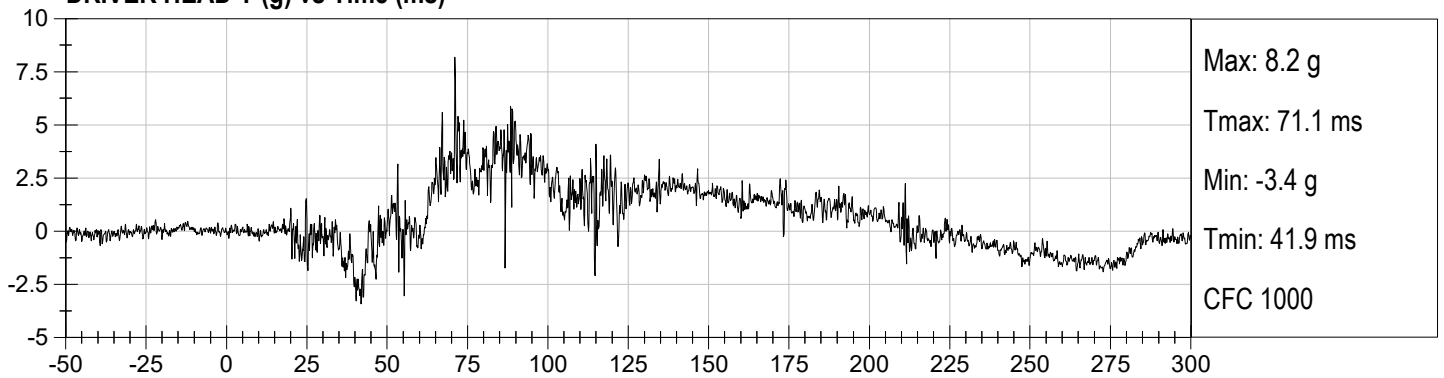
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z
Driver Lap Belt Force
Driver Shoulder Belt Force
Passenger Head X Redundant
Passenger Head Y Redundant
Passenger Head Z Redundant
Passenger Head Angular Velocity X
Passenger Head Angular Velocity Y
Passenger Head Angular Velocity Z
Passenger Upper Neck Force Y
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Z
Passenger Chest X Redundant
Passenger Chest Y Redundant
Passenger Chest Z Redundant
Passenger Pelvis X
Passenger Pelvis Y

Passenger Pelvis Z
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z
Passenger Lap Belt Force
Passenger Shoulder Belt Force
Left Rear Seat Crossmember X
Right Rear Seat Crossmember X
Vehicle Engine Top X
Vehicle Engine Bottom X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember Xr
Right Rear Seat Crossmember Xr
Advanced Research Load Cell Barrier – 528 channels

DRIVER HEAD X (g) vs Time (ms)



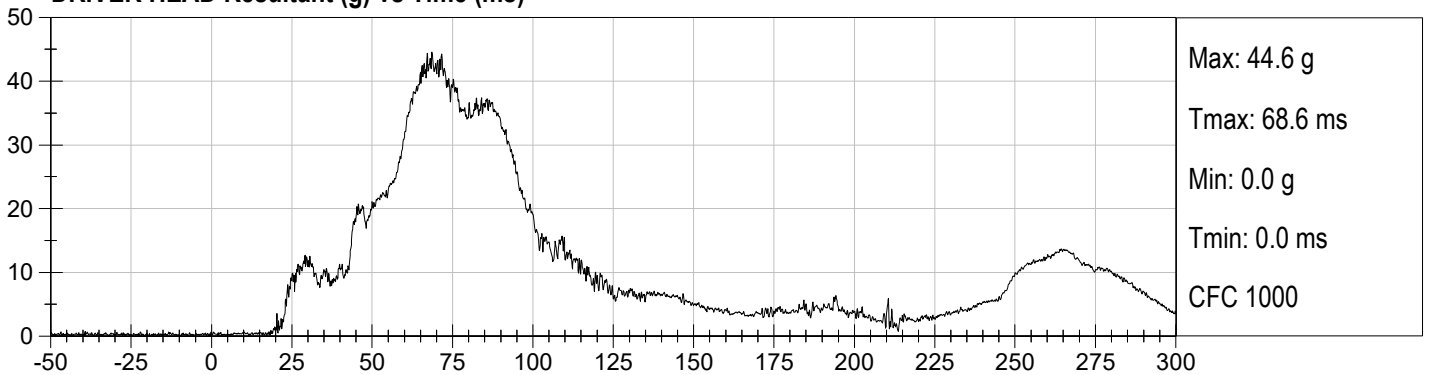
DRIVER HEAD Y (g) vs Time (ms)

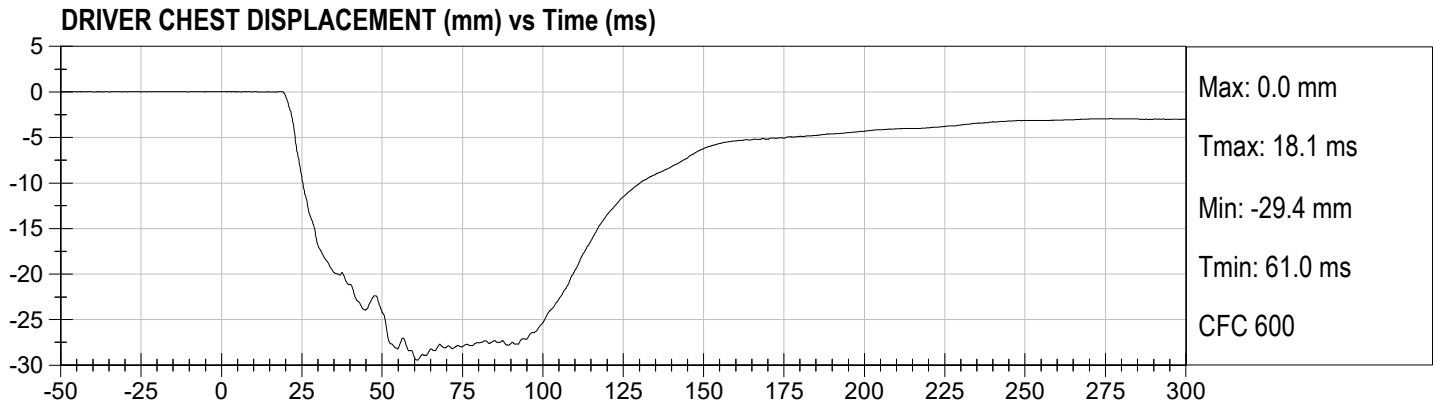


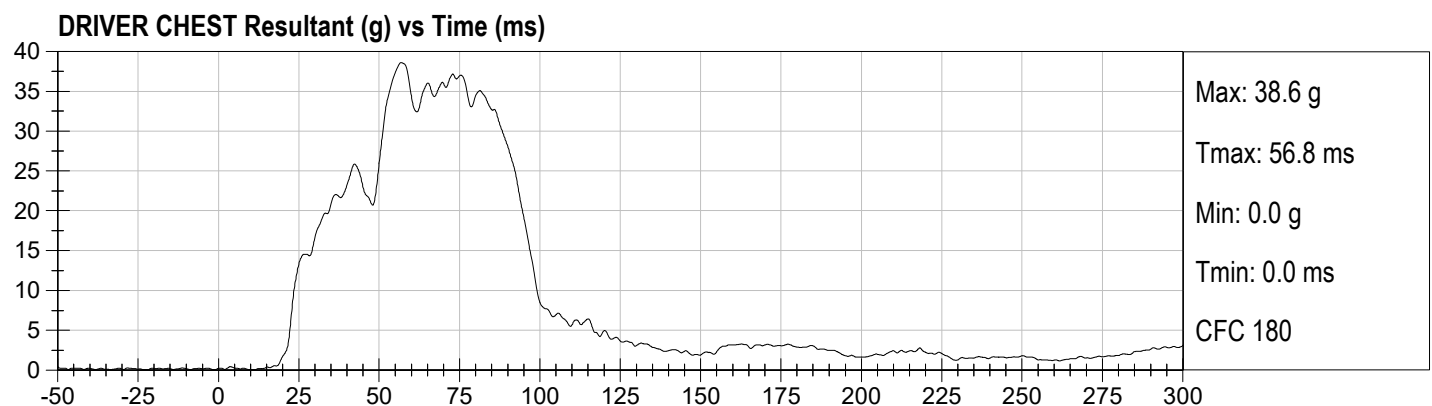
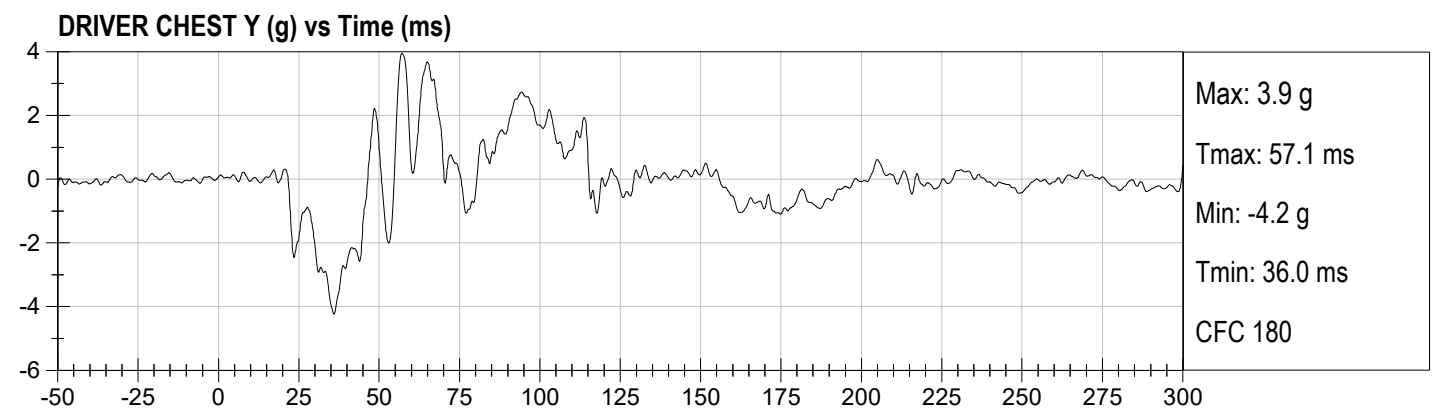
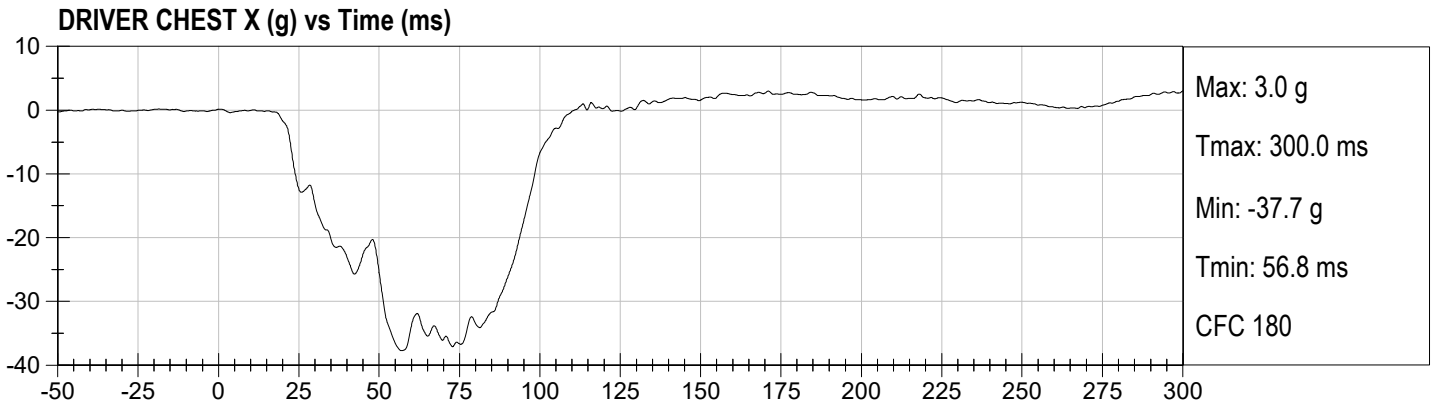
DRIVER HEAD Z (g) vs Time (ms)

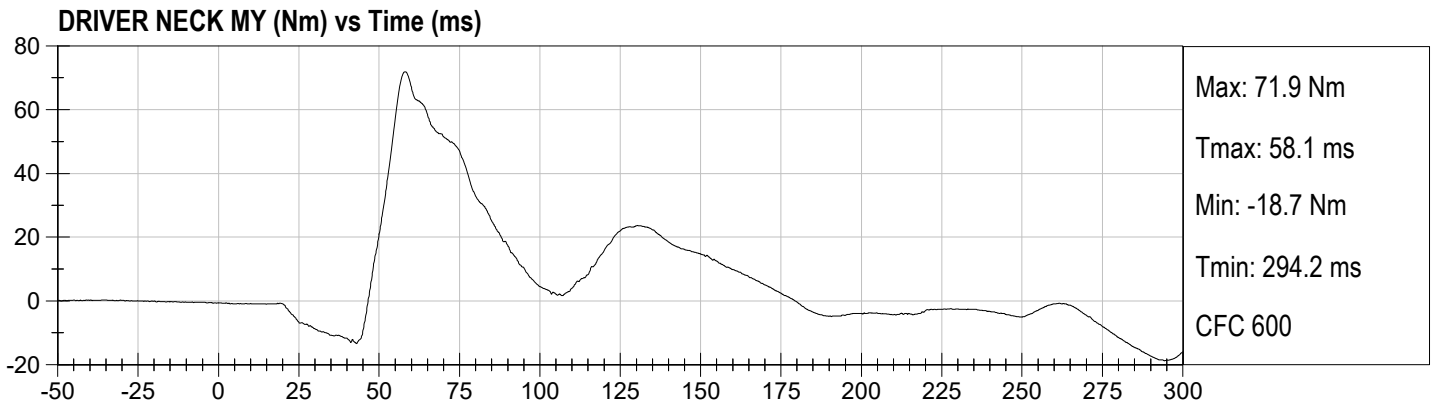
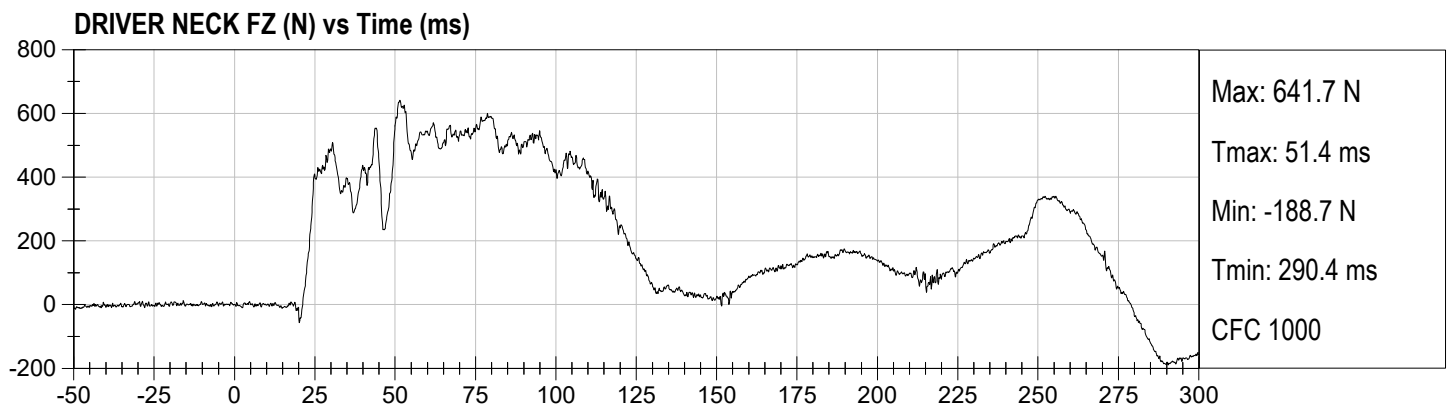
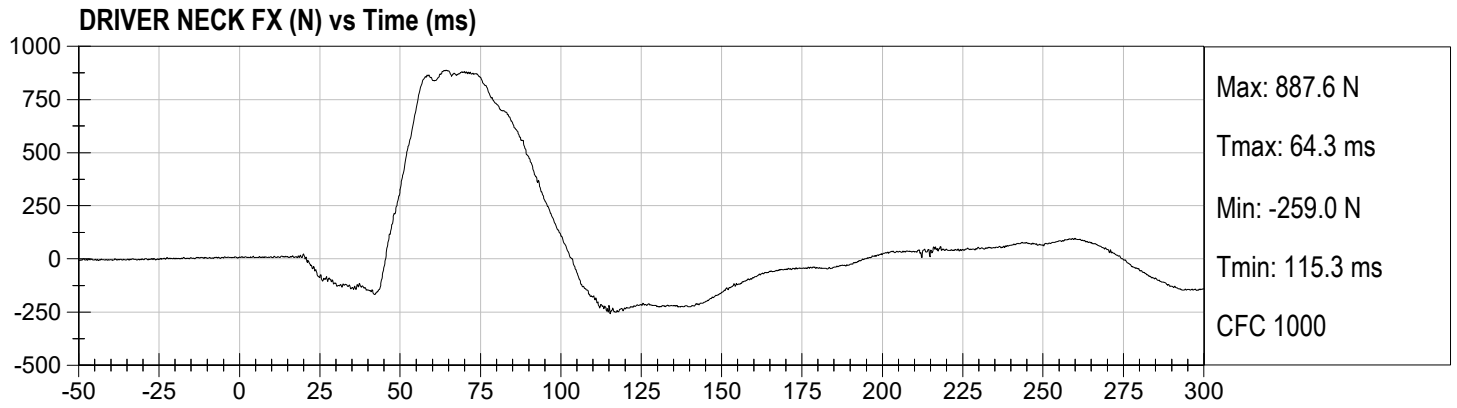


DRIVER HEAD Resultant (g) vs Time (ms)

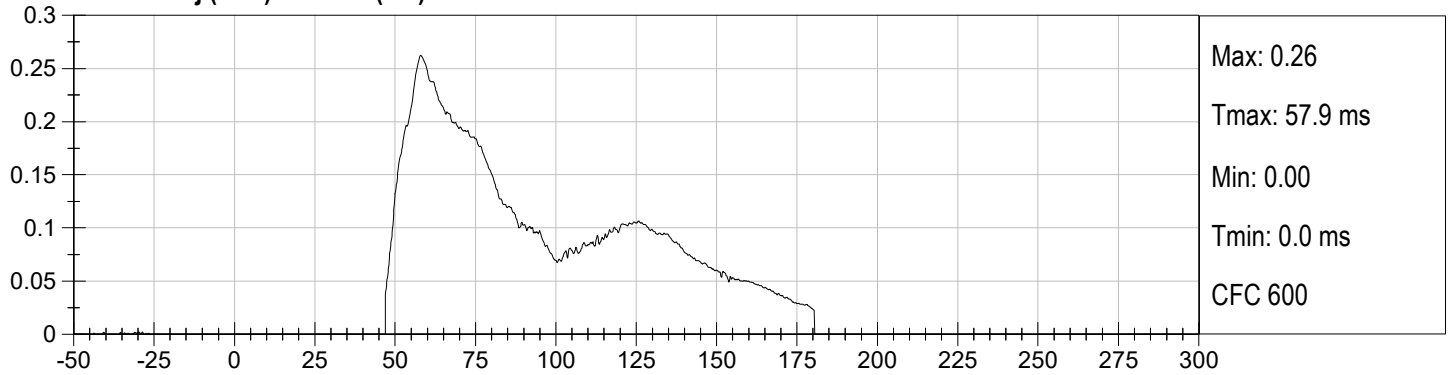




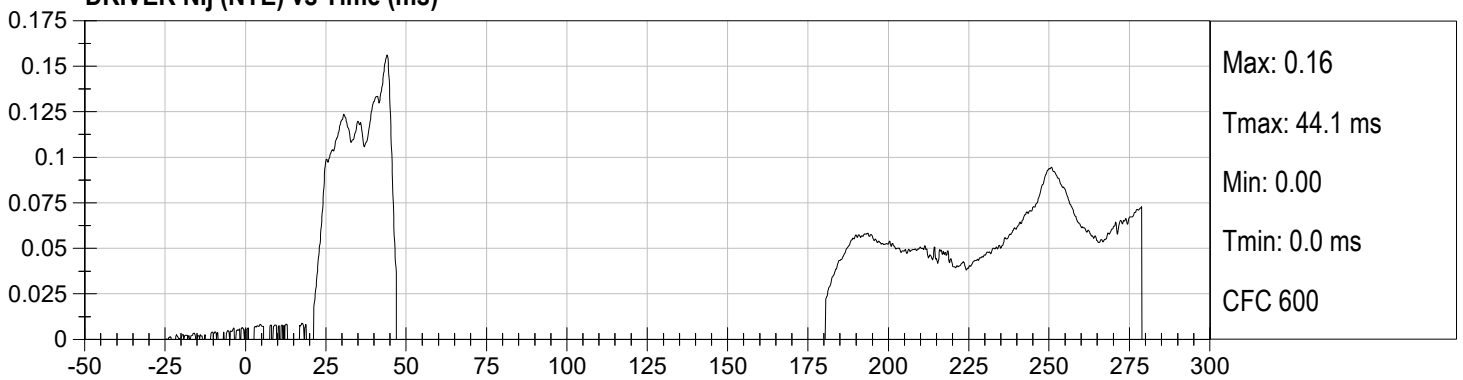




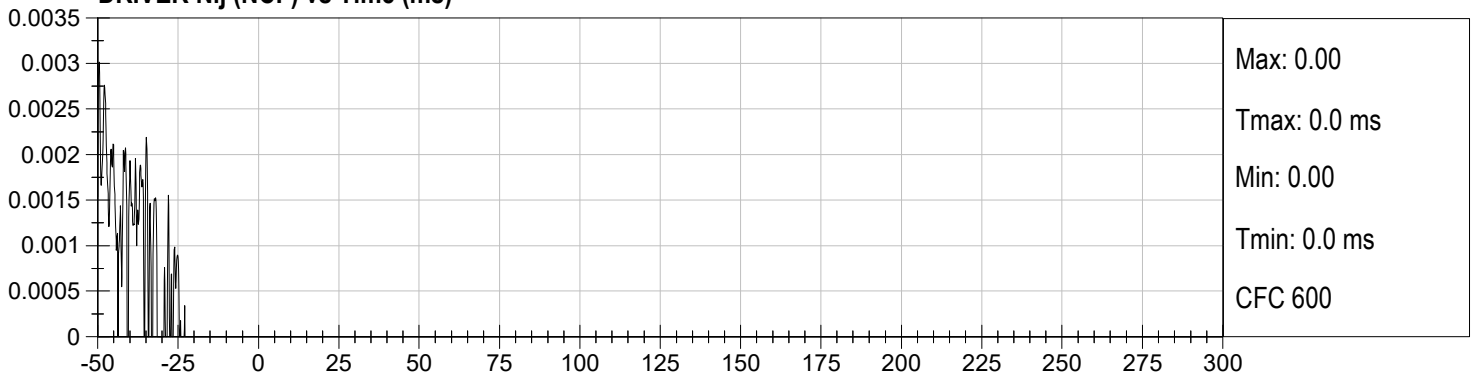
DRIVER Nij (NTF) vs Time (ms)



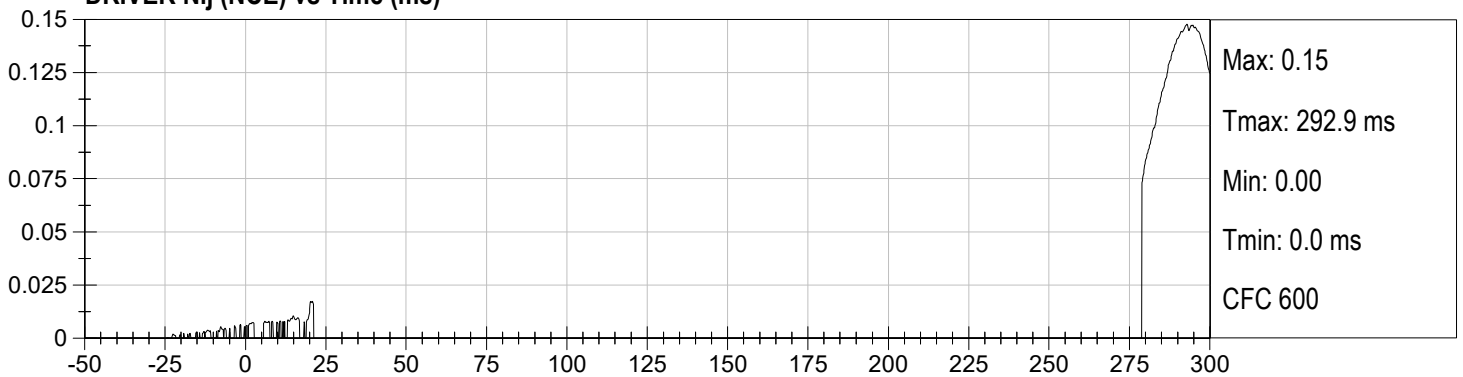
DRIVER Nij (NTE) vs Time (ms)



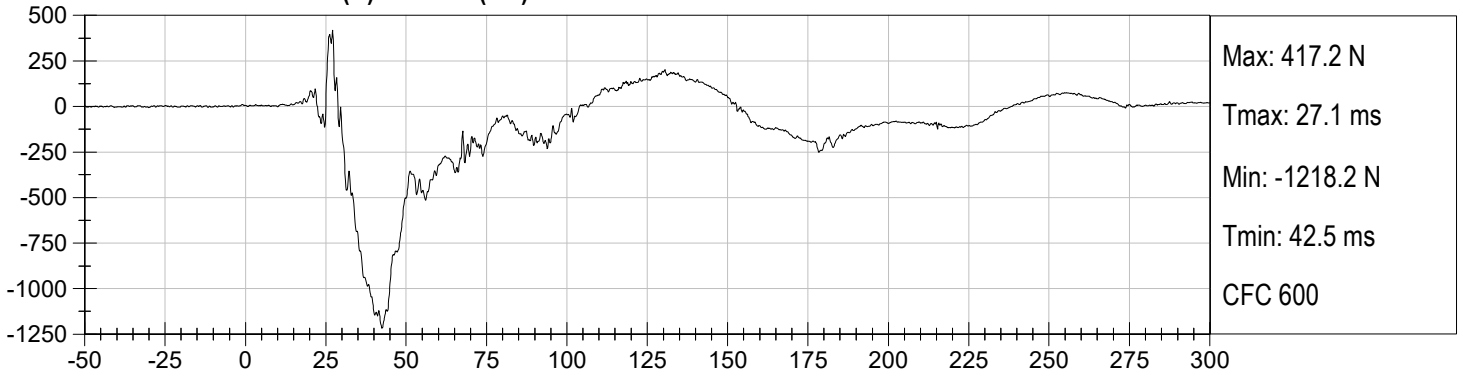
DRIVER Nij (NCF) vs Time (ms)



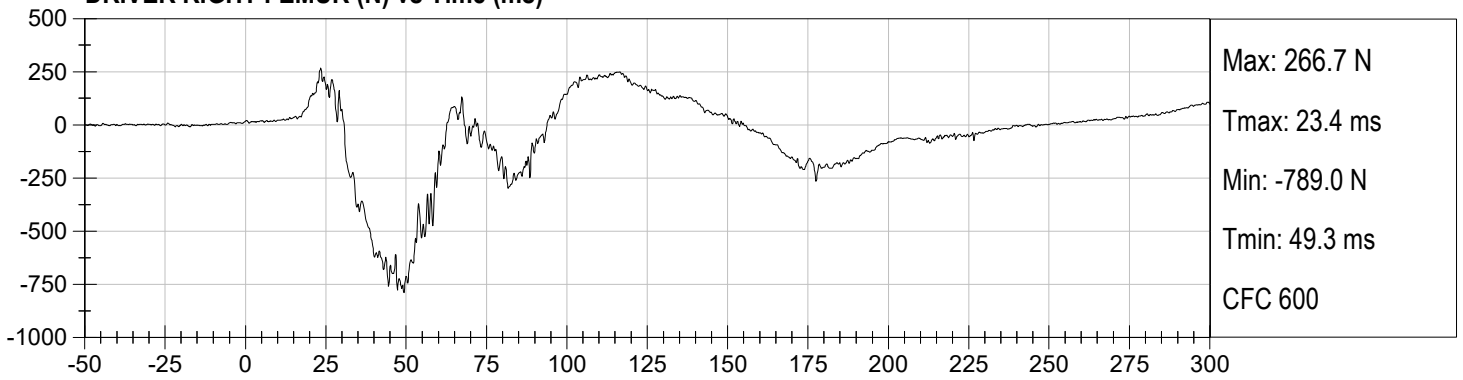
DRIVER Nij (NCE) vs Time (ms)

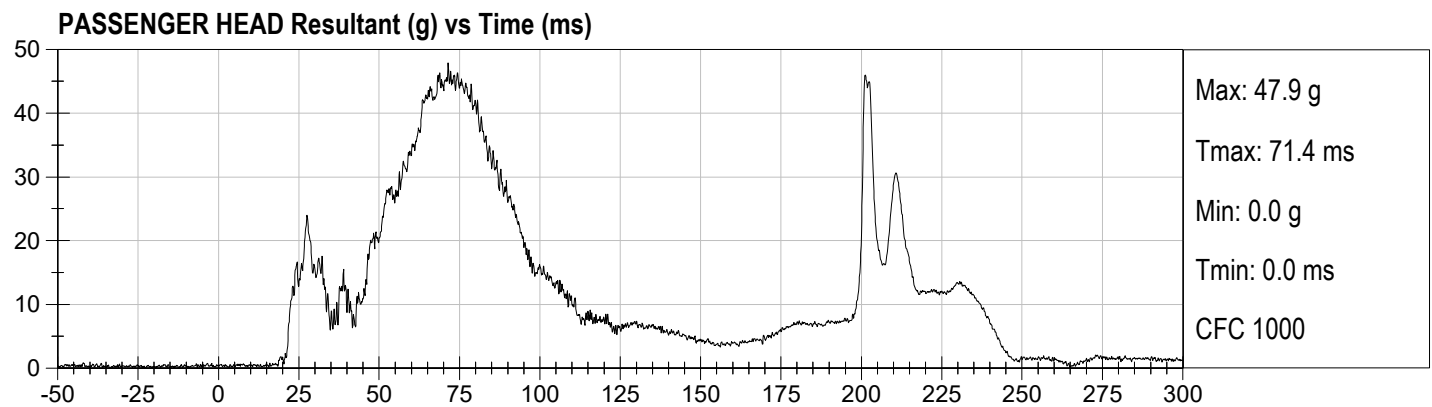
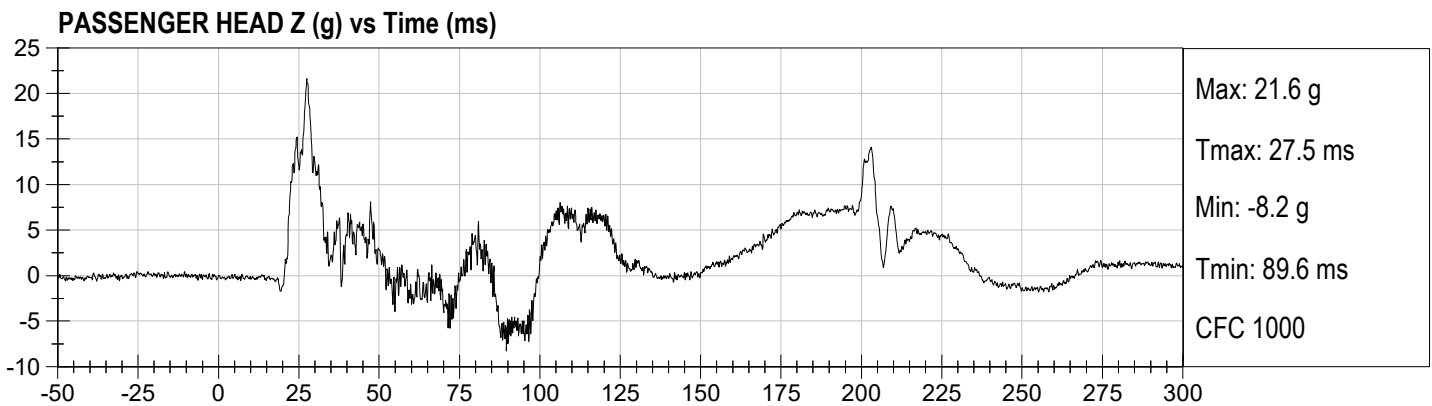
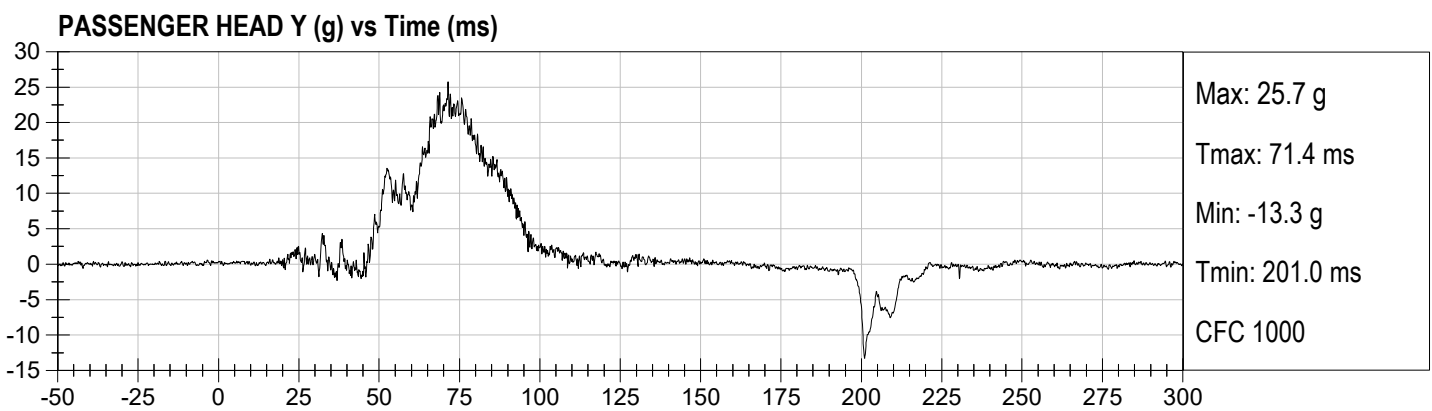
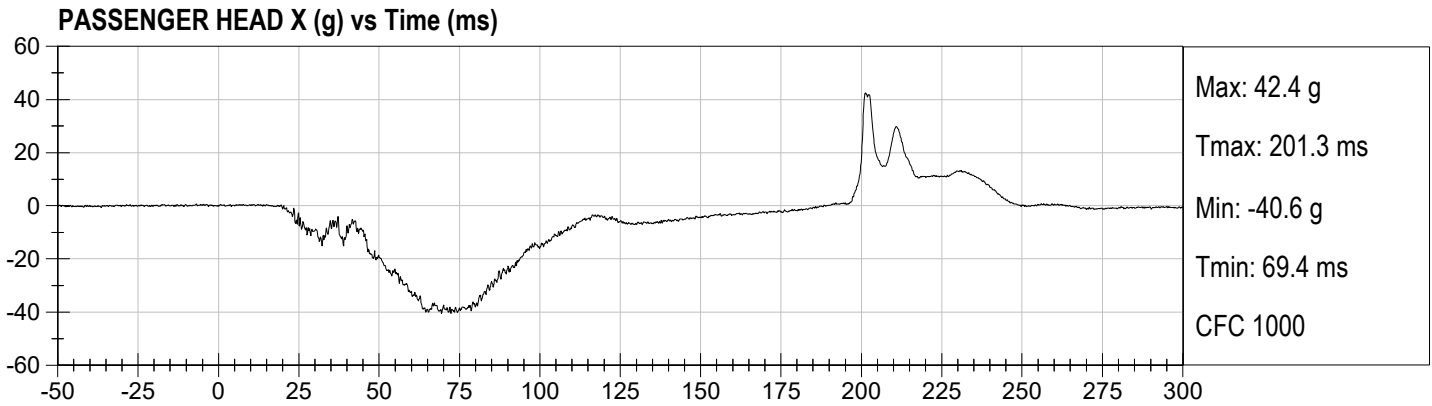


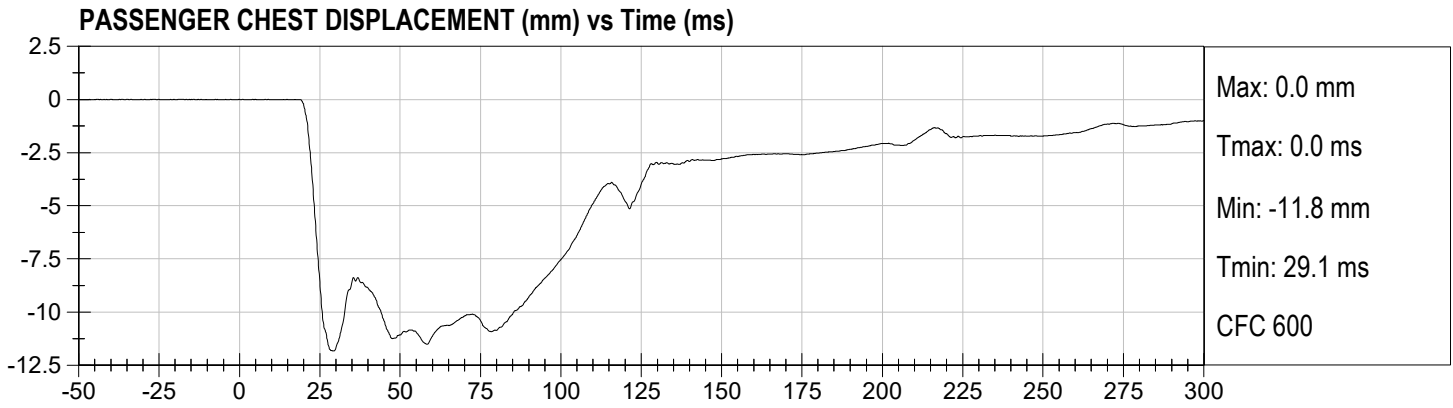
DRIVER LEFT FEMUR (N) vs Time (ms)



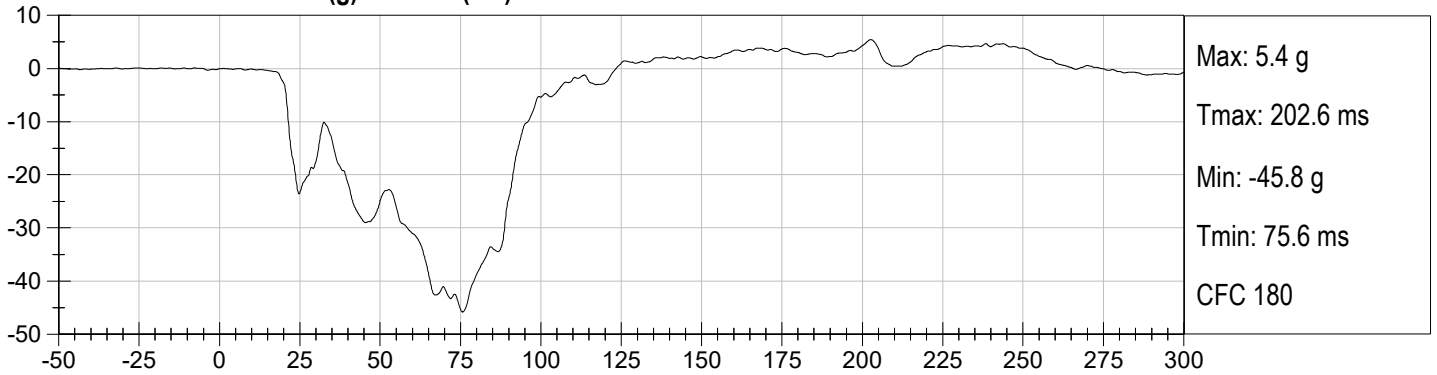
DRIVER RIGHT FEMUR (N) vs Time (ms)



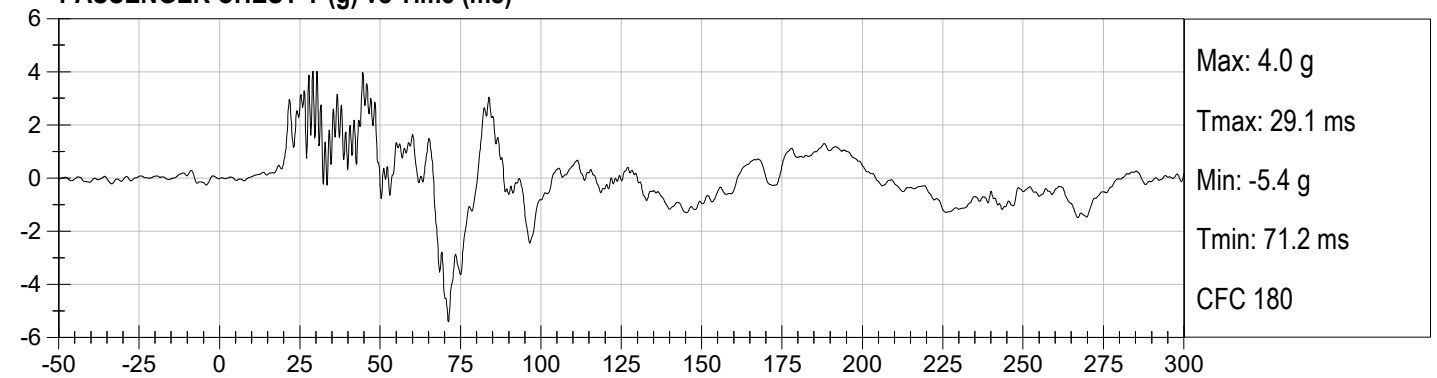




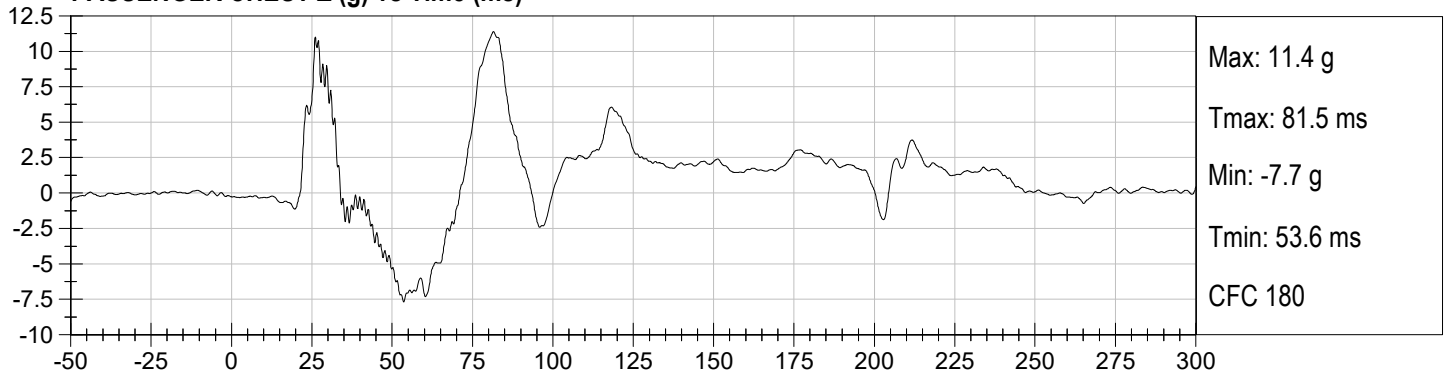
PASSENGER CHEST X (g) vs Time (ms)



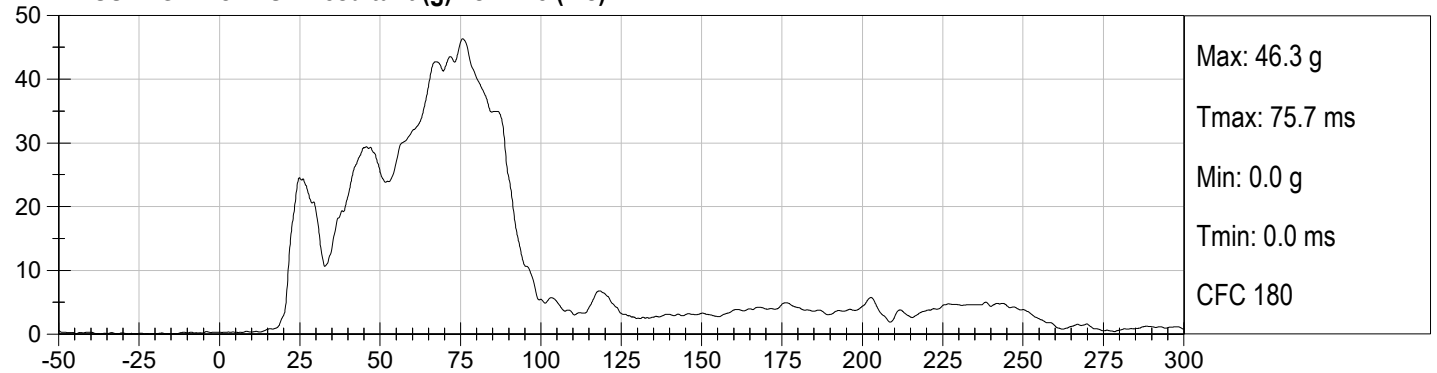
PASSENGER CHEST Y (g) vs Time (ms)



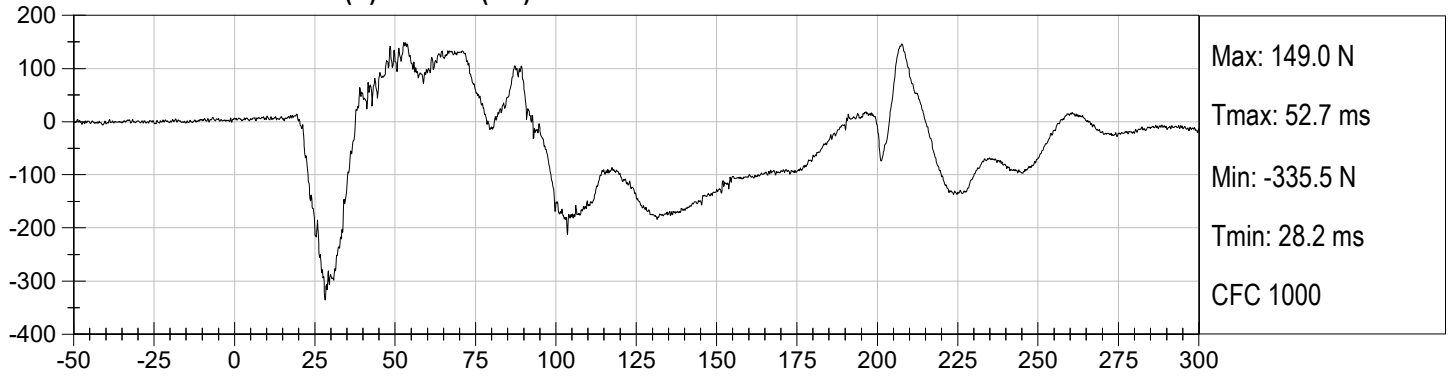
PASSENGER CHEST Z (g) vs Time (ms)



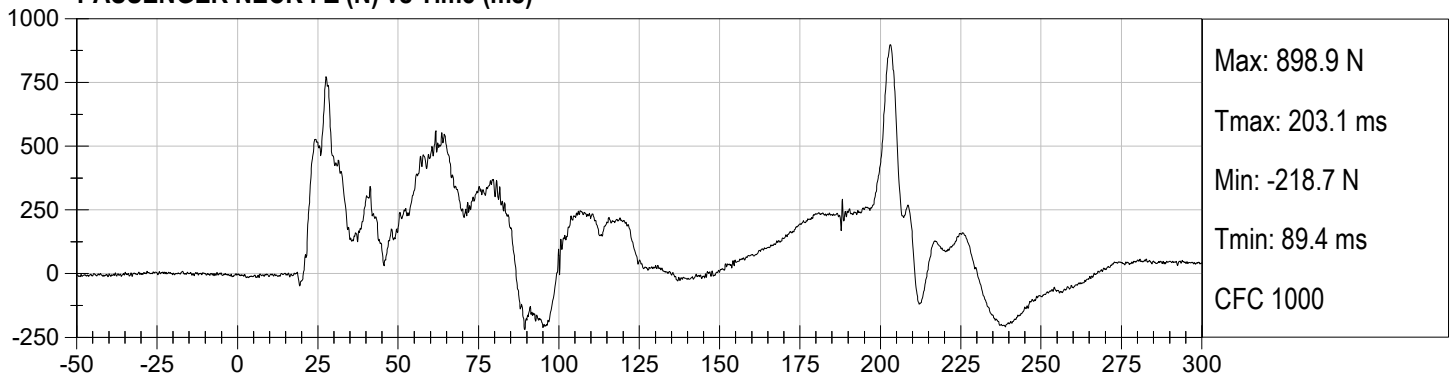
PASSENGER CHEST Resultant (g) vs Time (ms)



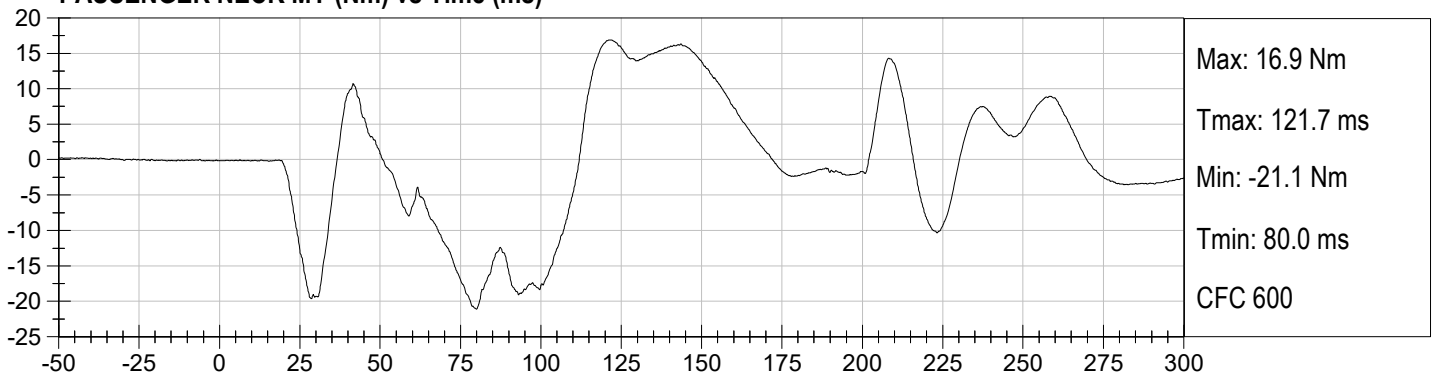
PASSENGER NECK FX (N) vs Time (ms)



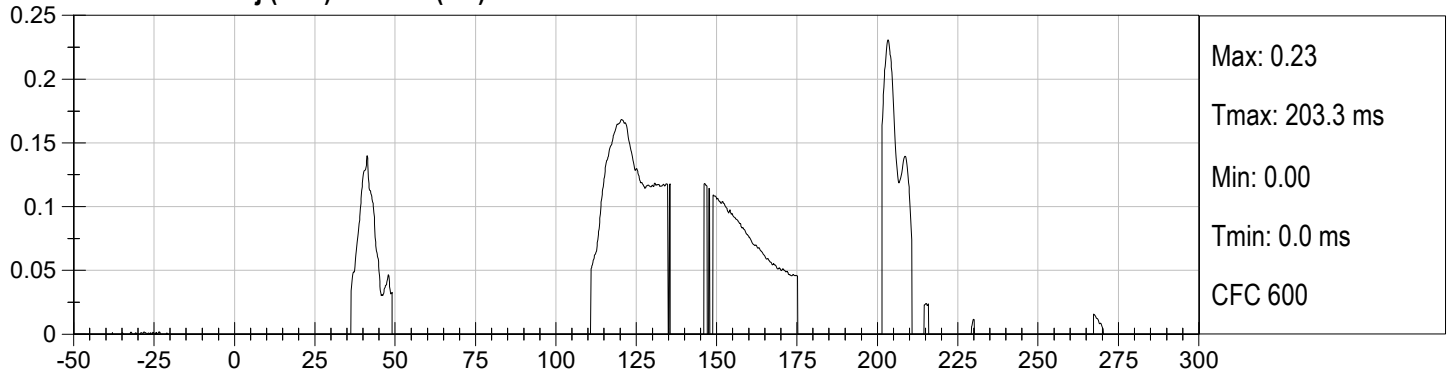
PASSENGER NECK FZ (N) vs Time (ms)



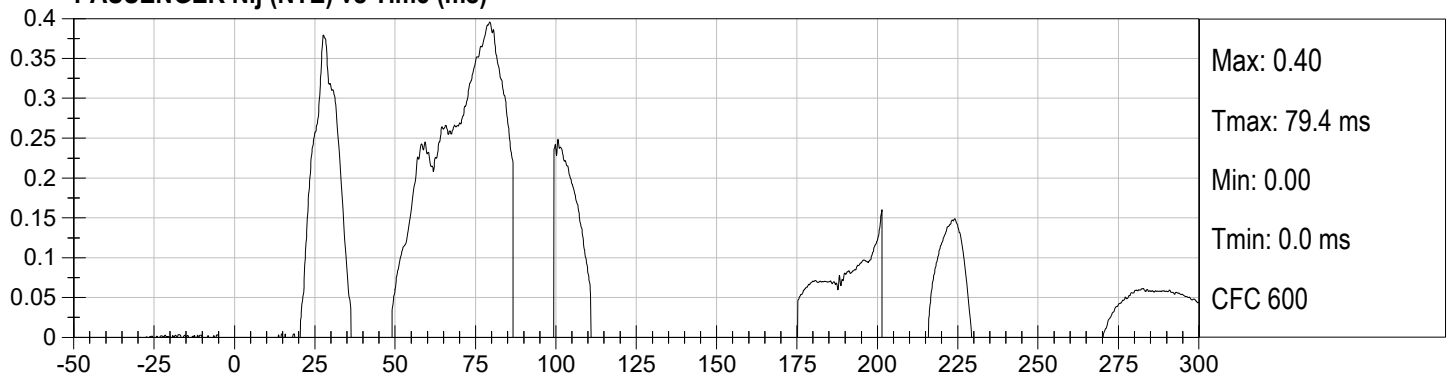
PASSENGER NECK MY (Nm) vs Time (ms)



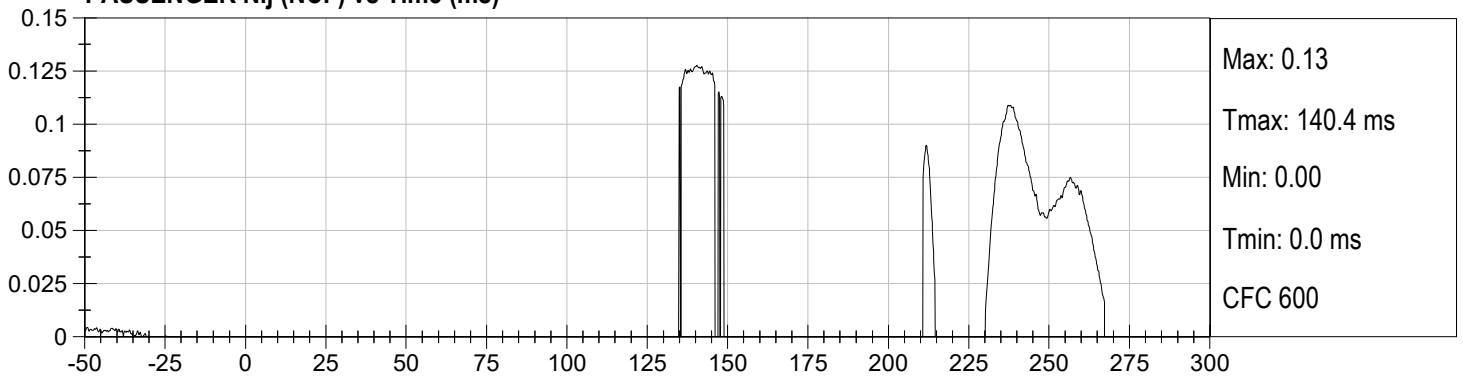
PASSENGER Nij (NTF) vs Time (ms)



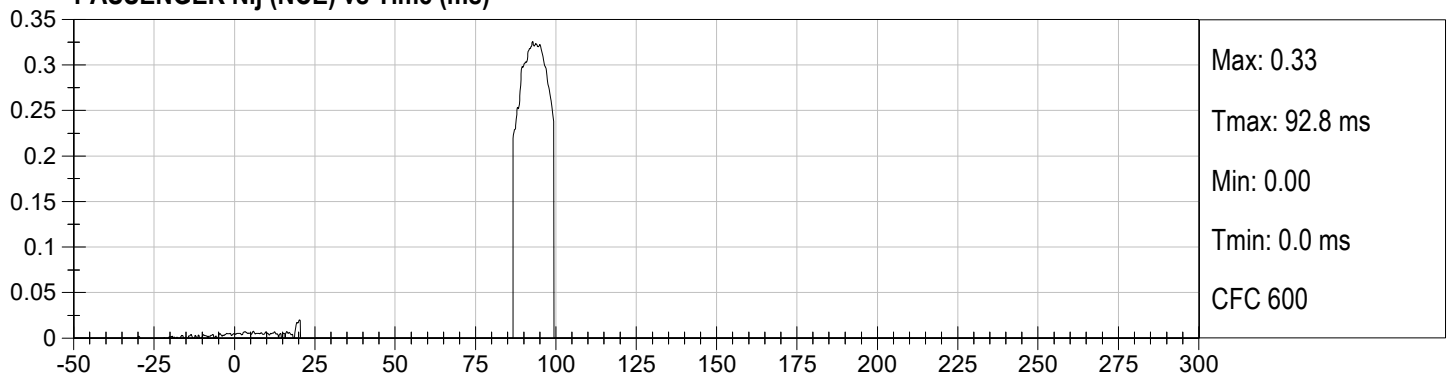
PASSENGER Nij (NTE) vs Time (ms)

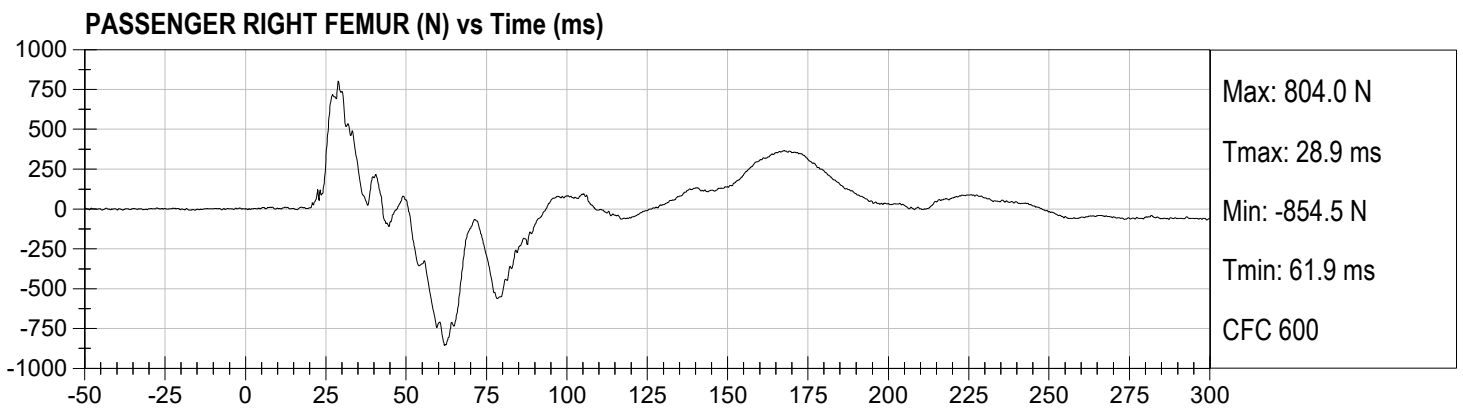
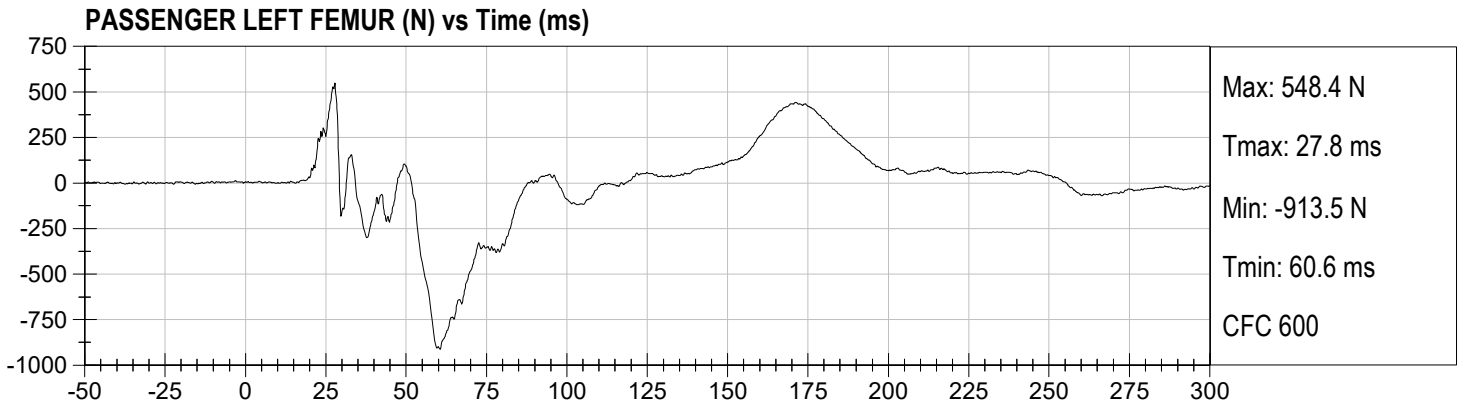


PASSENGER Nij (NCF) vs Time (ms)



PASSENGER Nij (NCE) vs Time (ms)





APPENDIX C
DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA

CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

Hybrid III, 50th External Measurements
SN: 351

| HYBRID III, PART 572, SUBPART E EXTERNAL DIMENSIONS | | | | |
|---|--------------------------------|--|-----------------------------|--------------------|
| DIMENSION | DESCRIPTION | DETAILS | ASSEMBLY DIMENSION (inches) | ACTUAL MEASUREMENT |
| A | TOTAL SITTING HEIGHT | Seat surface to highest point on top of the head. | 34.6-35.0 | 34.8 |
| B | SHOULDER PIVOT HEIGHT | Centerline of shoulder pivot bolt to the seat surface. | 19.9-20.5 | 20.0 |
| C | H-POINT HEIGHT | Reference | 3.3-3.5 | 3.4 |
| D | H-POINT LOCATION FROM BACKLINE | Reference | 5.3-5.5 | 5.5 |
| E | SHOULDER PIVOT FROM BACKLINE | Center of the shoulder clevis to the rear vertical surface of the fixture. | 3.3-3.7 | 3.5 |
| F | THIGH CLEARANCE | Measured at the highest point on the upper femur segment. | 5.5-6.1 | 6.0 |
| G | BACK OF ELBOW TO WRIST PIVOT | back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots | 11.4-12.0 | 11.8 |
| H | HEAD BACK TO BACKLINE | Back of Skull cap skin to seat rear vertical surface (Reference) | 1.6-1.8 | 1.7 |
| I | SHOULDER TO- ELBOW LENGTH | Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt. | 13.0-13.6 | 13.3 |
| J | ELBOW REST HEIGHT | Measure from the flesh below the elbow pivot bolt to the seat surface. | 7.5-8.3 | 7.8 |
| K | BUTTOCK TO KNEE LENGTH | The forward most part of the knee flesh to the rear vertical surface of the fixture. | 22.8-23.8 | 23.8 |
| L | POPLITEAL HEIGHT | Seat surface to the plane of the horizontal plane of the bottom of the feet. | 16.9-17.9 | 17.0 |
| M | KNEE PIVOT HEIGHT | Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet. | 19.1-19.7 | 19.5 |
| N | BUTTOCK POPLITEAL LENGTH | The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K". | 17.8-18.8 | 18.8 |

| HYBRID III, SUBPART E EXTERIOR DIMENSIONS, continued | | | | |
|--|---|---|-----------|--------------------|
| DIMENSION | DESCRIPTION | DETAILS | | ACTUAL MEASUREMENT |
| O | CHEST DEPTH WITHOUT JACKET | Measured 16.9-17.1 in. above seat surface | 8.4-9.0 | 8.5 |
| P | FOOT LENGTH | Tip of toe to rear of heel | 9.9-10.5 | 10.3 |
| V | SHOULDER BREADTH | Outside edges of right and left shoulder clevises | 16.3-17.2 | 16.5 |
| W | FOOT BREADTH | The widest part of the foot | 3.6-4.2 | 4.0 |
| Y | CHEST CIRCUMFERENCE (WITH CHEST JACKET) | Measured 16.9-17.1 in. above seat surface | 38.2-39.4 | 39.2 |
| Z | WAIST CIRCUMFERENCE | Measured 8.9-9.1 in. above seat surface | 32.9-34.1 | 33.7 |
| AA | REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE | Reference | 16.9-17.1 | 17.0 |
| BB | REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE | Reference | 8.9-9.1 | 9.0 |

NOTE: THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

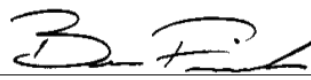
ATD Serial No: 351

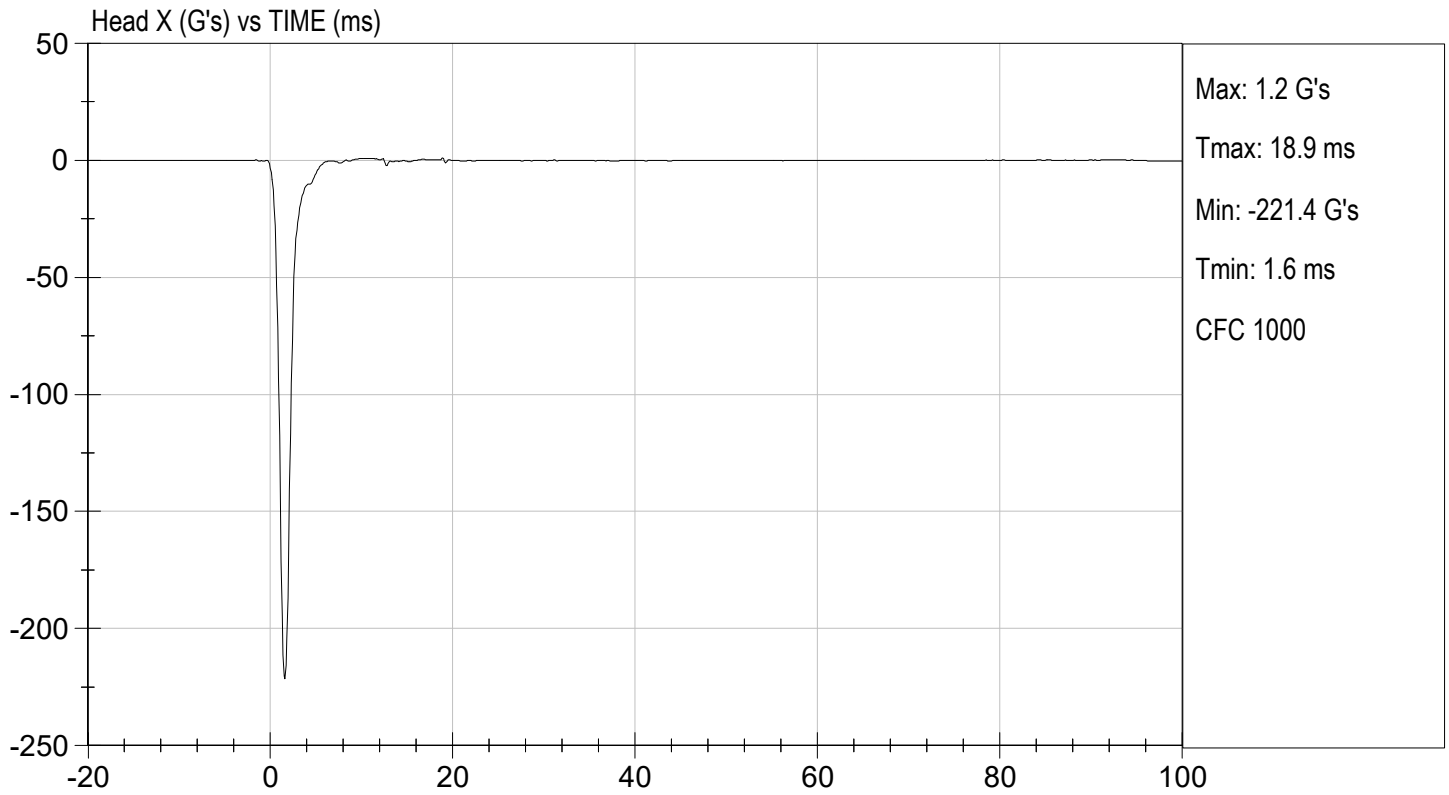
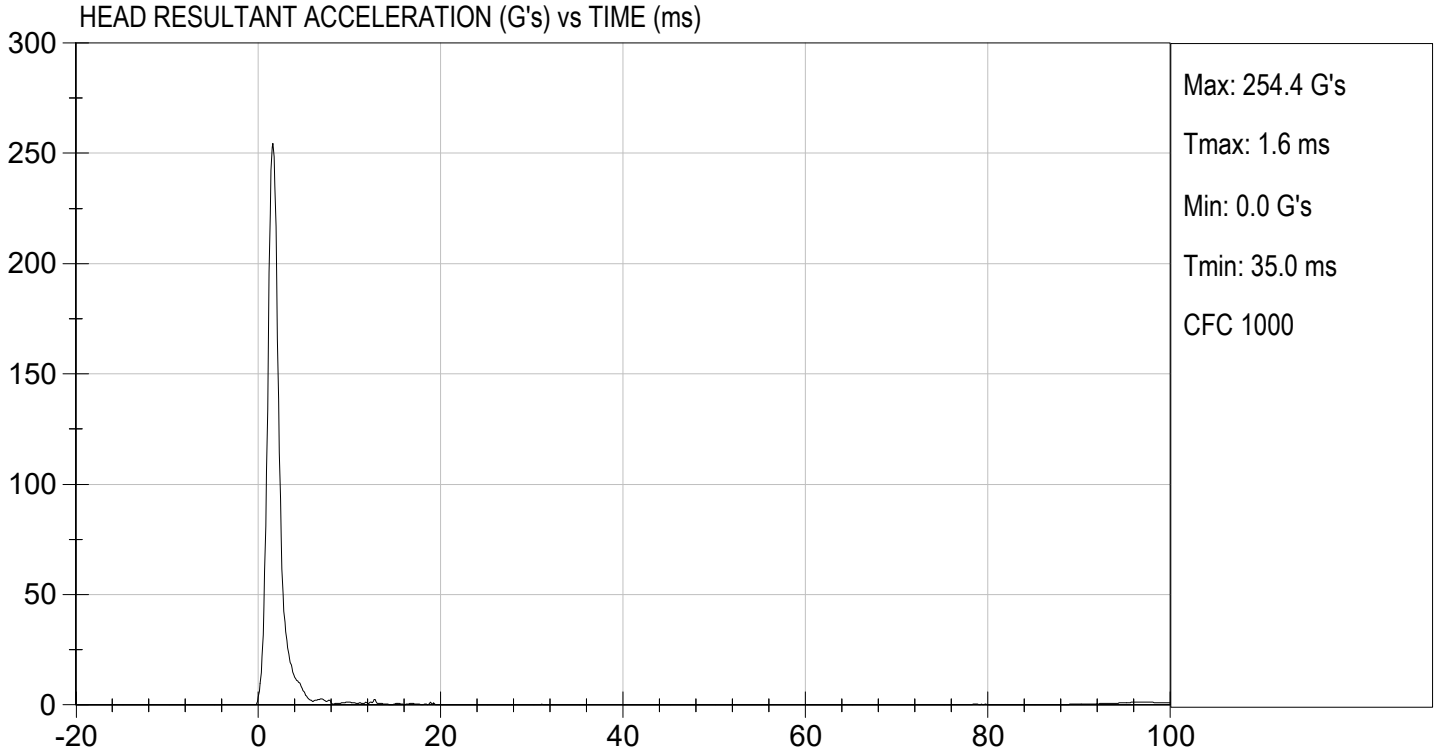
Test ID: D220571

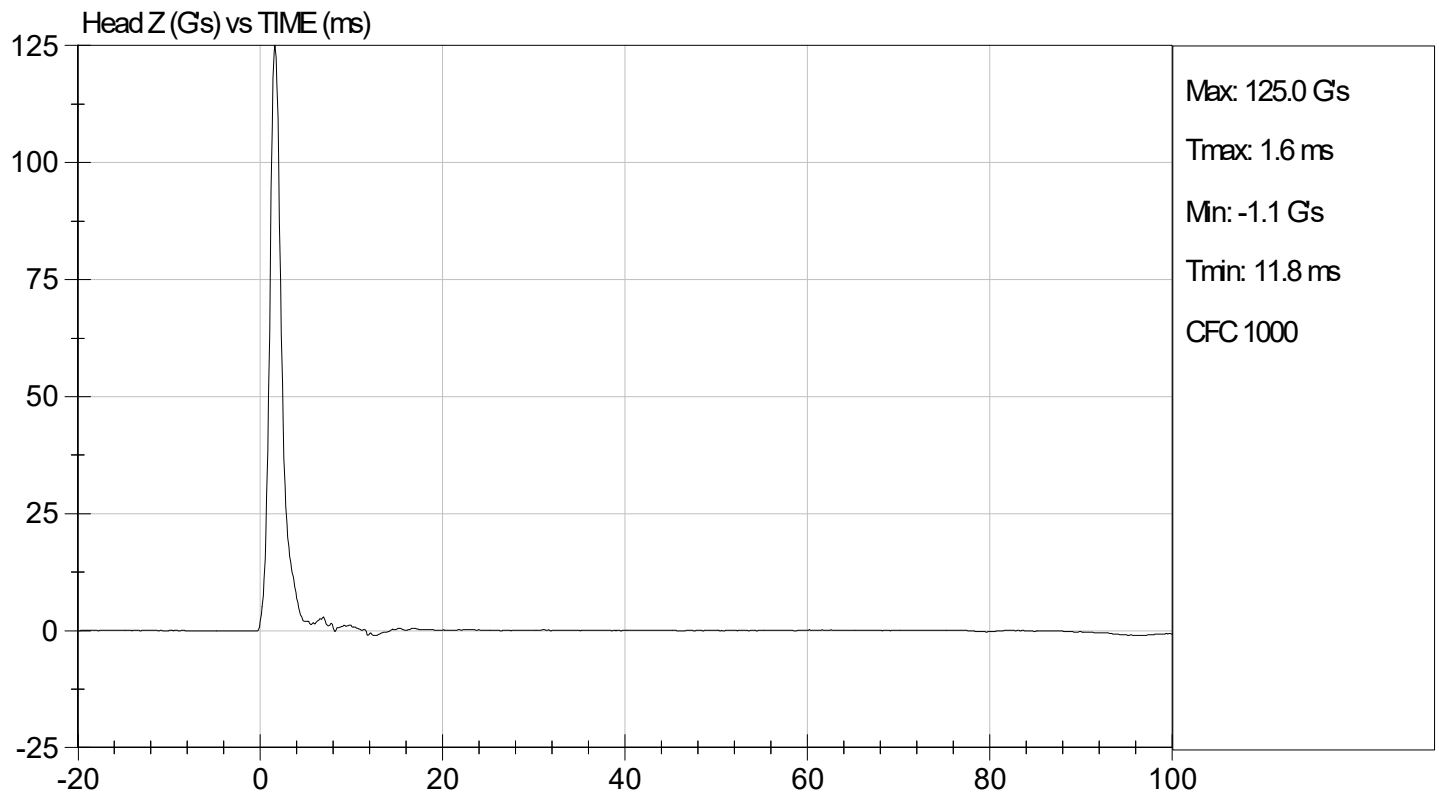
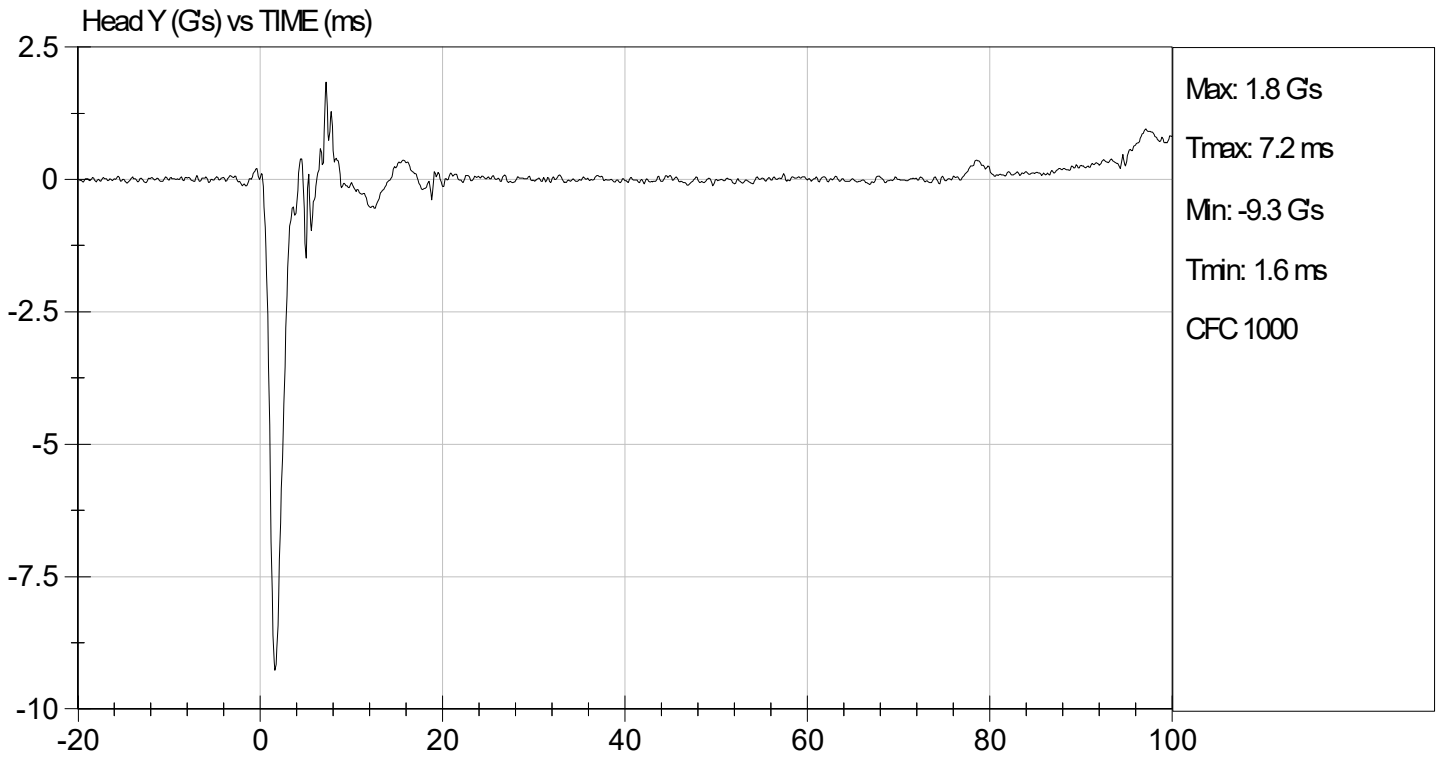
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|--------------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 22.0 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 22 | Pass |
| Peak Resultant Acceleration | G's | 225 to 275 | 254 | Pass |
| Peak Lateral Acceleration | G's | <= +/- 15.0 | -9.3 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 10% of peak | Yes | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

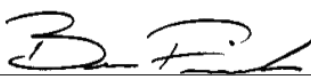
ATD Serial No: 351

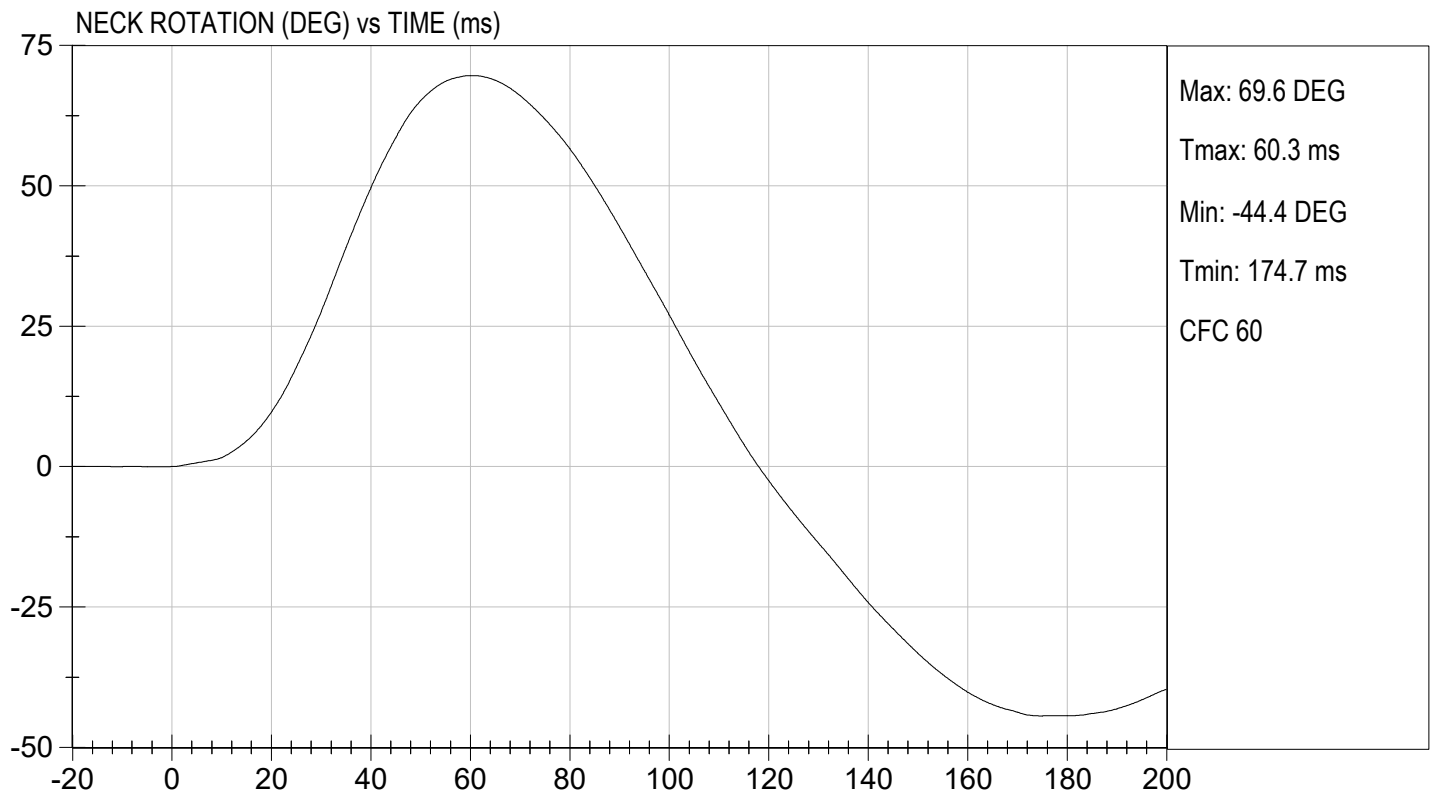
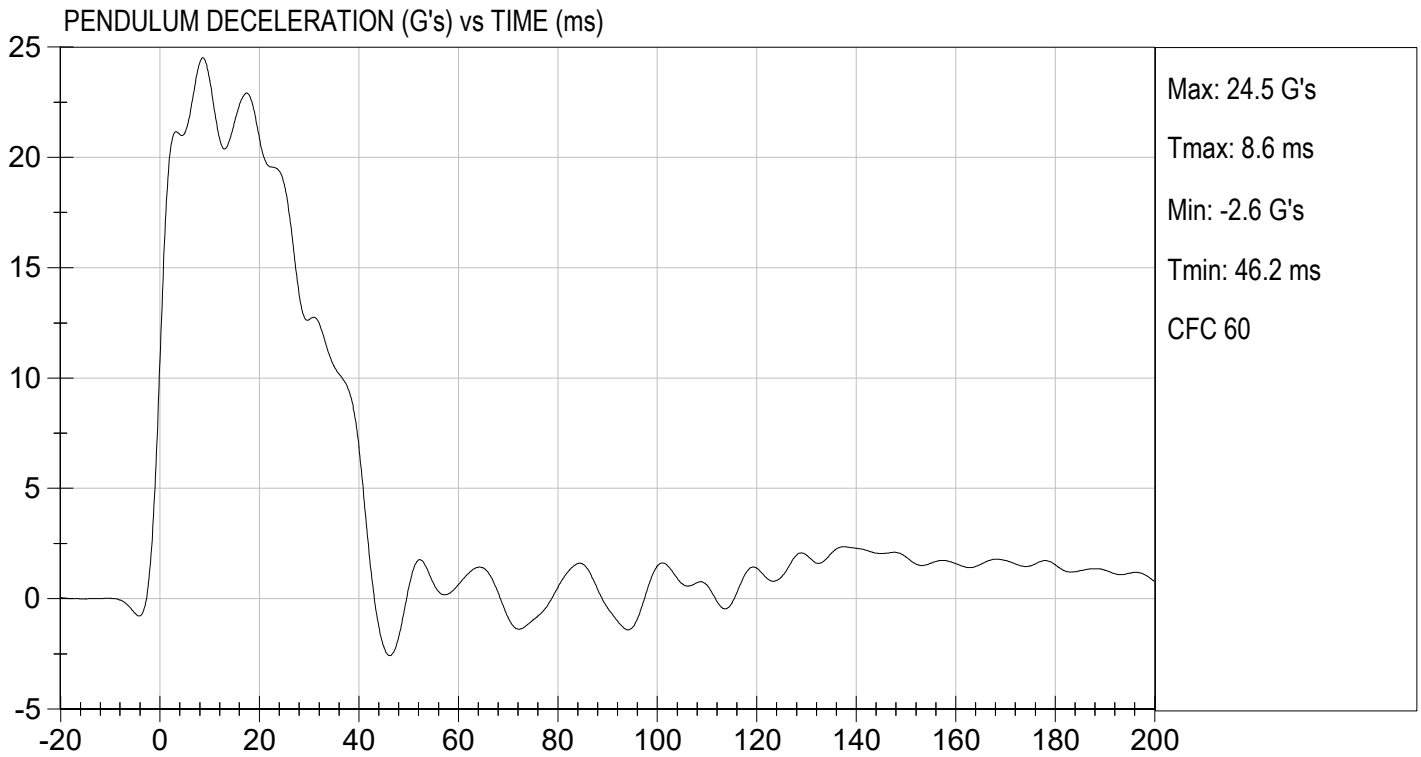
Test I.D.: D220572

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|--|---------|-------|----------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 22.0 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 22 | Pass |
| Pendulum Velocity | | m/s | 6.89 to 7.13 | 6.96 | Pass |
| Pendulum Deceleration | 10 ms | G's | 22.50 to 27.50 | 23.50 | Pass |
| | 20 ms | G's | 17.60 to 22.60 | 20.86 | Pass |
| | 30 ms | G's | 12.50 to 18.50 | 12.65 | Pass |
| Peak Pendulum Deceleration After 30 ms | | G's | <= 29.0 | 12.8 | Pass |
| Deceleration Decay Time to Cross 5 G's | | ms | 34.0 to 42.0 | 40.9 | Pass |
| Maximum "D" Plane Rotation | Maximum | Deg | 64.0 to 78.0 | 69.6 | Pass |
| | Time | ms | 57.0 to 64.0 | 60.3 | Pass |
| "D" Plane Rotation Decay Time To Zero Crossing | | ms | 113.0 to 128.0 | 118.1 | Pass |
| Moment About Occipital Condyle | Maximum | Nm | 88.1 to 108.5 | 88.1 | Pass |
| | Time | ms | 47.0 to 58.0 | 50.6 | Pass |
| Positive Moment Decay Time To Zero Crossing | | ms | 97.0 to 107.0 | 99.8 | Pass |
| Overall Test Results | | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date

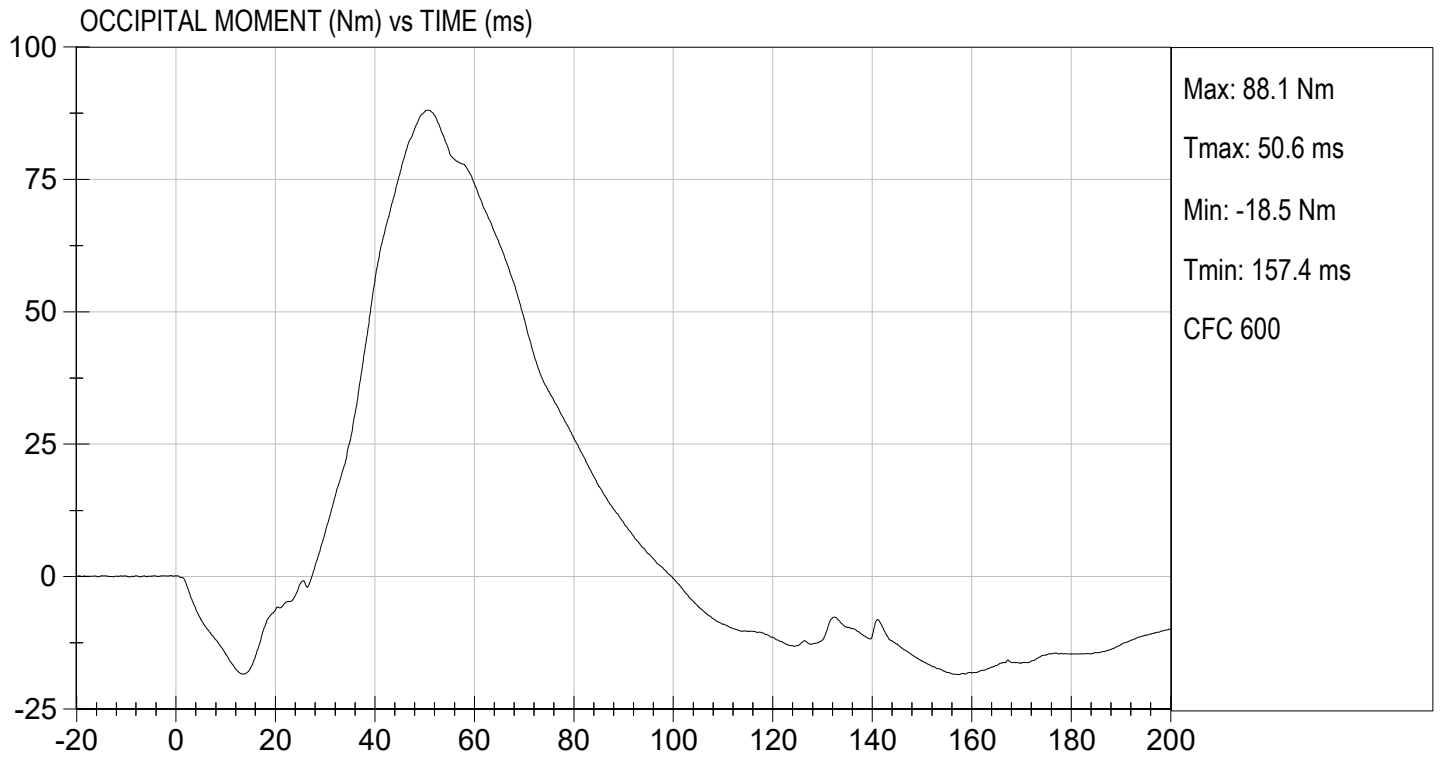

 Approved By





TEST DESC: NECK FLEXION
VELOCITY: 22.83 ft/s, 6.96 m/s

TEST DATE: 02/28/2022
TEST #: D220572



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

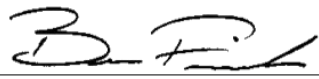
ATD Serial No: 351

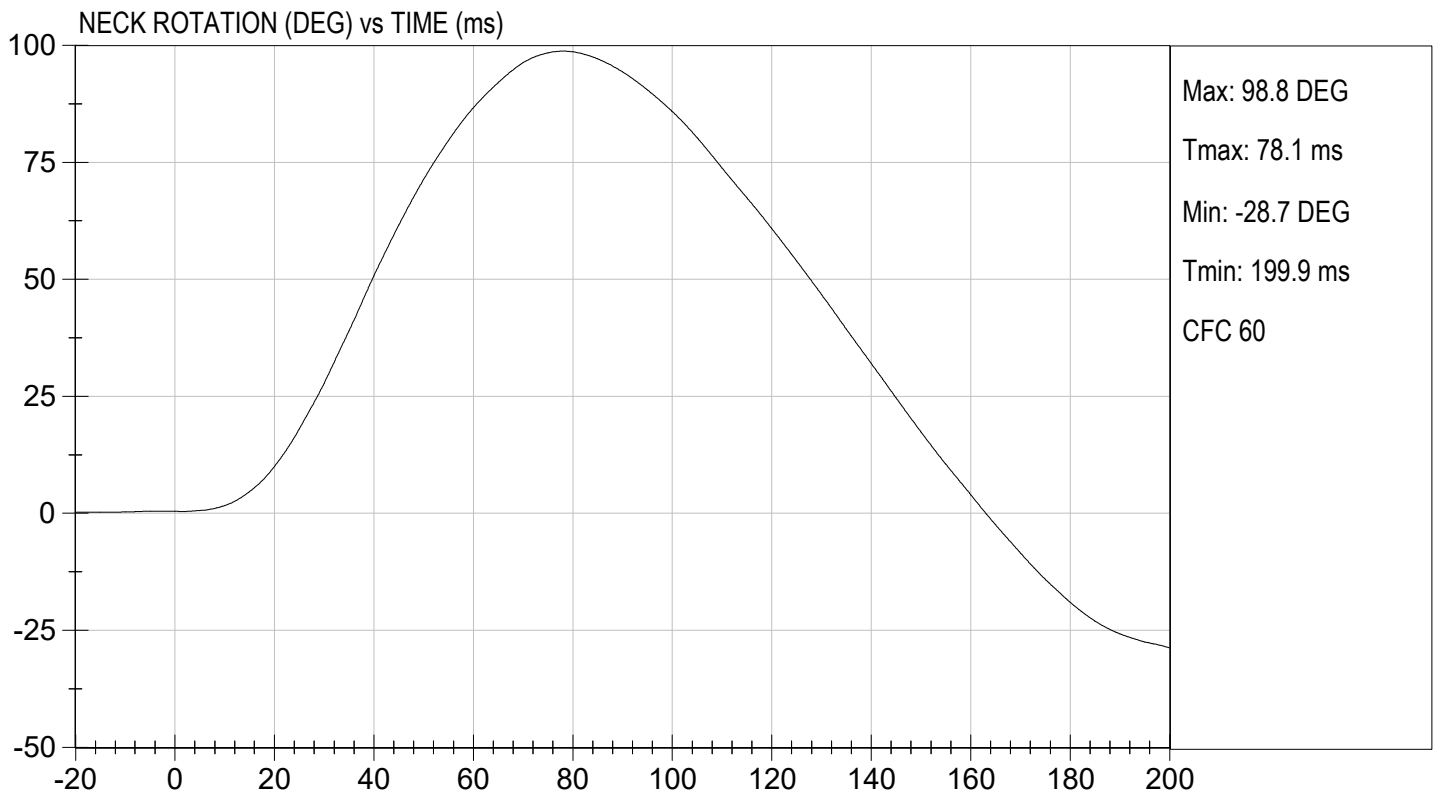
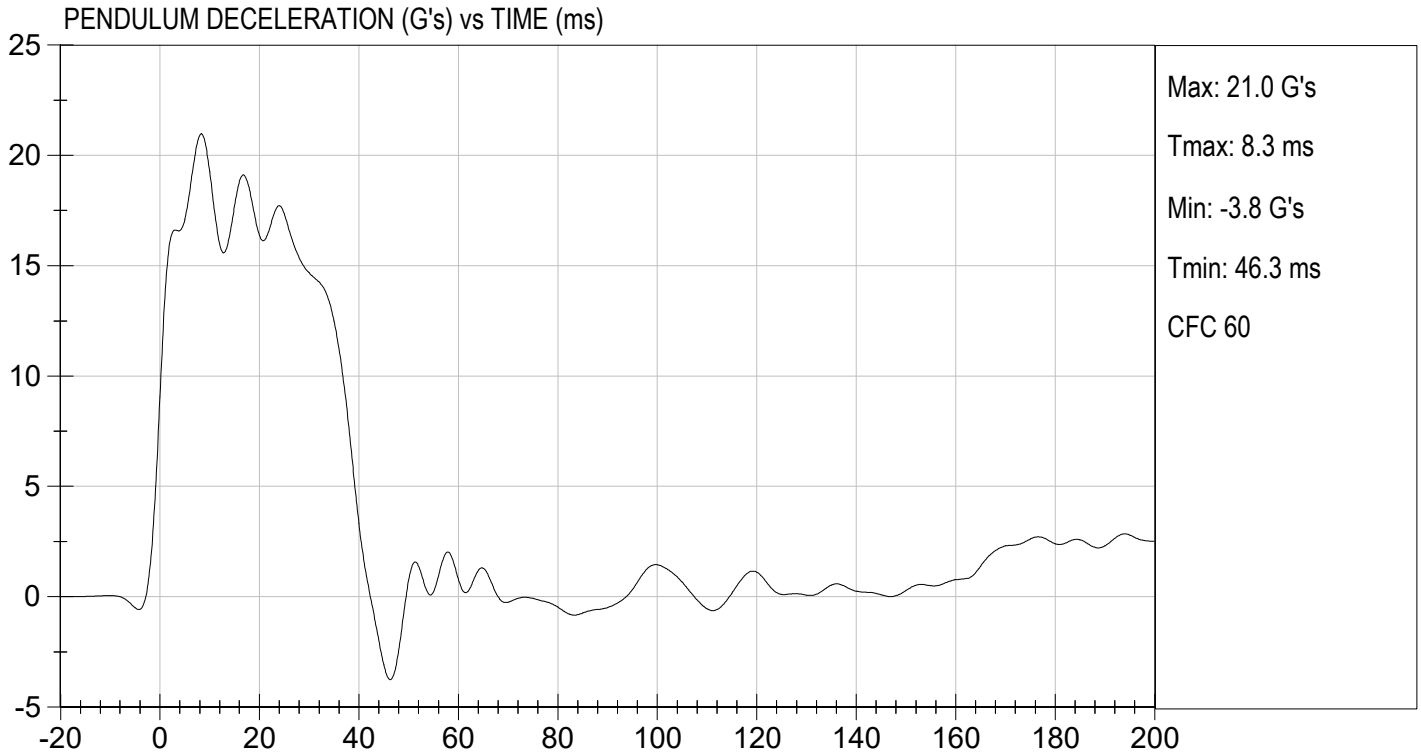
Test I.D.: D220573

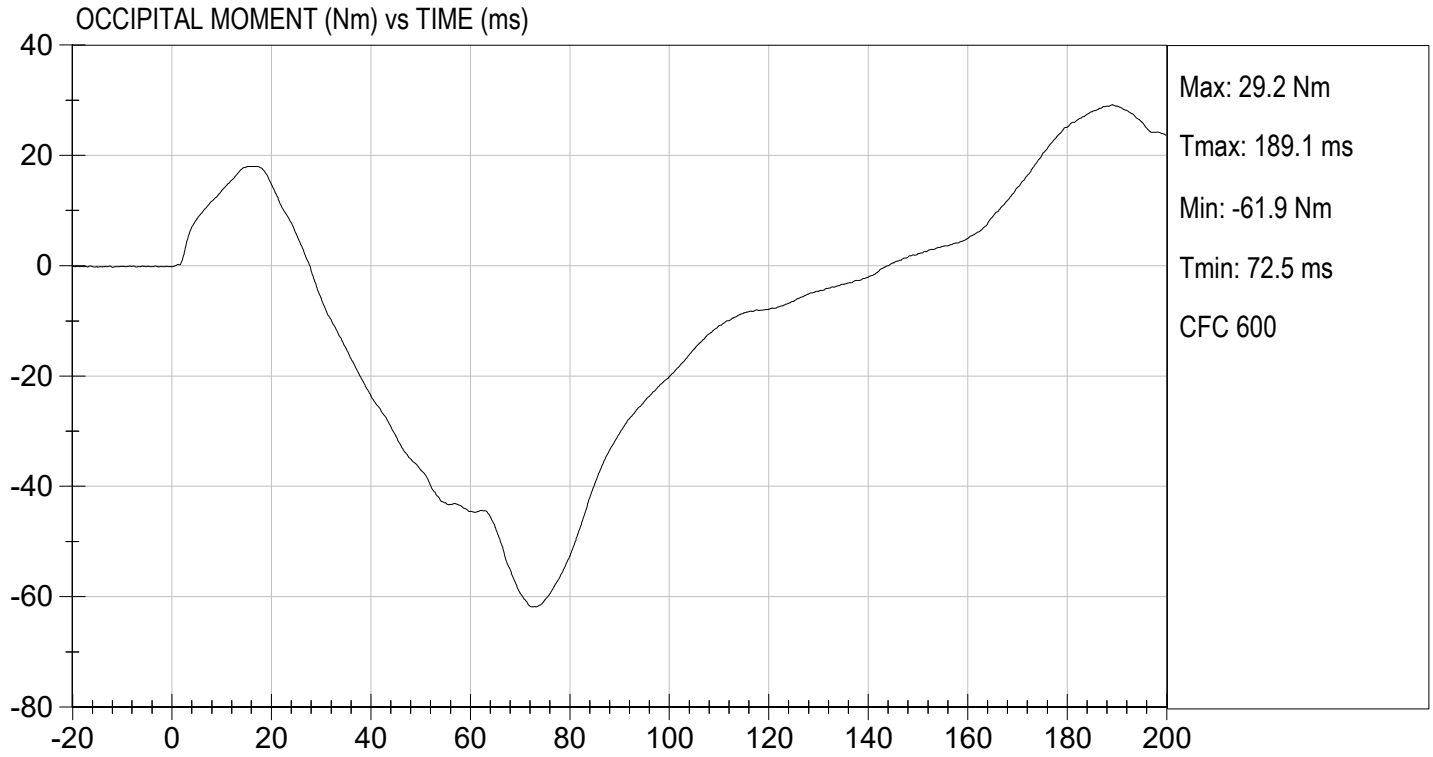
| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|--|---------|---------|----------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 22.0 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 22 | Pass |
| Pendulum Velocity | | m/s | 5.95 to 6.19 | 6.05 | Pass |
| Pendulum Deceleration | 10 ms | G's | 17.20 to 21.20 | 19.25 | Pass |
| | 20 ms | G's | 14.00 to 19.00 | 16.38 | Pass |
| | 30 ms | G's | 11.00 to 16.00 | 14.67 | Pass |
| Peak Pendulum Deceleration After 30 ms | | G's | <= 22.0 | 14.6 | Pass |
| Deceleration Decay Time to Cross 5 G's | | ms | 38.0 to 46.0 | 39.3 | Pass |
| Maximum "D" Plane Rotation | Maximum | Degrees | 81.0 to 106.0 | 98.8 | Pass |
| | Time | ms | 72.0 to 82.0 | 78.1 | Pass |
| "D" Plane Rotation Decay Time To Zero Crossing | | ms | 147.0 to 174.0 | 163.2 | Pass |
| Moment About Occipital Condyle | Maximum | Nm | -52.9 to -79.9 | -61.9 | Pass |
| | Time | ms | 65.0 to 79.0 | 72.5 | Pass |
| Negative Moment Decay Time To Zero Crossing | | ms | 120.0 to 148.0 | 144.2 | Pass |
| Overall Test Results | | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

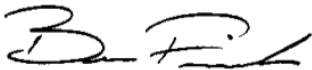
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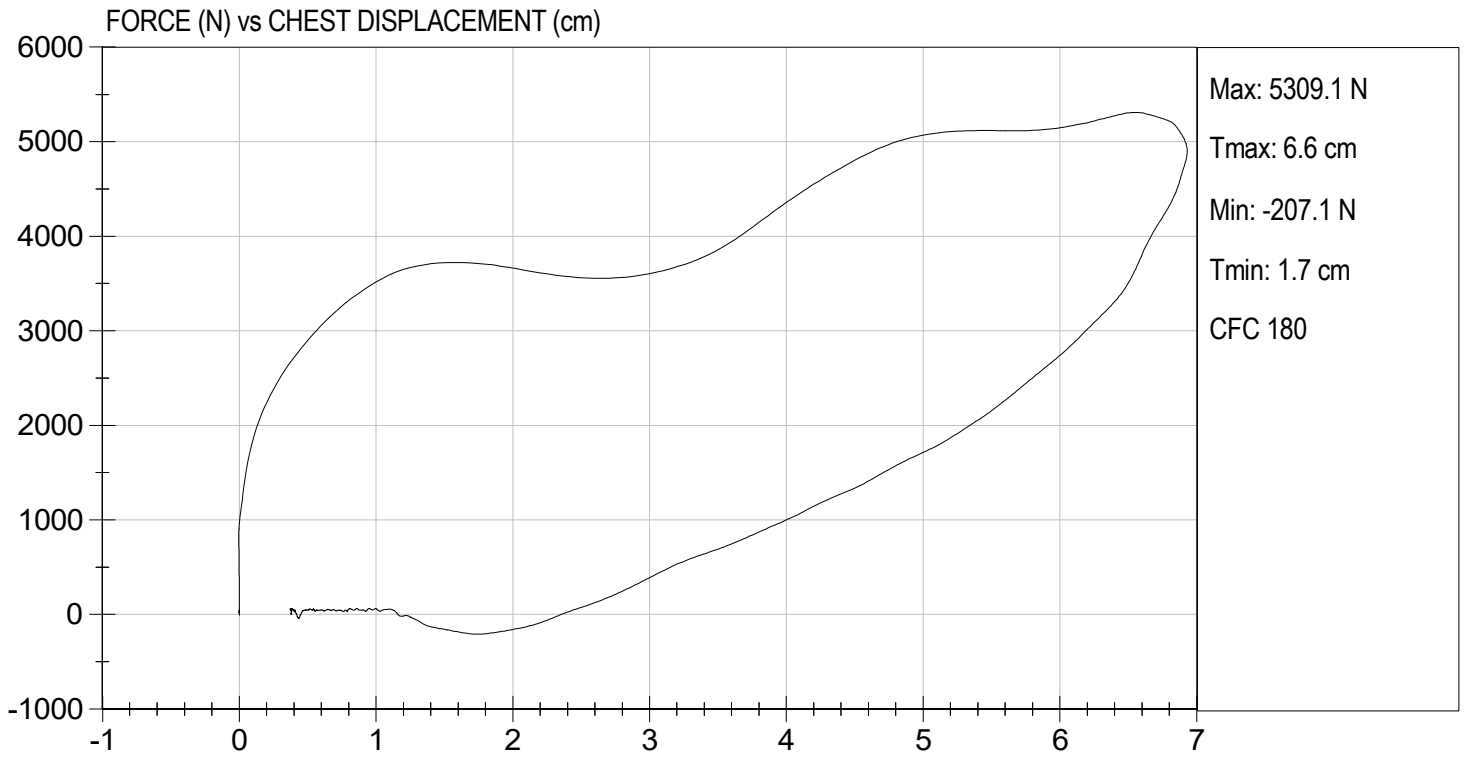
Test I.D.: D220574

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-------------|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 21.4 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 16 | Pass |
| Probe Velocity | m/s | 6.58 to 6.82 | 6.68 | Pass |
| Peak Probe Force | N | 5159 to 5893 | 5,309 | Pass |
| Peak Sternum Displacement | cm | 6.35 to 7.26 | 6.93 | Pass |
| Internal Hysteresis | % | 69 to 85 | 74 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date


 Approved By



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

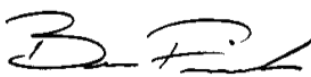
ATD Serial No: 351

Test I.D: D220575

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 25 | Pass |
| Probe Velocity | m/s | 2.07 to 2.13 | 2.07 | Pass |
| Peak Probe Force | N | 4715 to 5782 | 4,732 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

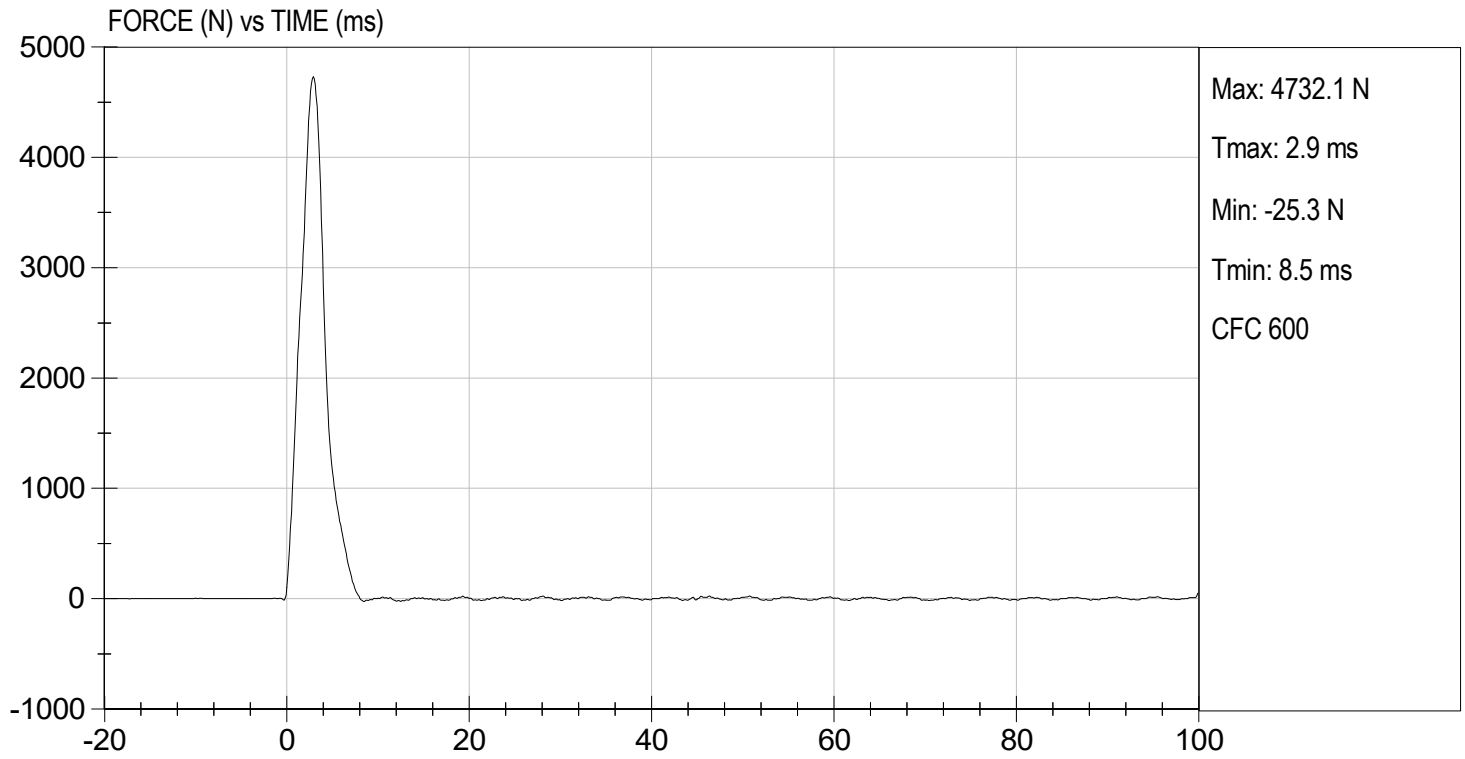
02/28/2022
 Test Date


 Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.80 ft/s, 2.07 m/s

TEST DATE: 02/28/2022
TEST #: D220575



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

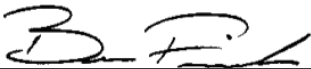
ATD Serial No: 351

Test I.D: D220576

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 25 | Pass |
| Probe Velocity | m/s | 2.07 to 2.13 | 2.07 | Pass |
| Peak Probe Force | N | 4715 to 5782 | 5,710 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

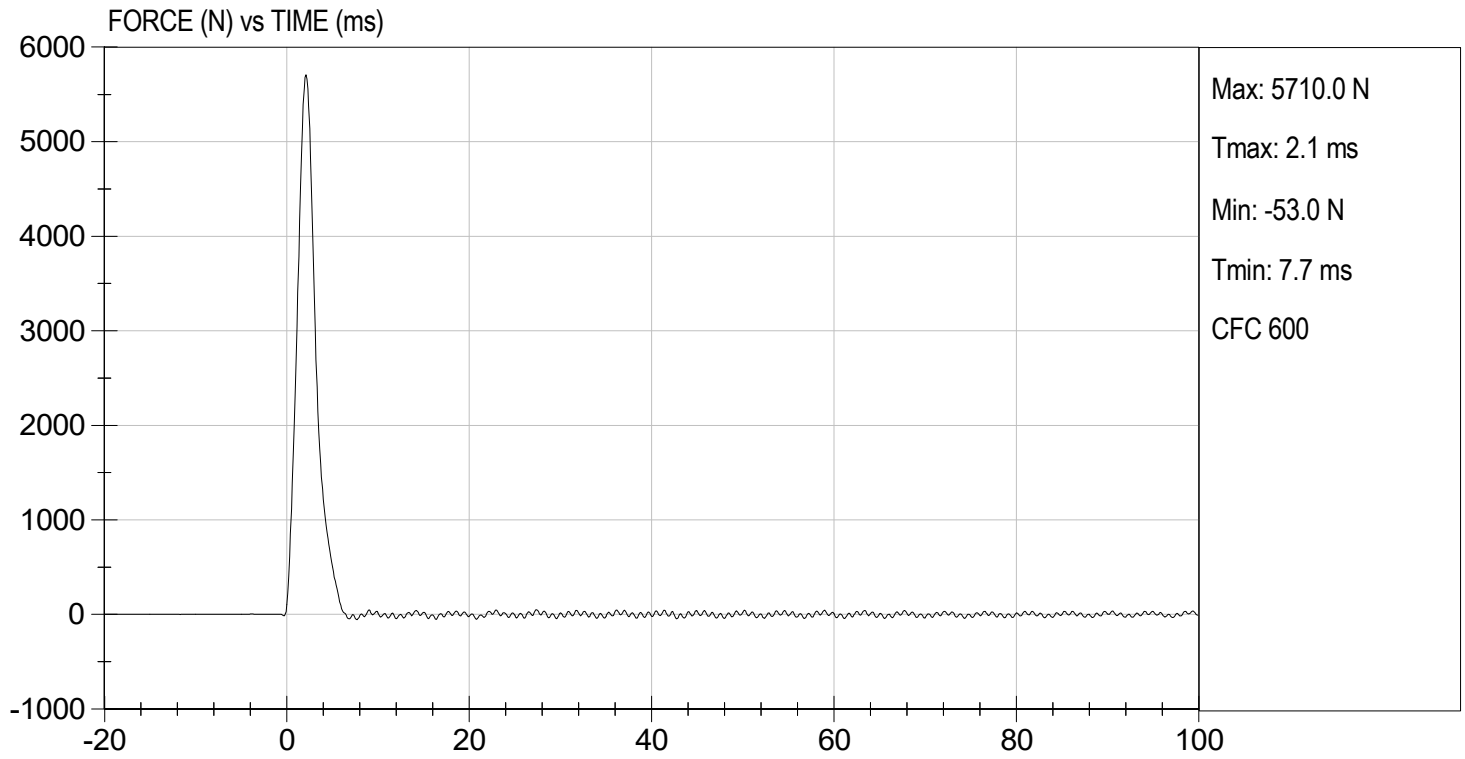
02/28/2022
 Test Date


 Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.80 ft/s, 2.07 m/s

TEST DATE: 02/28/2022
TEST #: D220576



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

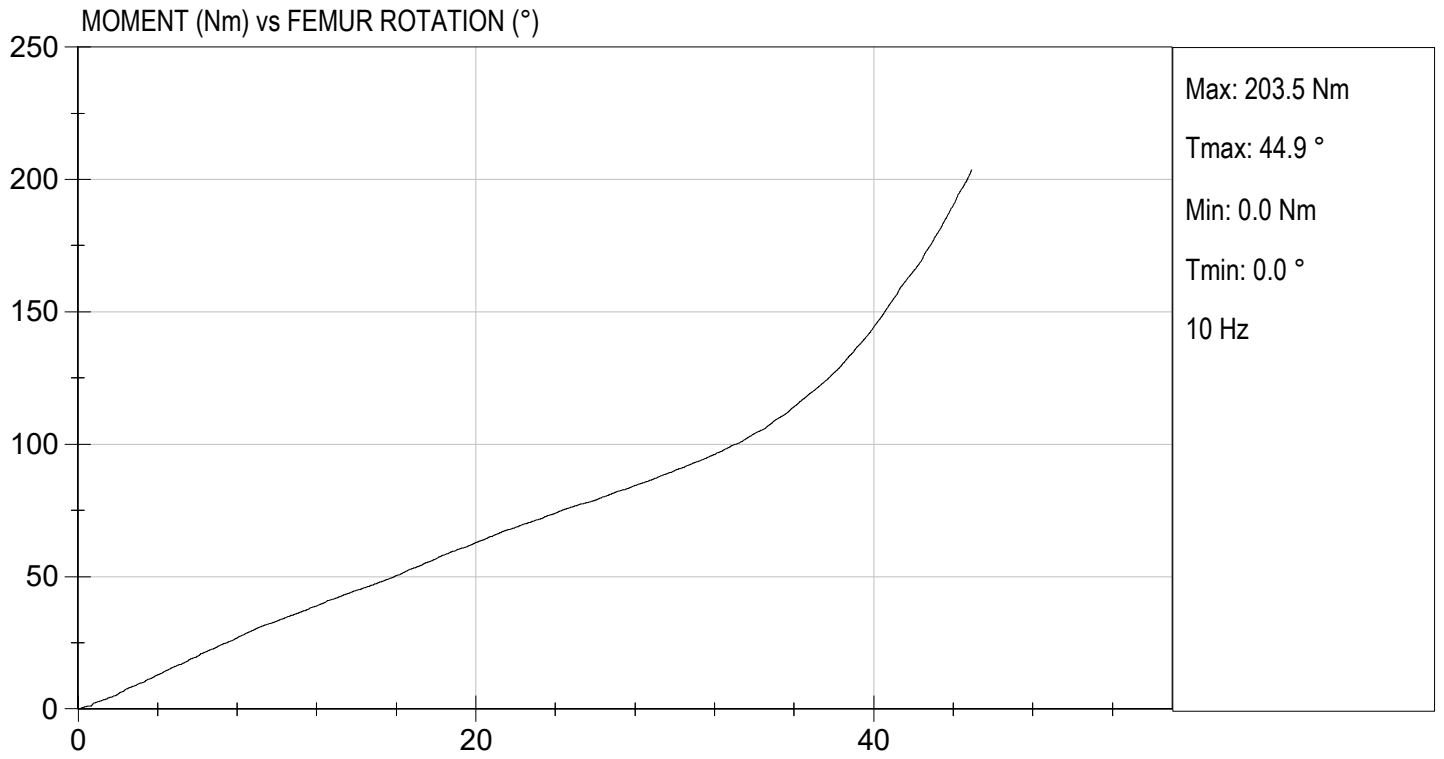
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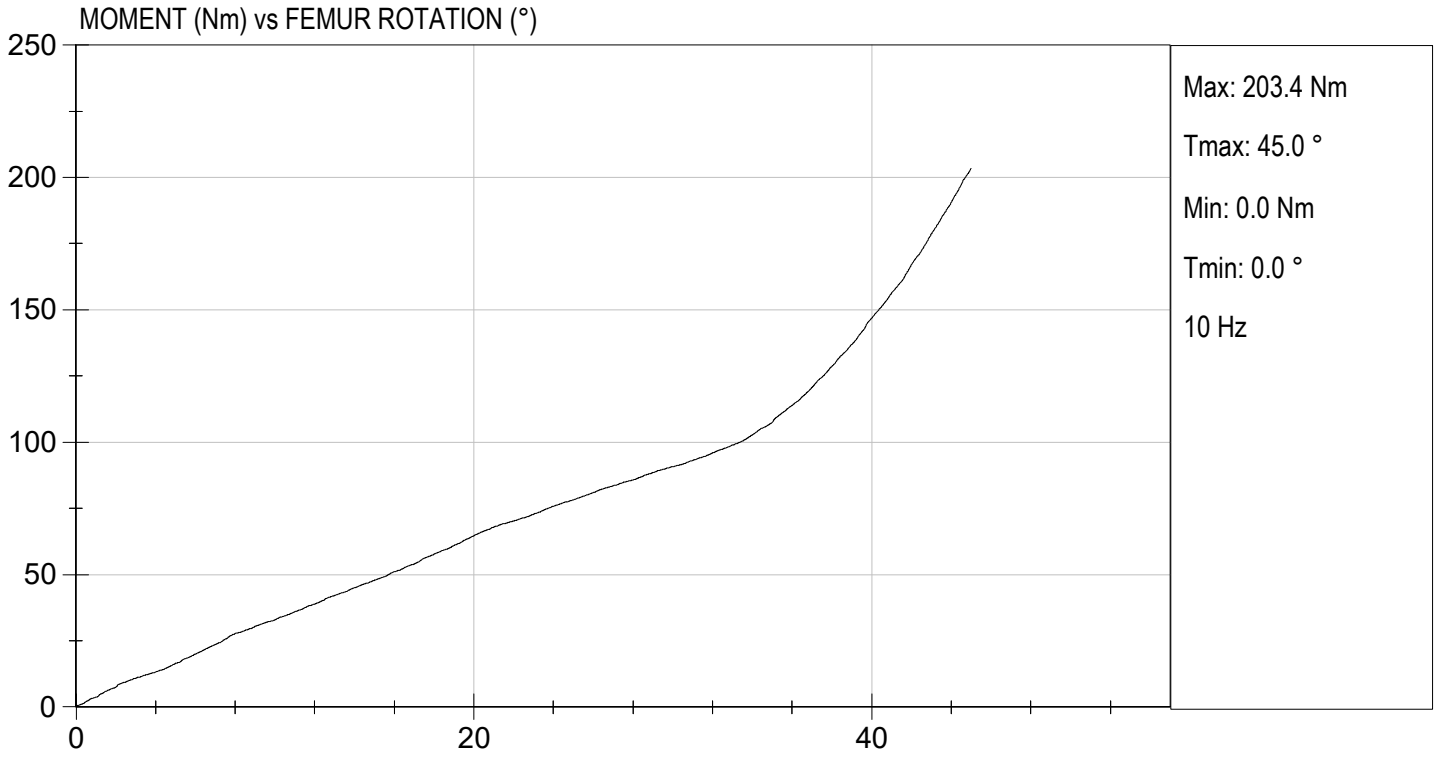
| Tested Parameter | Units | Specification | Result | | Pass/Fail |
|------------------------------|-------|-------------------------------------|--------|------|-----------|
| | | | Right | Left | |
| Laboratory Temperature | deg C | 18.9 to 25.6 | 22.0 | 22.0 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 22 | 22 | Pass |
| Rotation Rate | deg/s | 5.0 to 10.0 | 6.3 | 6.3 | Pass |
| 30 Degrees | Nm | 94.9 Nm Max | 90.1 | 90.8 | Pass |
| 150 ft-lbf / 203.4 Nm | Deg | 40.0 to 50.0 Degree Max Rotation | 44.9 | 45.0 | Pass |
| Overall Test Results | | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 50TH PERCENTILE MALE - DRIVER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test ID: D220861

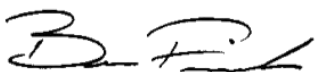
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|--------------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.8 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | Pass |
| Peak Resultant Acceleration | G's | 225 to 275 | 258 | Pass |
| Peak Lateral Acceleration | G's | <= +/- 15.0 | -4.5 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 10% of peak | Yes | Pass |
| Overall Test Results | | | | Pass |



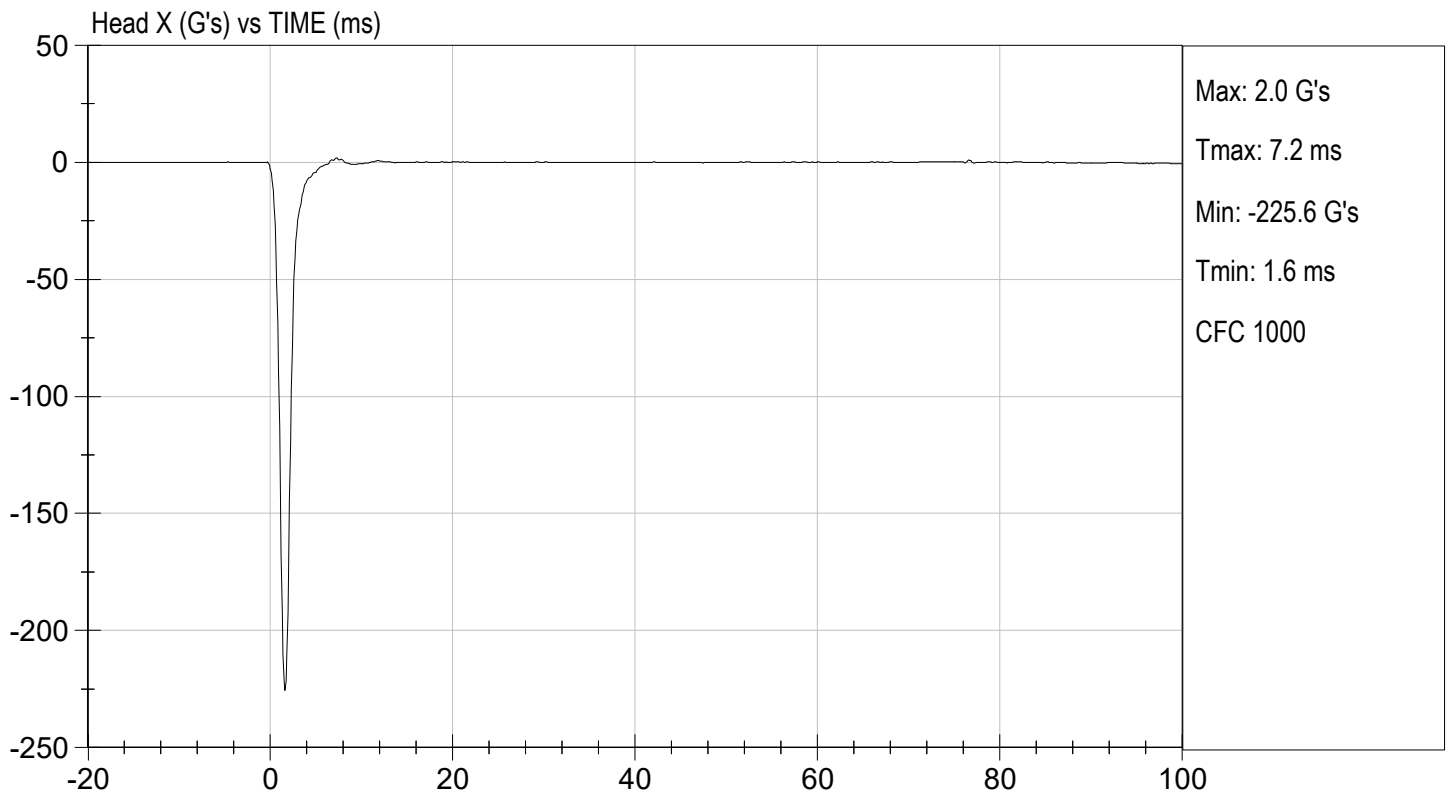
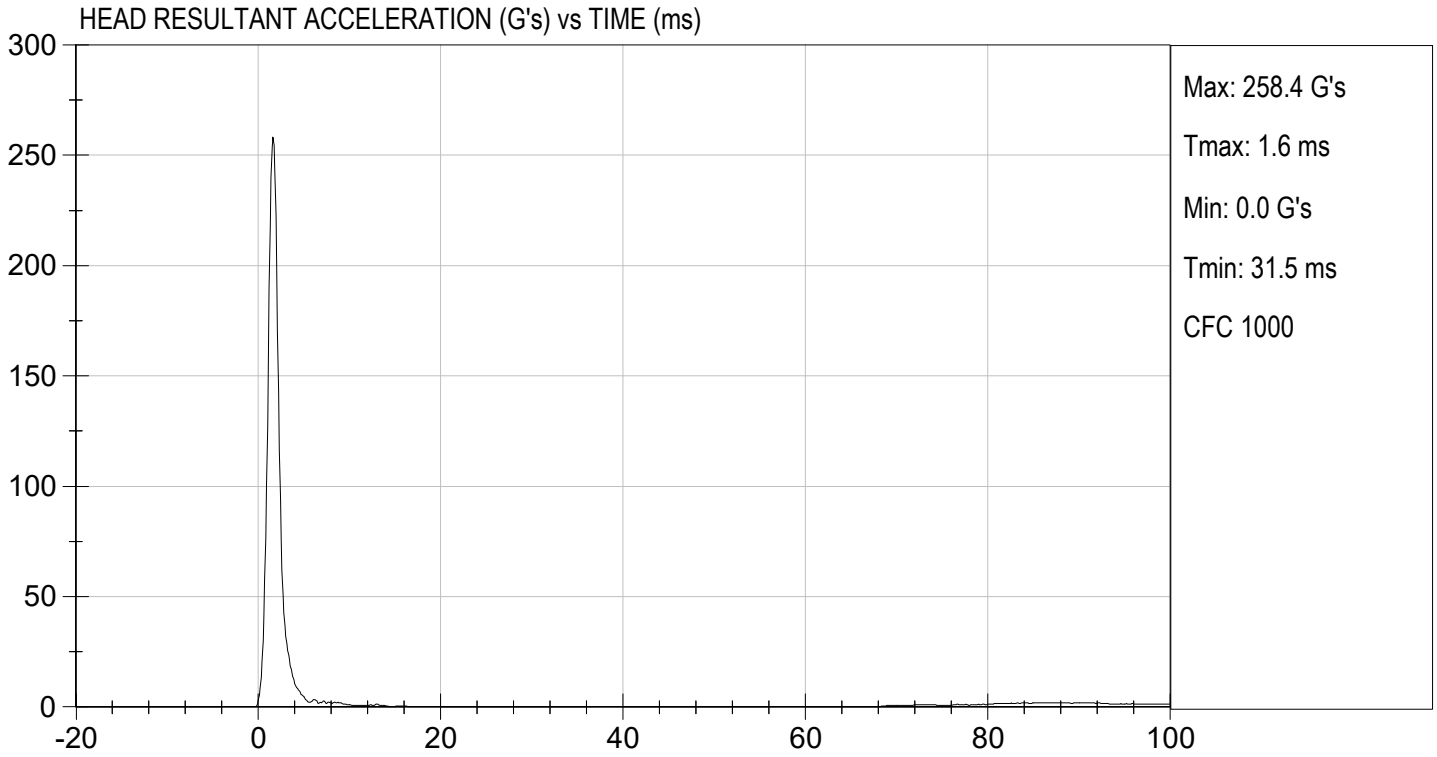
Laboratory Technician

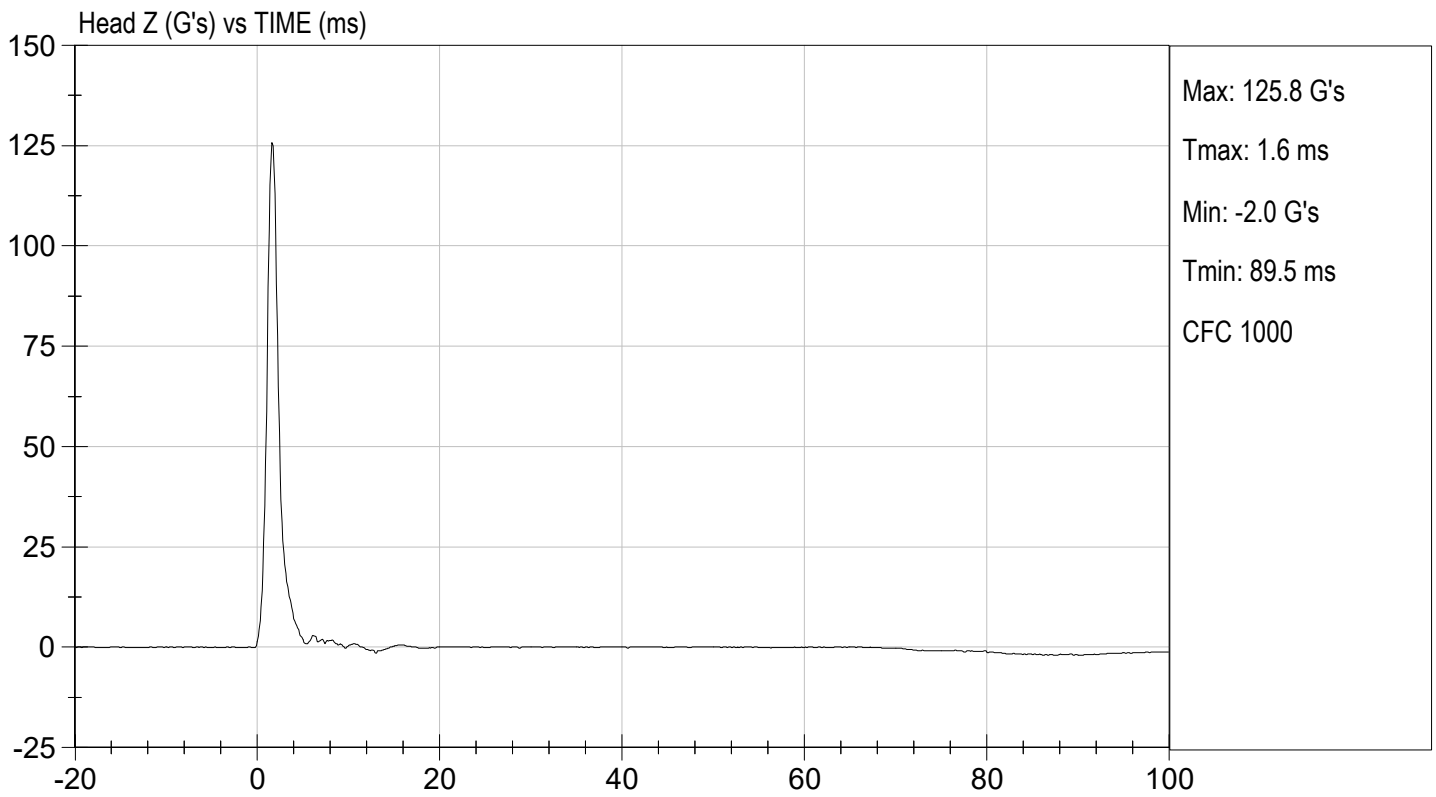
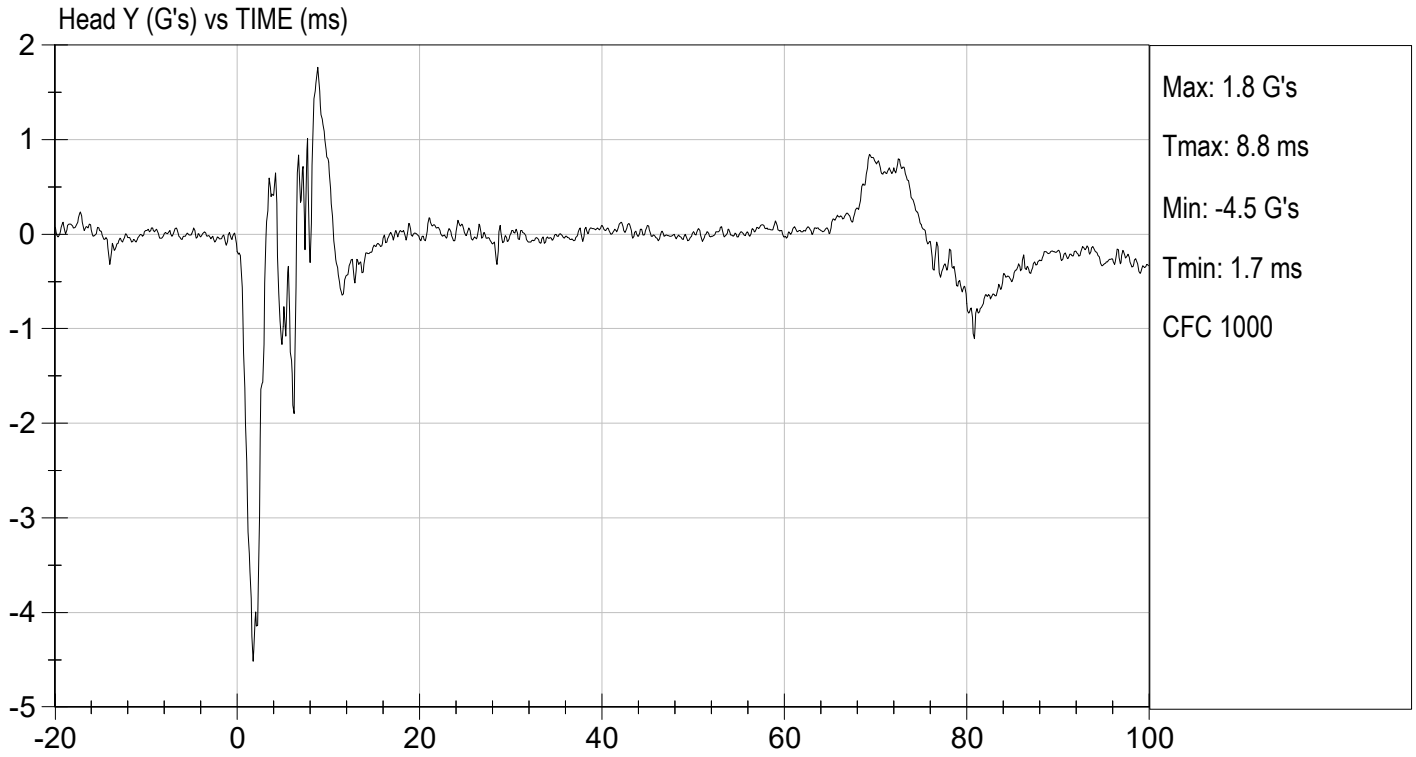
03/30/2022

Test Date



Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

ATD Serial No: 351

Test I.D.: D220862

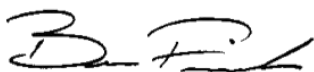
| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|--|---------|-------|----------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 28 | Pass |
| Pendulum Velocity | | m/s | 6.89 to 7.13 | 6.96 | Pass |
| Pendulum Deceleration | 10 ms | G's | 22.50 to 27.50 | 25.46 | Pass |
| | 20 ms | G's | 17.60 to 22.60 | 20.55 | Pass |
| | 30 ms | G's | 12.50 to 18.50 | 16.67 | Pass |
| Peak Pendulum Deceleration After 30 ms | | G's | <= 29.0 | 16.7 | Pass |
| Deceleration Decay Time to Cross 5 G's | | ms | 34.0 to 42.0 | 35.5 | Pass |
| Maximum "D" Plane Rotation | Maximum | Deg | 64.0 to 78.0 | 69.5 | Pass |
| | Time | ms | 57.0 to 64.0 | 59.6 | Pass |
| "D" Plane Rotation Decay Time To Zero Crossing | | ms | 113.0 to 128.0 | 117.7 | Pass |
| Moment About Occipital Condyle | Maximum | Nm | 88.1 to 108.5 | 88.3 | Pass |
| | Time | ms | 47.0 to 58.0 | 47.6 | Pass |
| Positive Moment Decay Time To Zero Crossing | | ms | 97.0 to 107.0 | 99.5 | Pass |
| Overall Test Results | | | | | Pass |



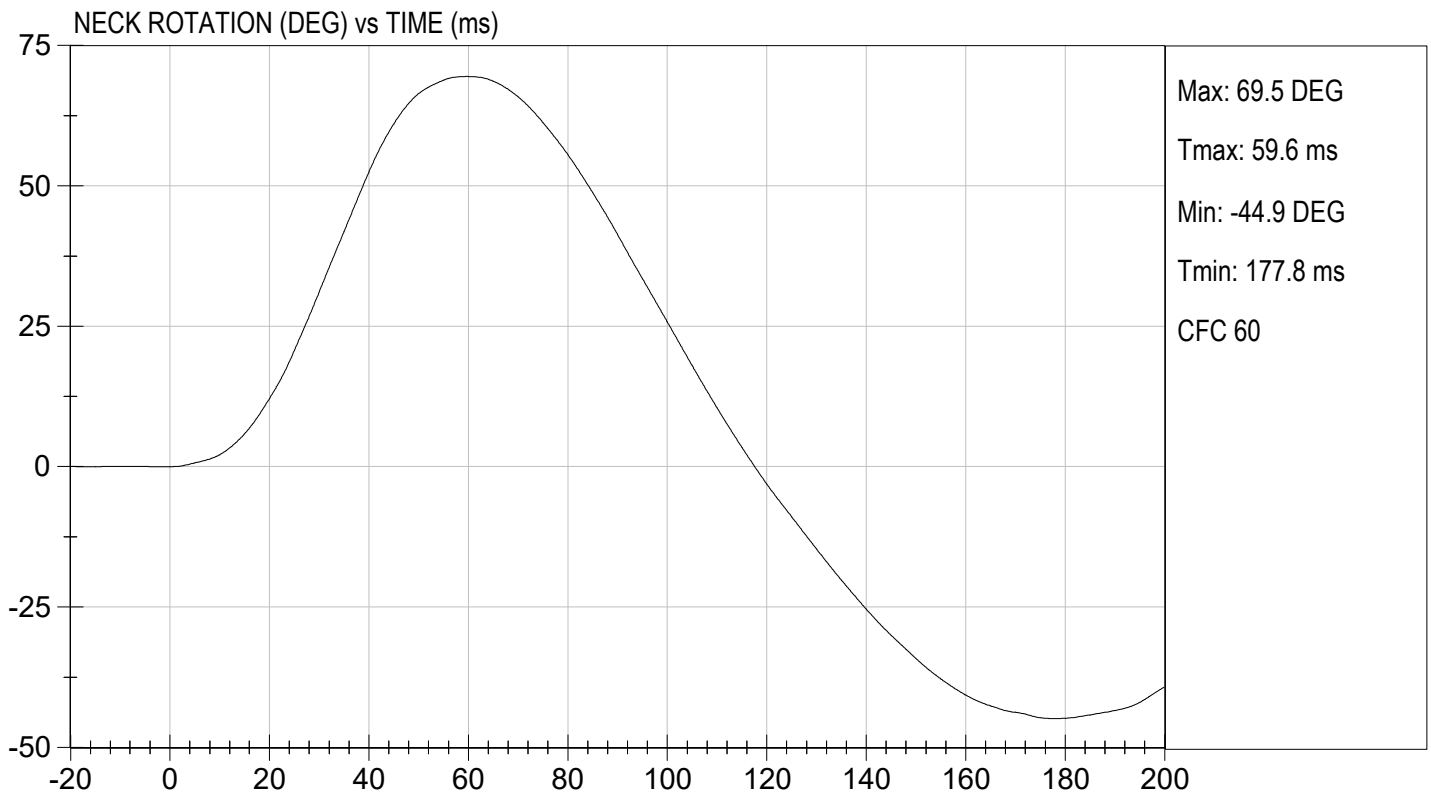
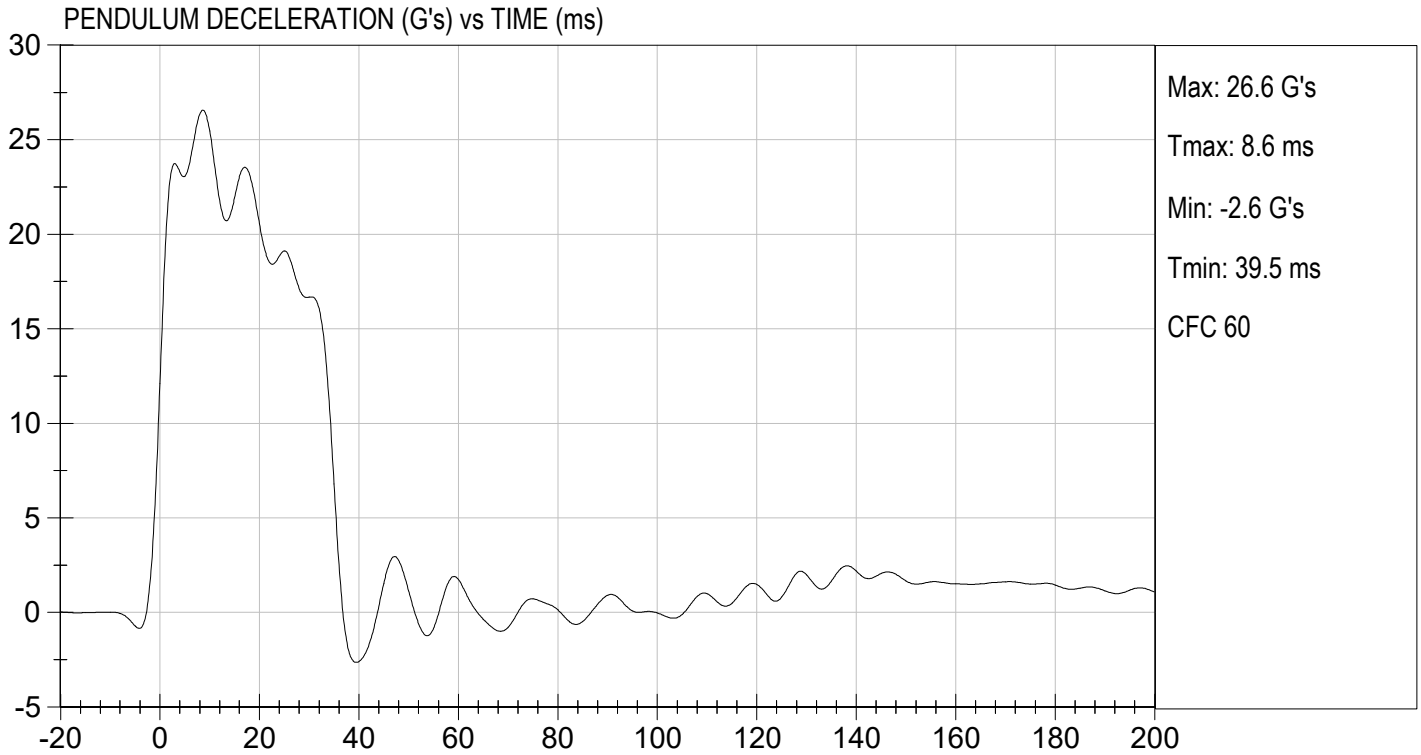
Laboratory Technician

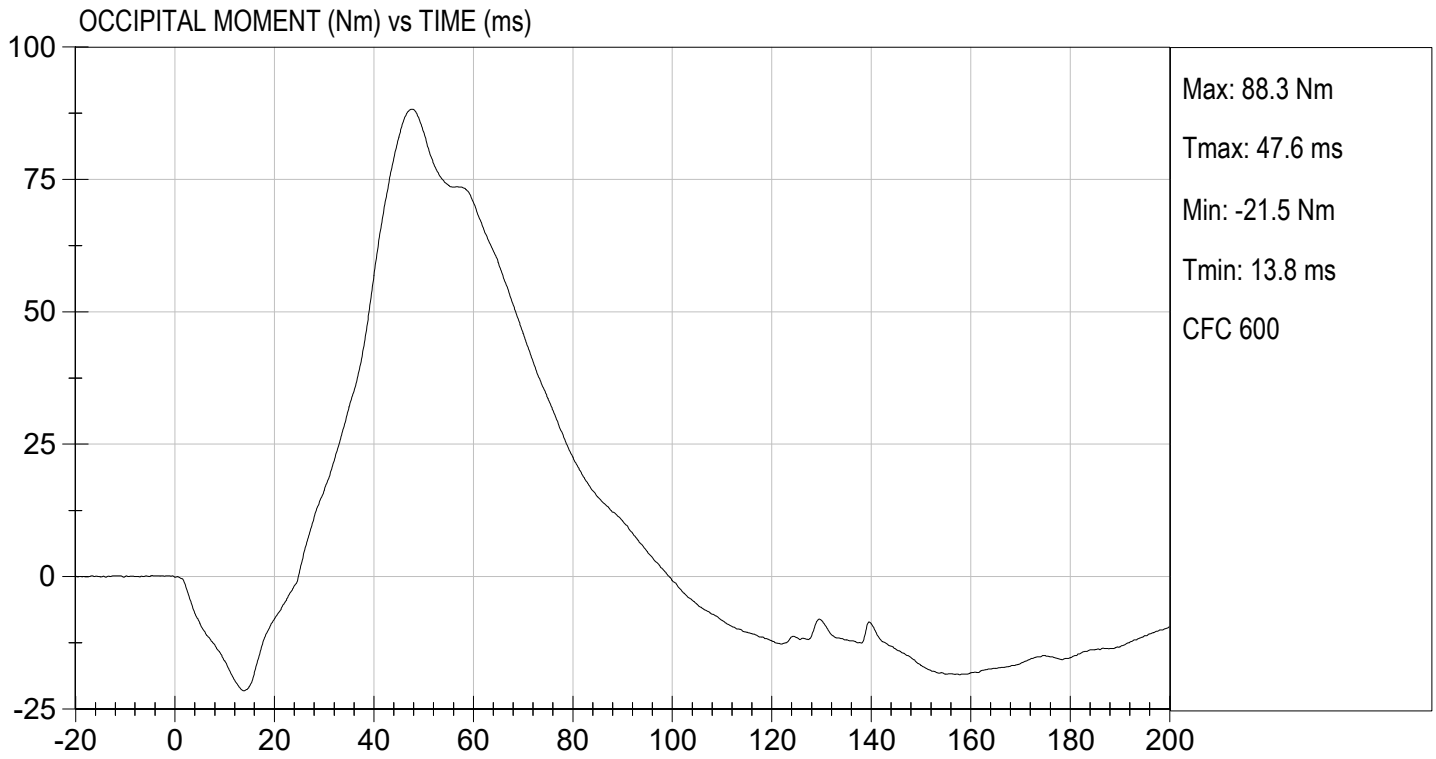
03/30/2022

Test Date



Approved By





MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 50TH PERCENTILE MALE

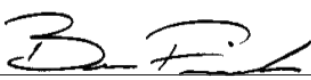
ATD Serial No: 351

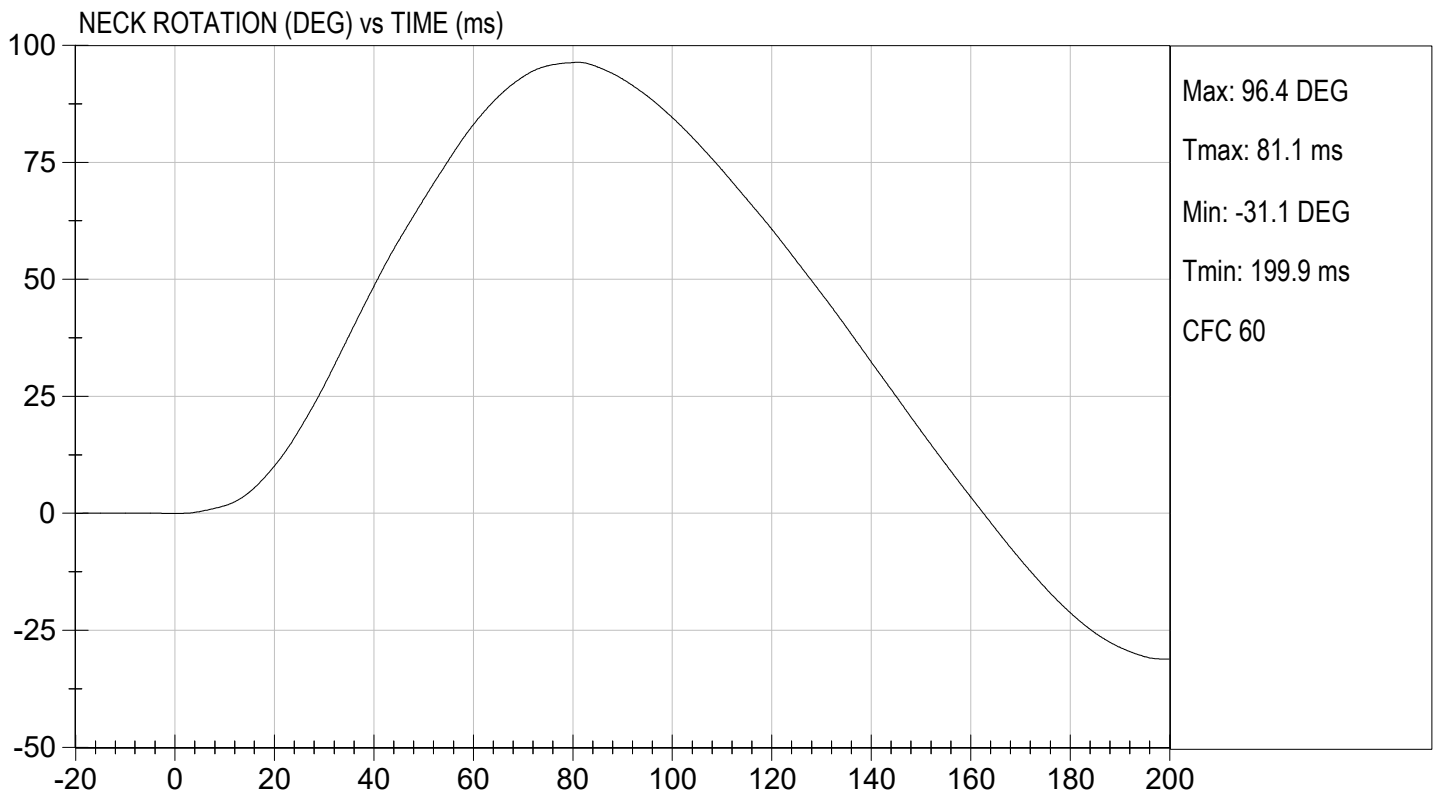
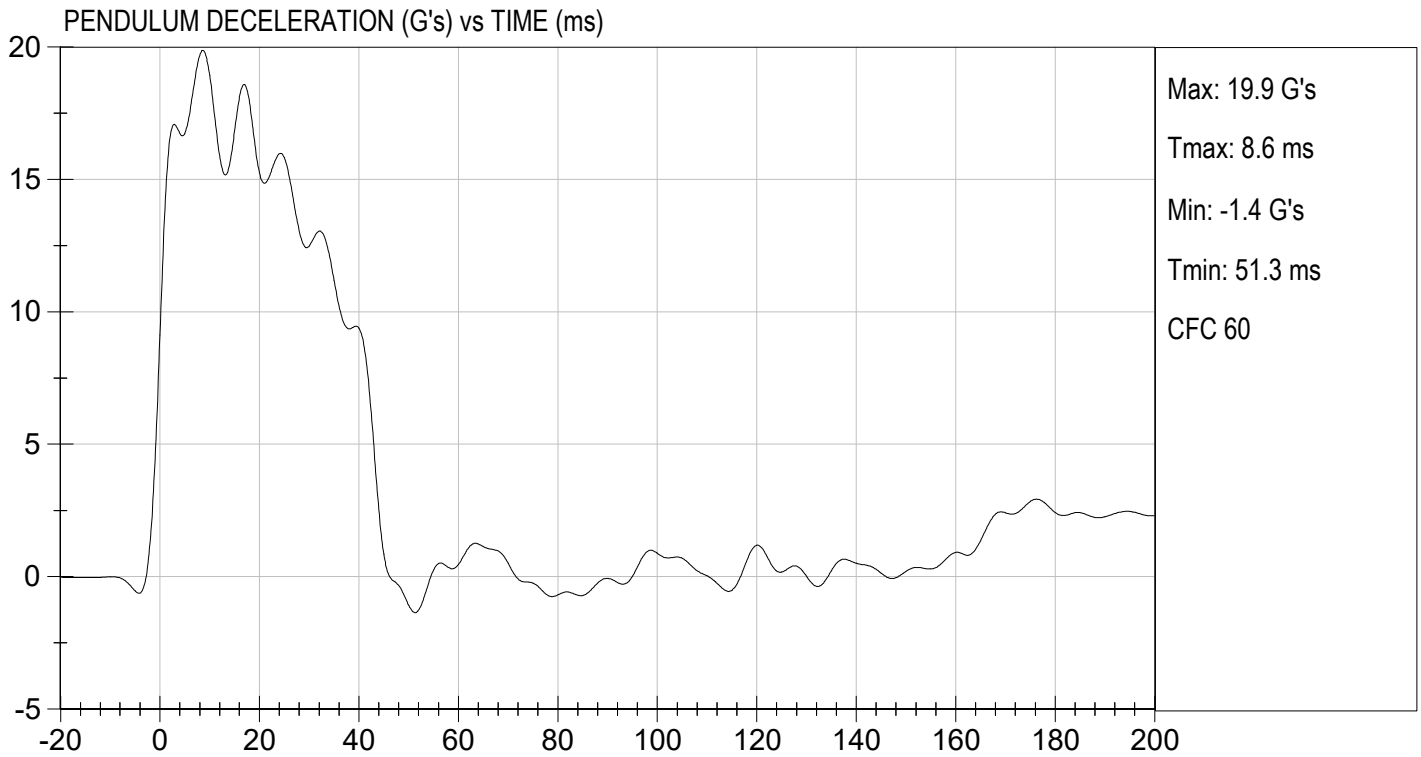
Test I.D.: D220863

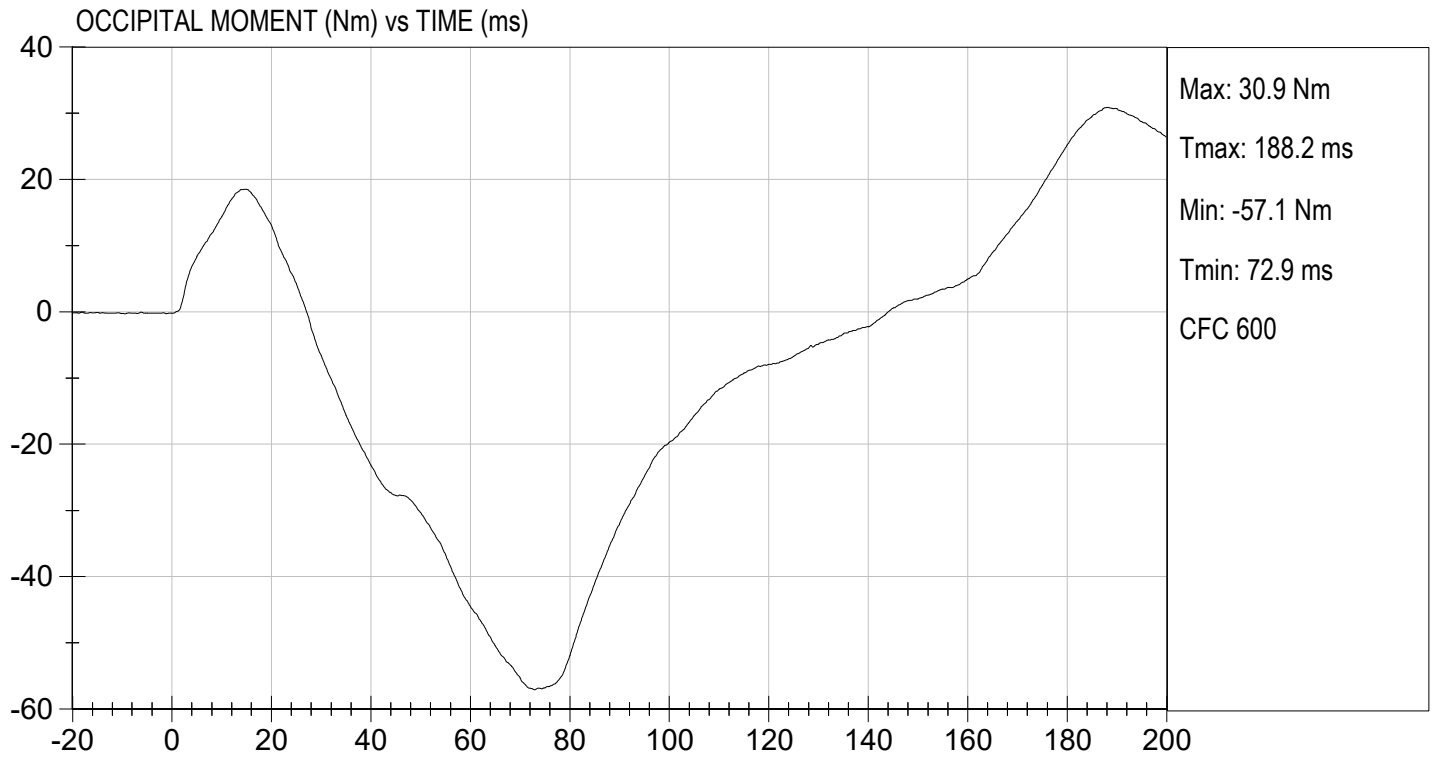
| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|--|---------|---------|----------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 28 | Pass |
| Pendulum Velocity | | m/s | 5.95 to 6.19 | 6.05 | Pass |
| Pendulum Deceleration | 10 ms | G's | 17.20 to 21.20 | 18.93 | Pass |
| | 20 ms | G's | 14.00 to 19.00 | 15.26 | Pass |
| | 30 ms | G's | 11.00 to 16.00 | 12.49 | Pass |
| Peak Pendulum Deceleration After 30 ms | | G's | <= 22.0 | 13.0 | Pass |
| Deceleration Decay Time to Cross 5 G's | | ms | 38.0 to 46.0 | 43.1 | Pass |
| Maximum "D" Plane Rotation | Maximum | Degrees | 81.0 to 106.0 | 96.4 | Pass |
| | Time | ms | 72.0 to 82.0 | 81.1 | Pass |
| "D" Plane Rotation Decay Time To Zero Crossing | | ms | 147.0 to 174.0 | 162.7 | Pass |
| Moment About Occipital Condyle | Maximum | Nm | -52.9 to -79.9 | -57.1 | Pass |
| | Time | ms | 65.0 to 79.0 | 72.9 | Pass |
| Negative Moment Decay Time To Zero Crossing | | ms | 120.0 to 148.0 | 144.1 | Pass |
| Overall Test Results | | | | | Pass |


 Laboratory Technician

03/30/2022
 Test Date


 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 50TH PERCENTILE MALE

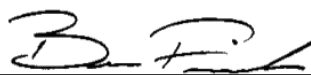
ATD Serial No: 351

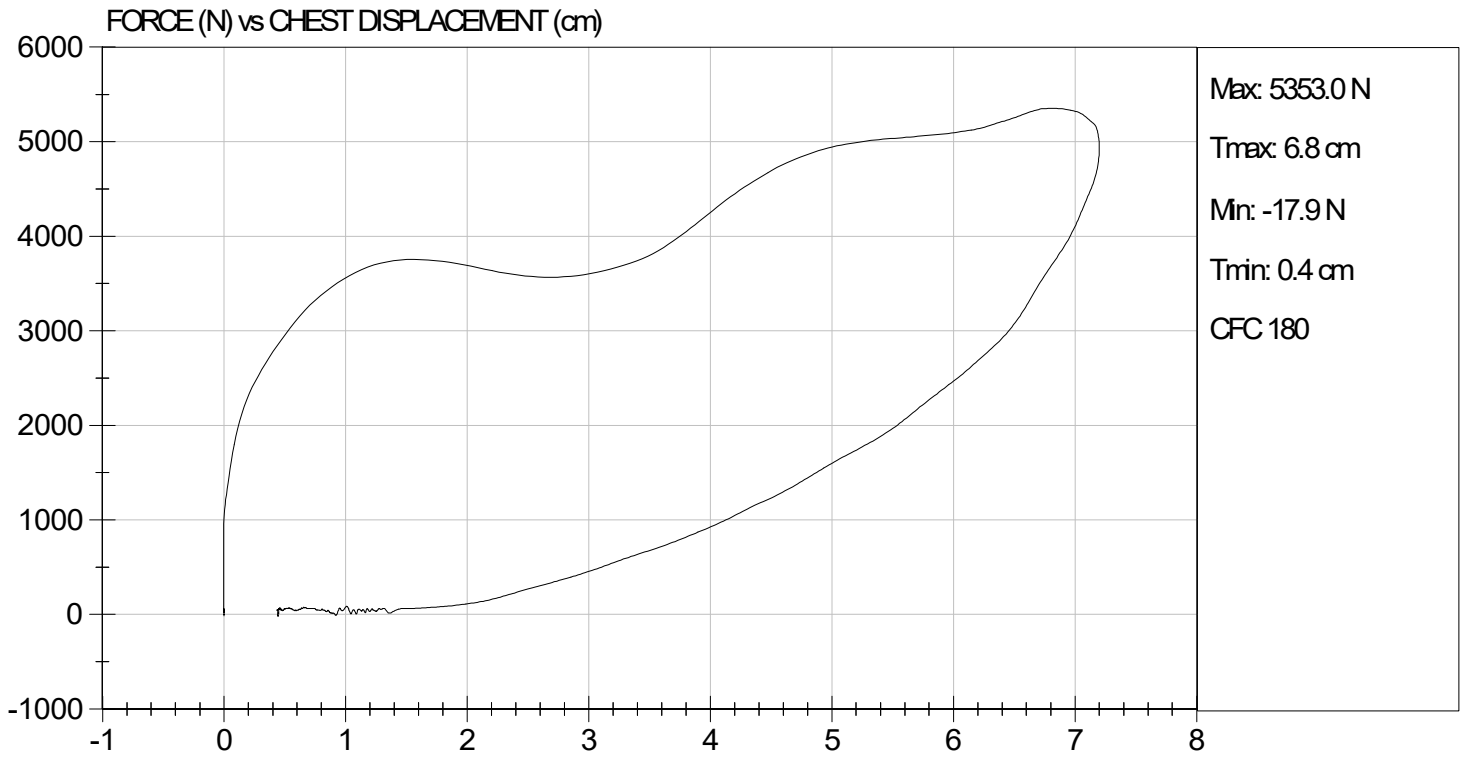
Test I.D: D220864

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-------------|
| Laboratory Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 28 | Pass |
| Probe Velocity | m/s | 6.58 to 6.82 | 6.68 | Pass |
| Peak Probe Force | N | 5159 to 5893 | 5,353 | Pass |
| Peak Sternum Displacement | cm | 6.35 to 7.26 | 7.20 | Pass |
| Internal Hysteresis | % | 69 to 85 | 72 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

03/30/2022
 Test Date


 Approved By



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

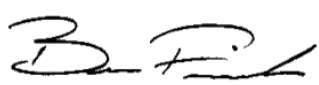
ATD Serial No: 351

Test I.D: D220865

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-------------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | Pass |
| Probe Velocity | m/s | 2.07 to 2.13 | 2.08 | Pass |
| Peak Probe Force | N | 4715 to 5782 | 5,342 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

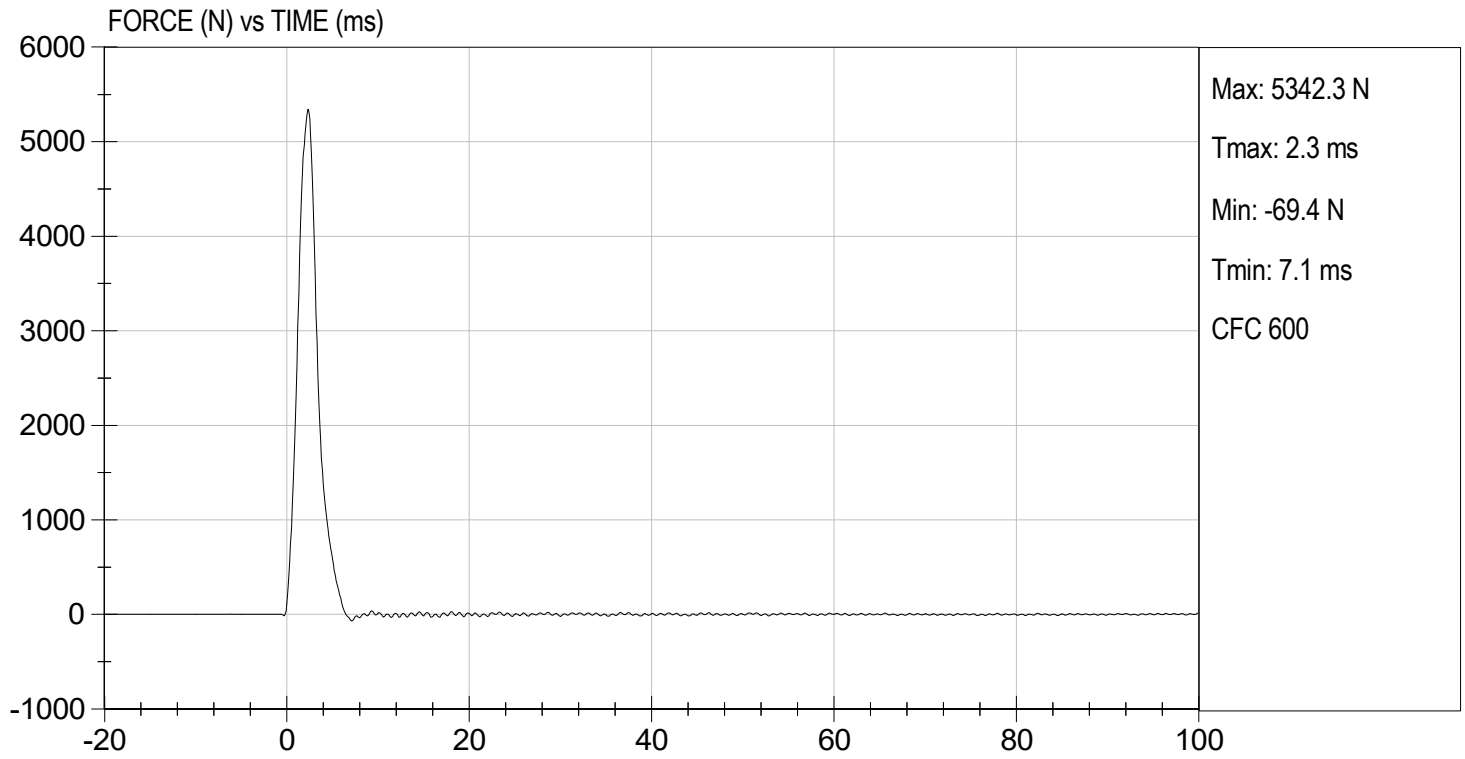
03/30/2022
 Test Date


 Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.83 ft/s, 2.08 m/s

TEST DATE: 03/30/2022
TEST #: D220865



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 50TH PERCENTILE MALE

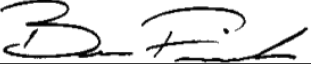
ATD Serial No: 351

Test I.D: D220866

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | Pass |
| Probe Velocity | m/s | 2.07 to 2.13 | 2.08 | Pass |
| Peak Probe Force | N | 4715 to 5782 | 5,630 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

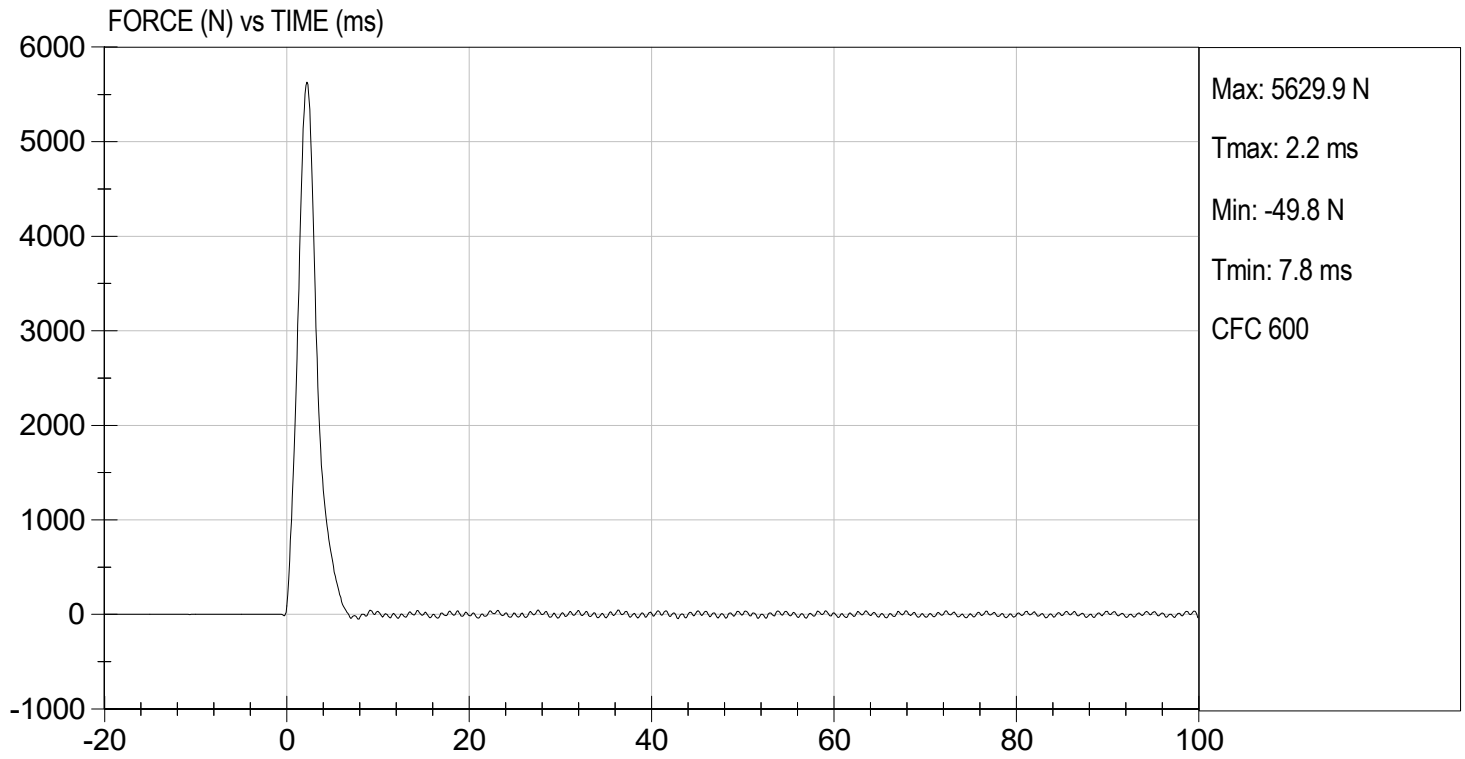
03/30/2022
 Test Date


 Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.83 ft/s, 2.08 m/s

TEST DATE: 03/30/2022
TEST #: D220866



MGA RESEARCH CORPORATION
HIP-FEMUR FLEXION TEST
HYBRID III 50TH PERCENTILE MALE

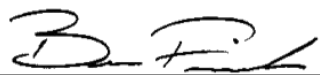
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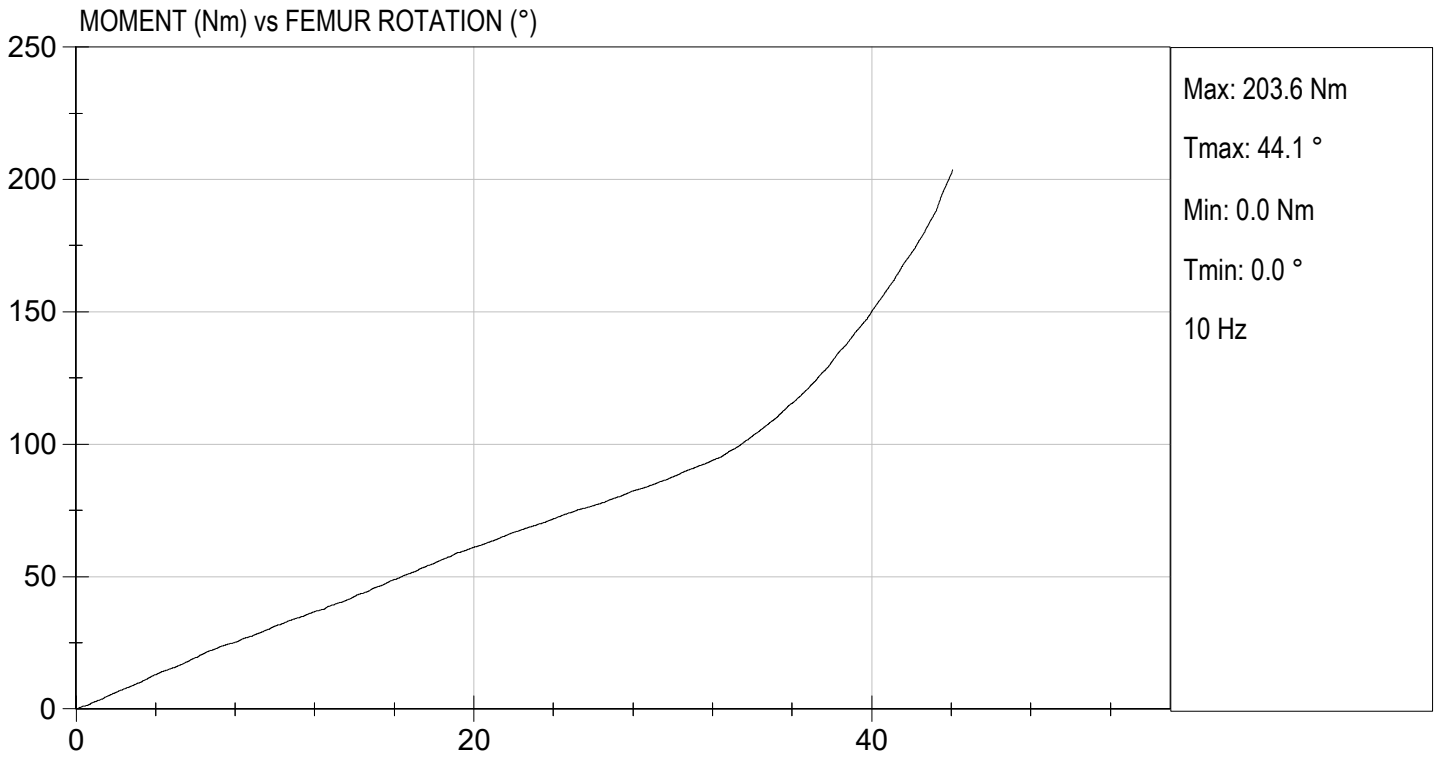
Test I.D: D220860

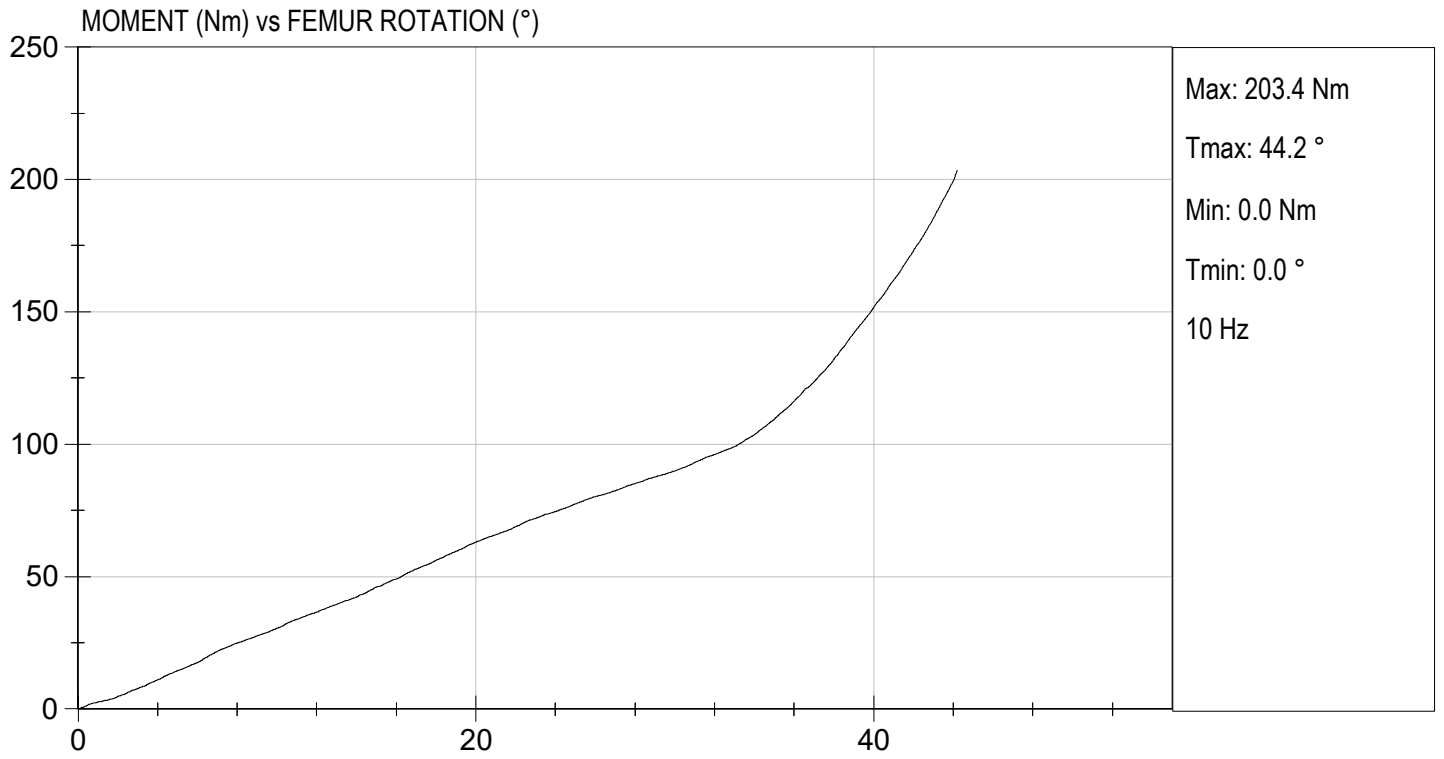
| Tested Parameter | Units | Specification | Result | | Pass/Fail |
|------------------------------|-------|-------------------------------------|--------|------|-----------|
| | | | Right | Left | |
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.8 | 21.8 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | 29 | Pass |
| Rotation Rate | deg/s | 5.0 to 10.0 | 6.4 | 6.3 | Pass |
| 30 Degrees | Nm | 94.9 Nm Max | 87.7 | 89.9 | Pass |
| 150 ft-lbf / 203.4 Nm | Deg | 40.0 to 50.0 Degree Max Rotation | 44.1 | 44.2 | Pass |
| Overall Test Results | | | | | Pass |


 Laboratory Technician

03/30/2022
 Test Date


 Approved By





CALIBRATION TEST RESULTS

PRE-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

**Hybrid III, 5th External Measurements
SN: 142**

| HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS | | | | |
|---|--------------------------------|--|-------------------------|--------------------|
| DIMENSION | DESCRIPTION | DETAILS | ASSEMBLY DIMENSION (mm) | ACTUAL MEASUREMENT |
| A | TOTAL SITTING HEIGHT | Seat surface to highest point on top of the head. | 774.7-800.1 | 775.0 |
| B | SHOULDER PIVOT HEIGHT | Centerline of shoulder pivot bolt to the seat surface. | 431.8-457.2 | 438.2 |
| C | H-POINT HEIGHT | Reference | 81.3-86.3 | 81.8 |
| D | H-POINT LOCATION FROM BACKLINE | Reference | 144.8-149.8 | 148.3 |
| E | SHOULDER PIVOT FROM BACKLINE | Center of the shoulder clevis to the rear vertical surface of the fixture. | 68.6-83.8 | 83.0 |
| F | THIGH CLEARANCE | Measured at the highest point on the upper femur segment. | 119.4-134.6 | 124.4 |
| G | BACK OF ELBOW TO WRIST PIVOT | back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots | 243.9-259.1 | 245.2 |
| H | HEAD BACK TO BACKLINE | Back of Skull cap skin to seat rear vertical surface (Reference) | 43.2-48.2 | 43.4 |
| I | SHOULDER TO- ELBOW LENGTH | Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt. | 276.8-297.2 | 281.1 |
| J | ELBOW REST HEIGHT | Measure from the flesh below the elbow pivot bolt to the seat surface. | 182.8-203.2 | 197.2 |
| K | BUTTOCK TO KNEE LENGTH | The forward most part of the knee flesh to the rear vertical surface of the fixture. | 520.7-546.1 | 537.2 |
| L | POPLITEAL HEIGHT | Seat surface to the plane of the horizontal plane of the bottom of the feet. | 355.6-376 | 358.8 |
| M | KNEE PIVOT HEIGHT | Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet. | 393.7-419.1 | 403.1 |
| N | BUTTOCK POPLITEAL LENGTH | The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K". | 414-439.4 | 435.2 |

| HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued | | | | |
|--|---|---|-------------------------|--------------------|
| DIMENSION | DESCRIPTION | DETAILS | ASSEMBLY DIMENSION (mm) | ACTUAL MEASUREMENT |
| O | CHEST DEPTH WITHOUT JACKET | Measured 304.8 ± 5.1 mm above seat surface | 175.3-190.5 | 181.2 |
| P | FOOT LENGTH | Tip of toe to rear of heel | 218.5-233.7 | 227.3 |
| Q | STANDING HEIGHT | (THEORETICAL) | 1501.1 | N/A |
| R | BUTTOCK TO KNEE PIVOT LENGTH | The rear surface of the buttocks to the knee pivot bolt | 457.2-482.6 | 475.0 |
| S | HEAD BREADTH | The widest part of the head | 137.1-147.3 | 138.6 |
| T | HEAD DEPTH | Back of the head to the forehead | 177.8-188 | 181.0 |
| U | HIP BREADTH | The widest part of the hip | 299.7-314.9 | 308.4 |
| V | SHOULDER BREADTH | Outside edges of right and left shoulder clevises | 350.5-365.7 | 362.1 |
| W | FOOT BREADTH | The widest part of the foot | 78.8-94 | 82.8 |
| X | HEAD CIRCUMFERENCE | Measured at the point as in dim. "T" | 528.3-548.7 | 545.2 |
| Y | CHEST CIRCUMFERENCE (WITH CHEST JACKET) | Measured 345.4 ± 12.7 mm above seat surface | 850.9-881.3 | 870.7 |
| Z | WAIST CIRCUMFERENCE | Measured 165.1 ± 5.1 mm above seat surface | 759.5-789.9 | 779.9 |
| AA | REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE | Reference | 332.7-358.1 | 350.1 |
| BB | REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE | Reference | 160.1-170.2 | 170.0 |

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test ID: D220581

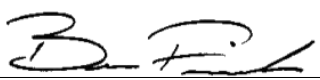
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|--------------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 22.0 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 22 | Pass |
| Peak Resultant Acceleration | G's | 250 to 300 | 272 | Pass |
| Peak Lateral Acceleration | G's | <= +/- 15.0 | -4.8 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 10% of peak | Yes | Pass |
| Overall Test Results | | | | Pass |



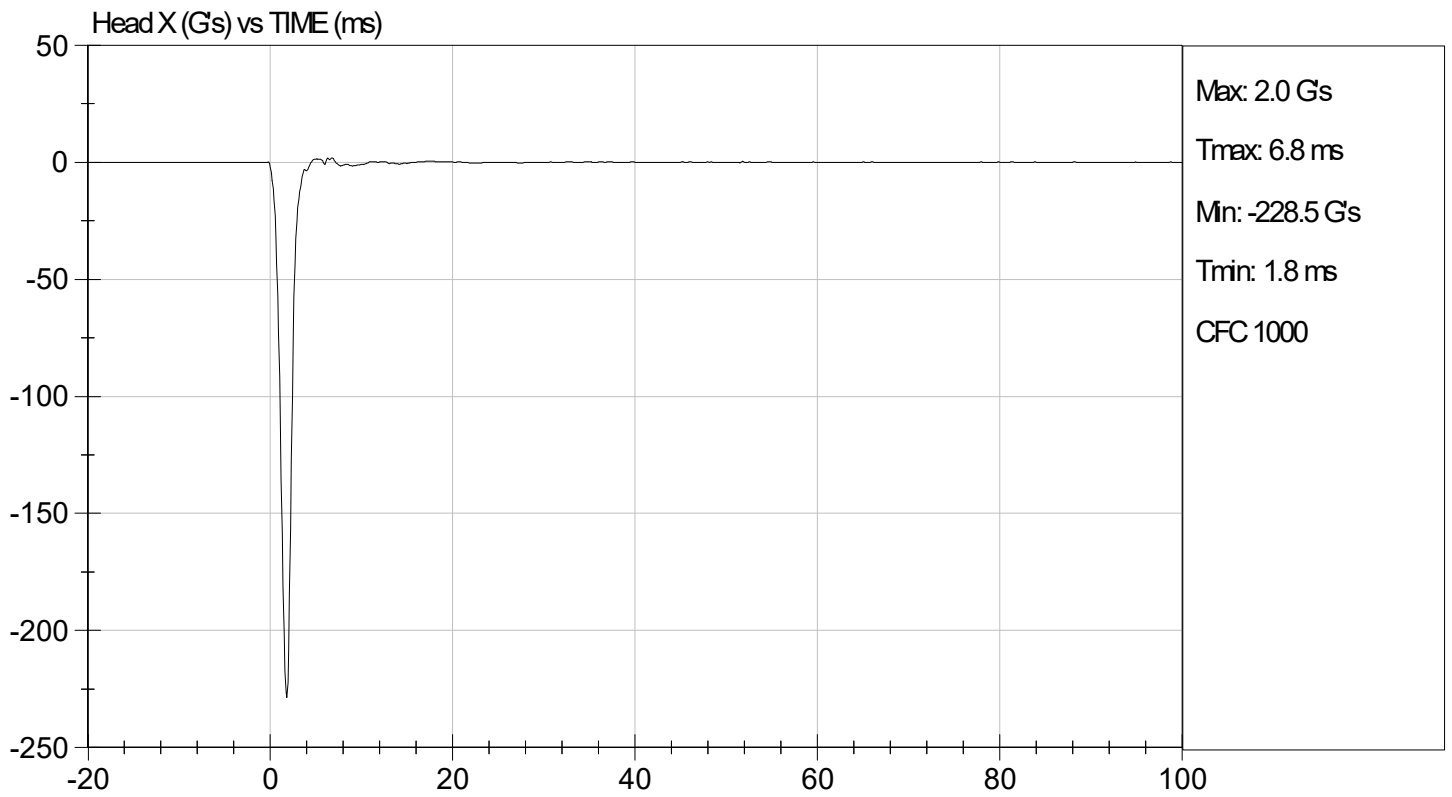
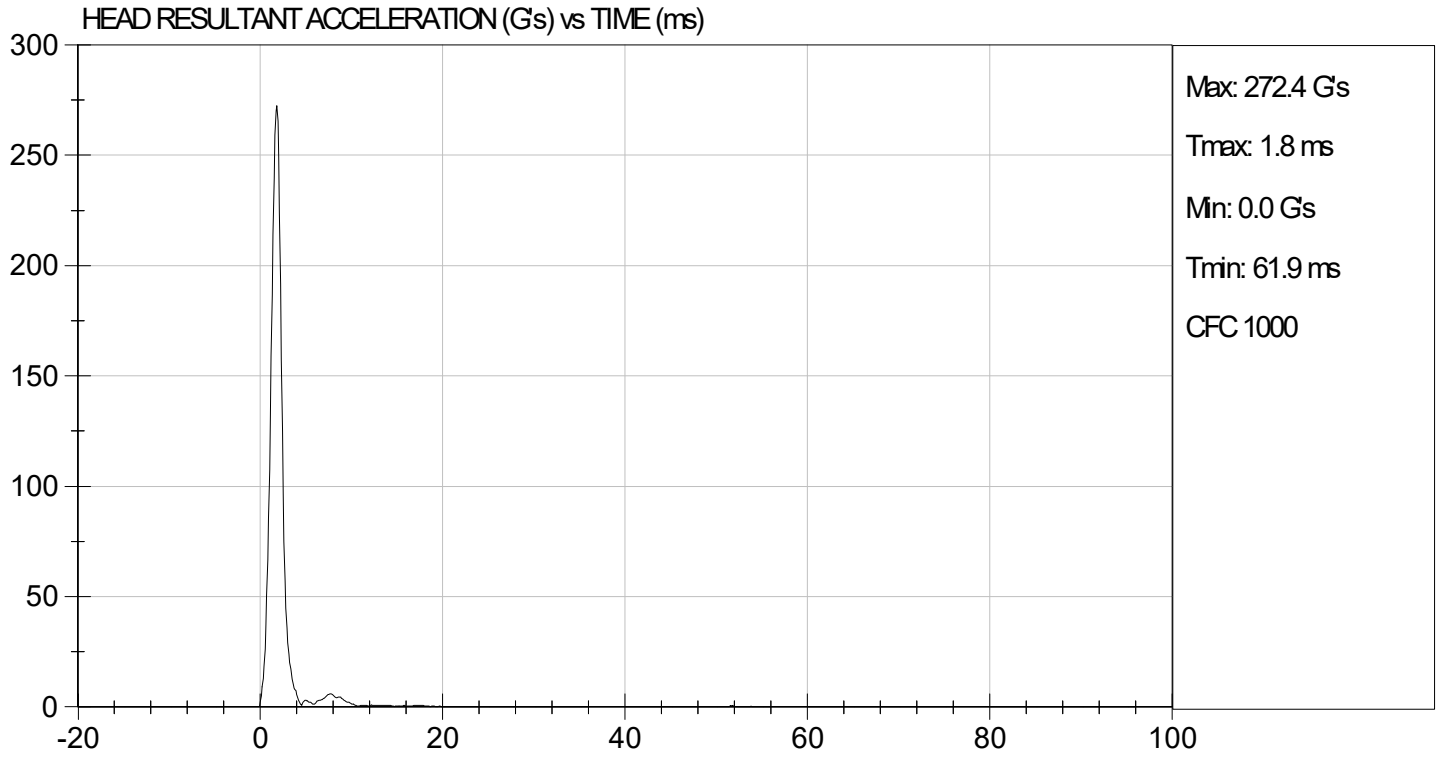
 Laboratory Technician

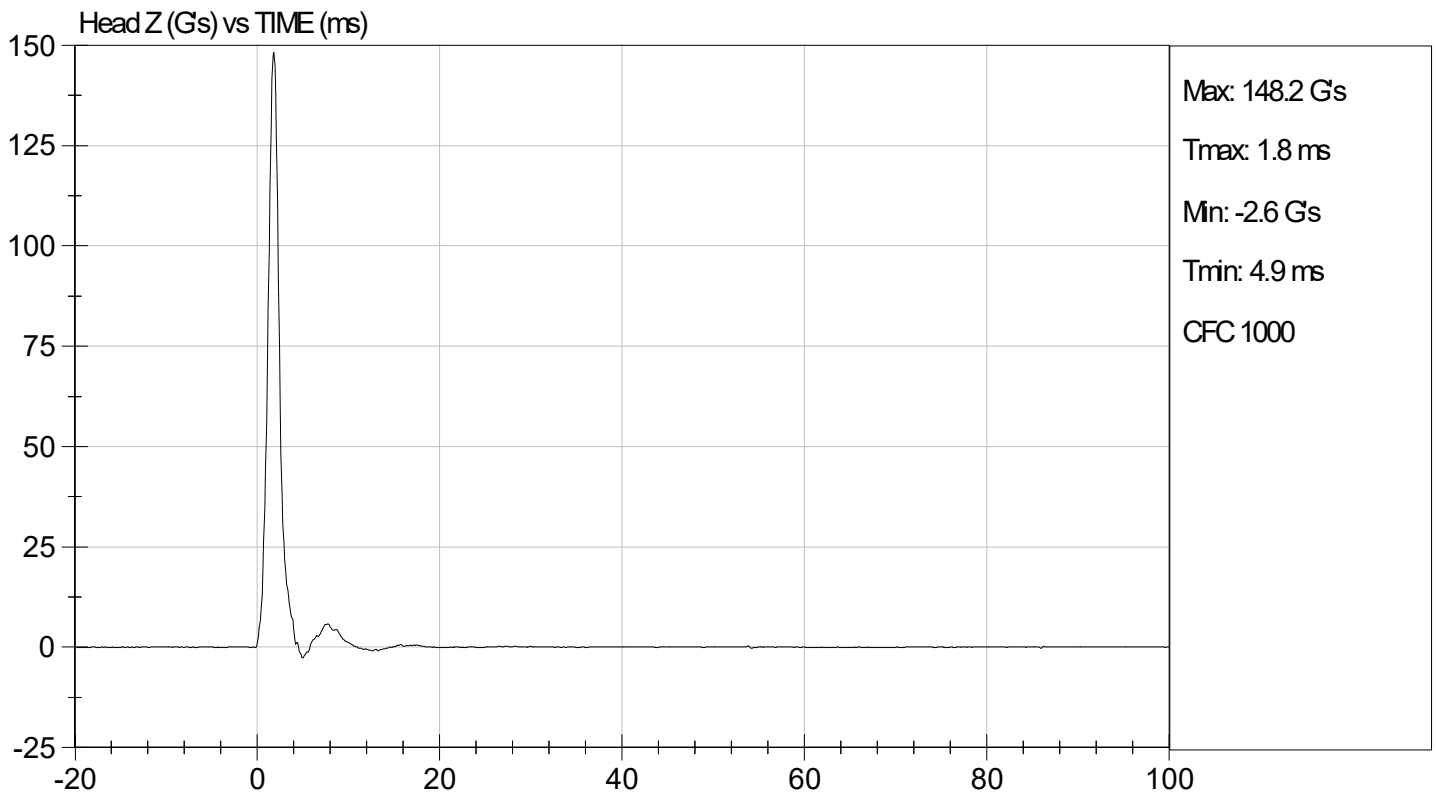
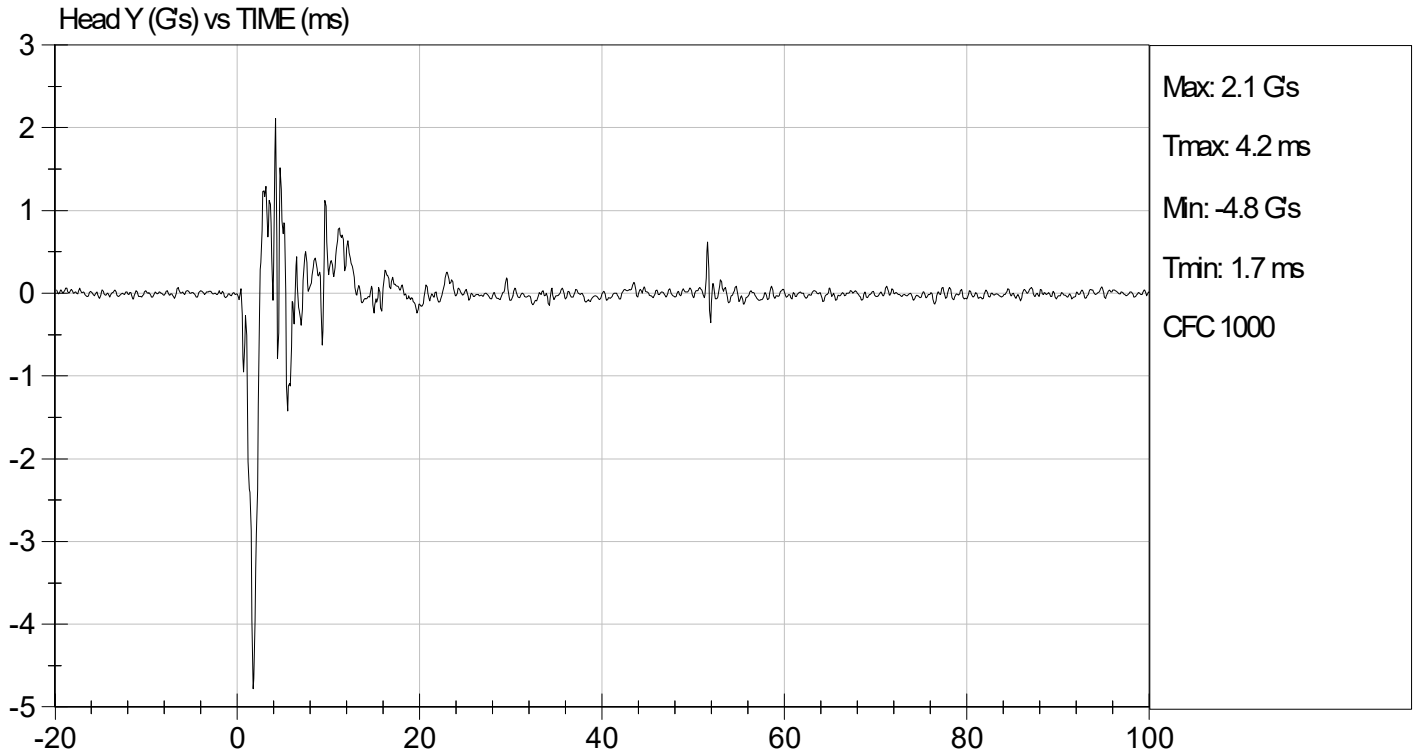
02/28/2022

 Test Date



 Approved By





MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

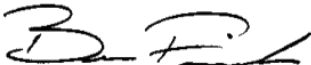
ATD Serial No: 142

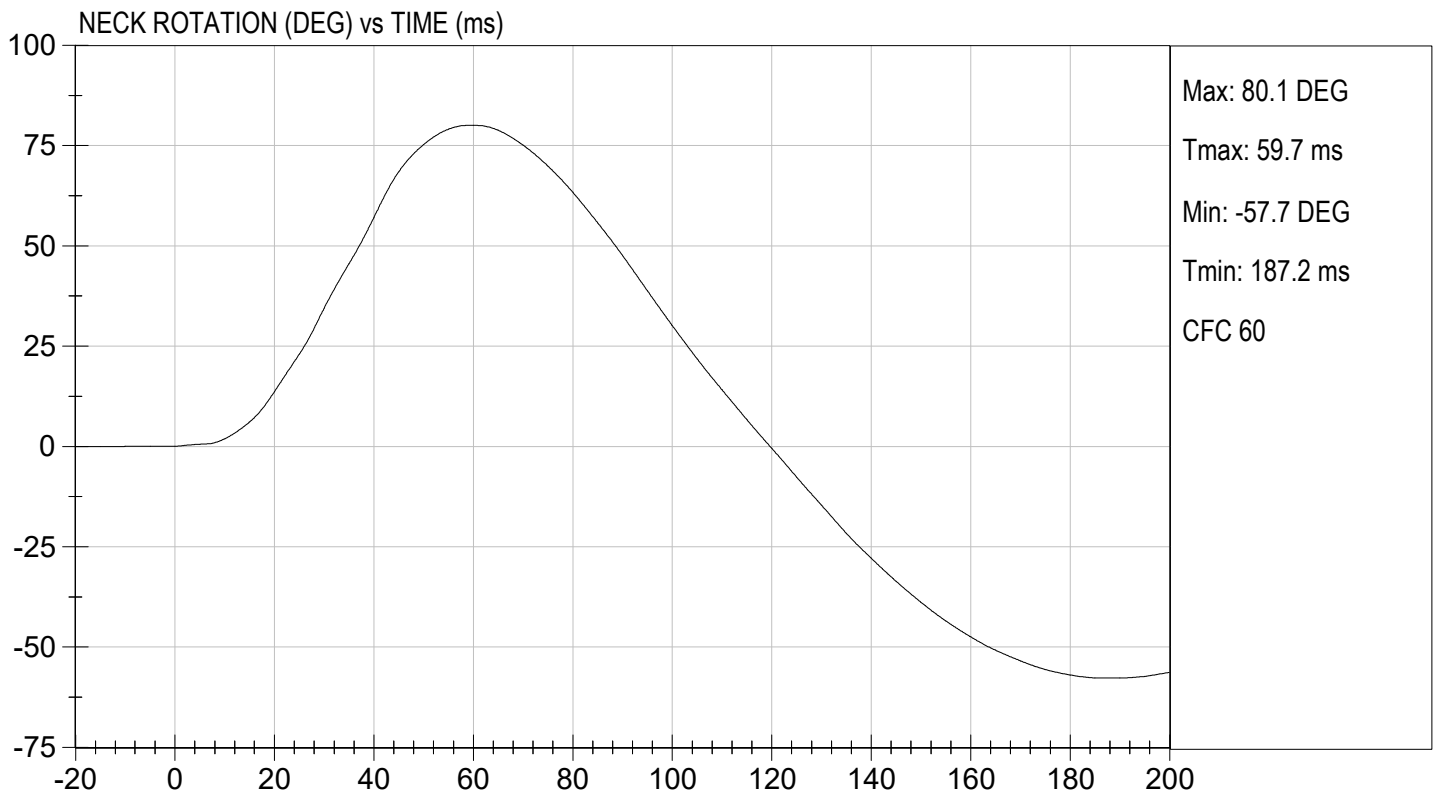
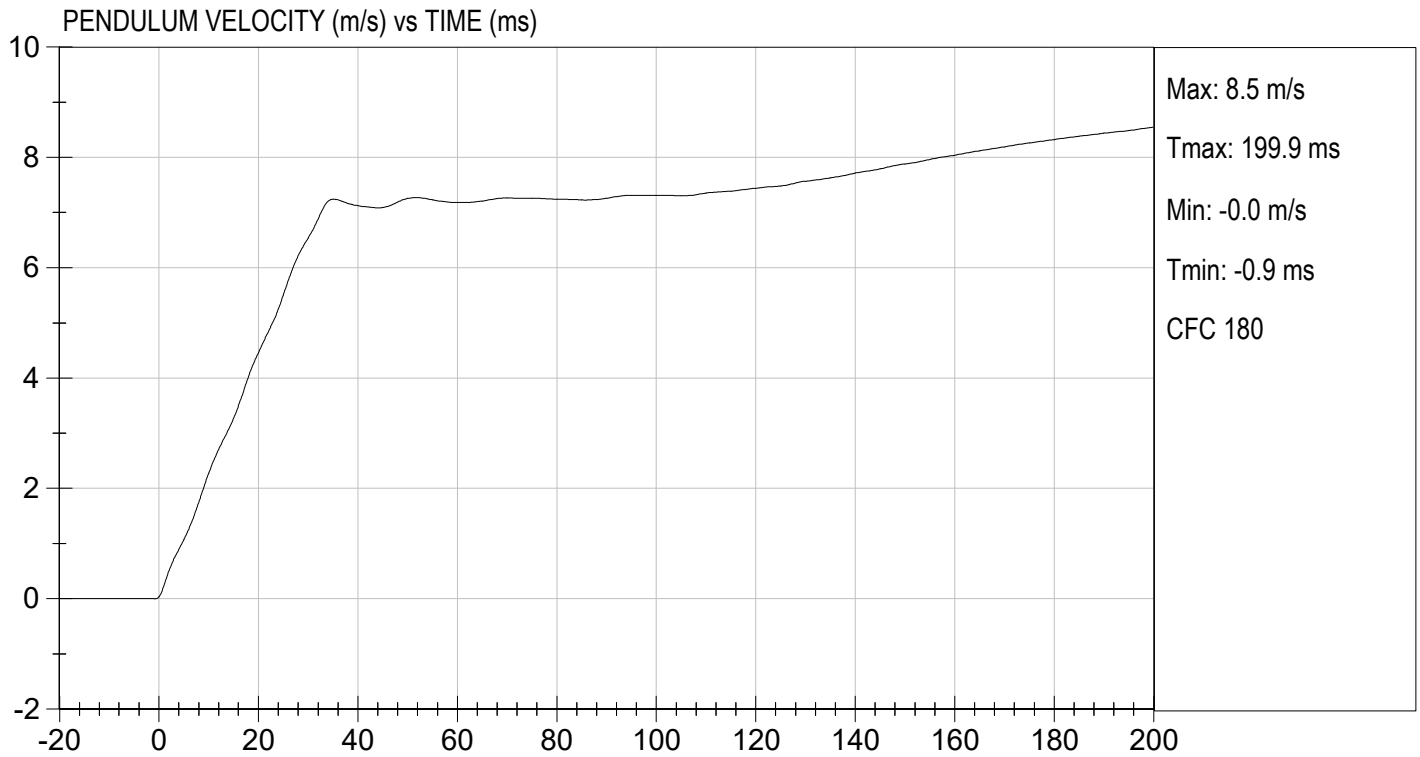
Test I.D: D220582

| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|-------|-------|---------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.8 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 20 | Pass |
| Pendulum Speed | | m/s | 6.89 to 7.13 | 7.06 | Pass |
| Pendulum Velocity | 10 ms | m/s | 2.1 to 2.5 | 2.3 | Pass |
| | 20 ms | m/s | 4.0 to 5.0 | 4.5 | Pass |
| | 30 ms | m/s | 5.8 to 7.0 | 6.5 | Pass |
| D Plane Rotation | Max | deg | 77 to 91 | 80 | Pass |
| Occipital Condyle Moment within Rotation Corridor | | Nm | 69 to 83 | 71 | Pass |
| Positive Moment Time Curve Decay to 10 Nm | | ms | 80 to 100 | 85 | Pass |
| Overall Results | | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date

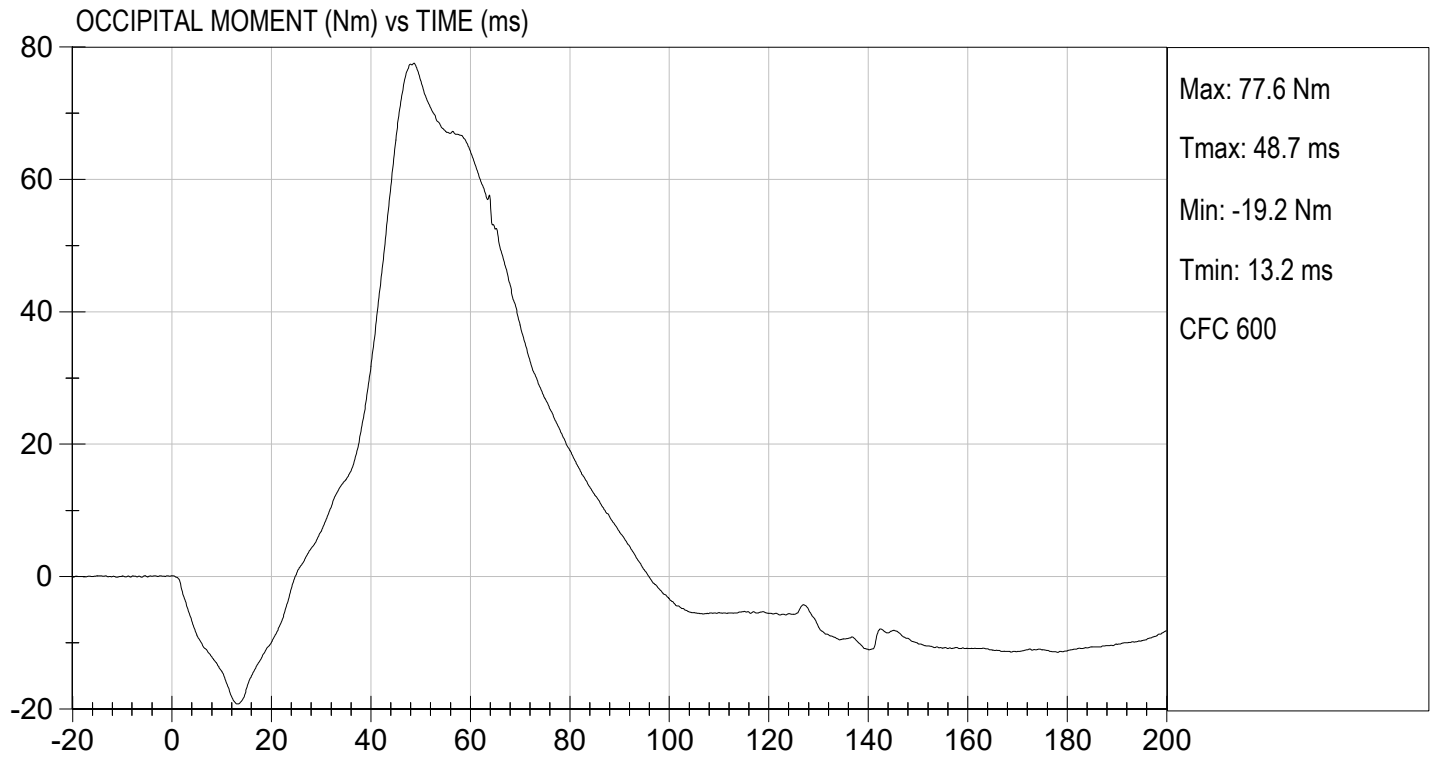

 Approved By





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 02/28/2022
TEST #: D220582



MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

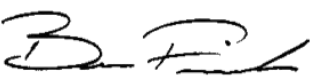
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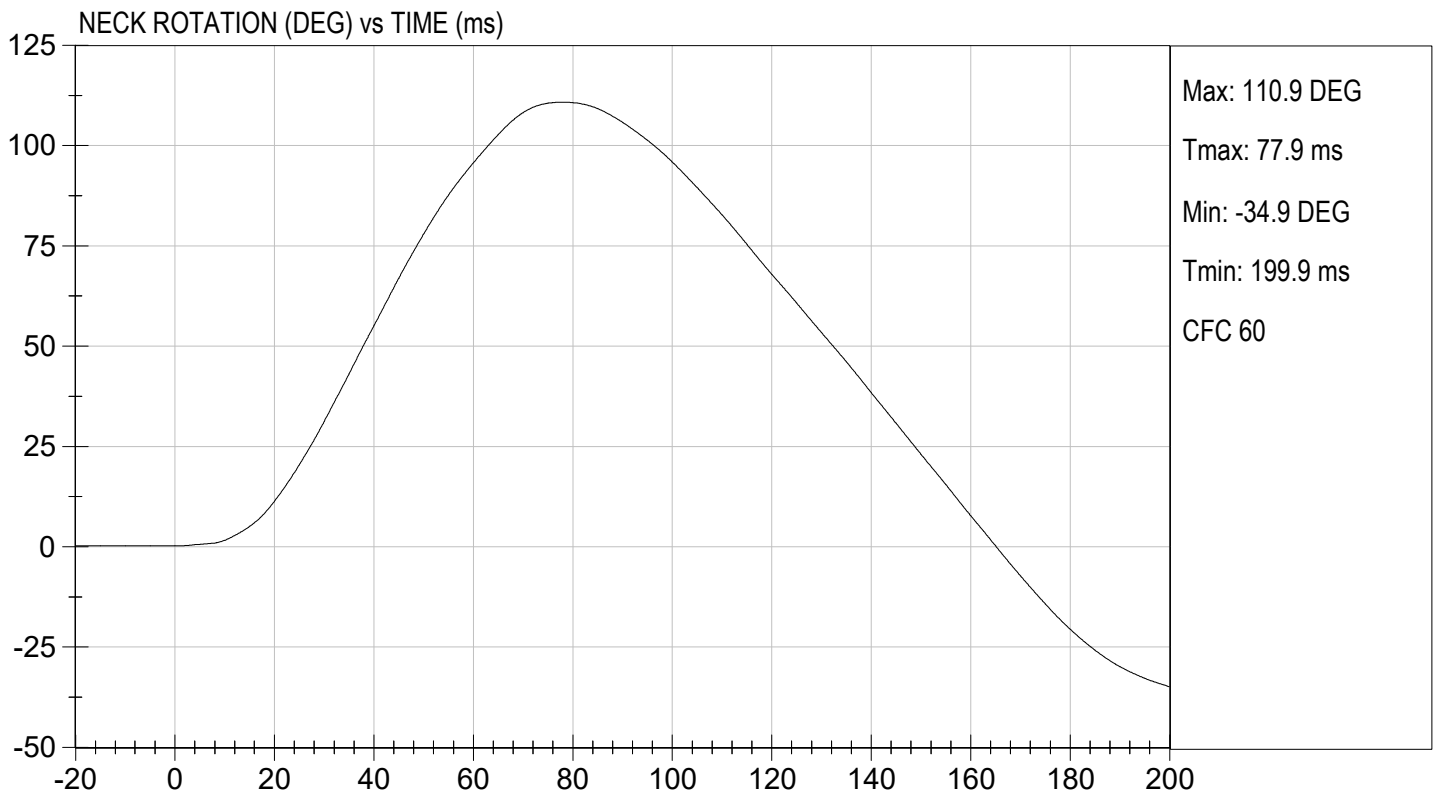
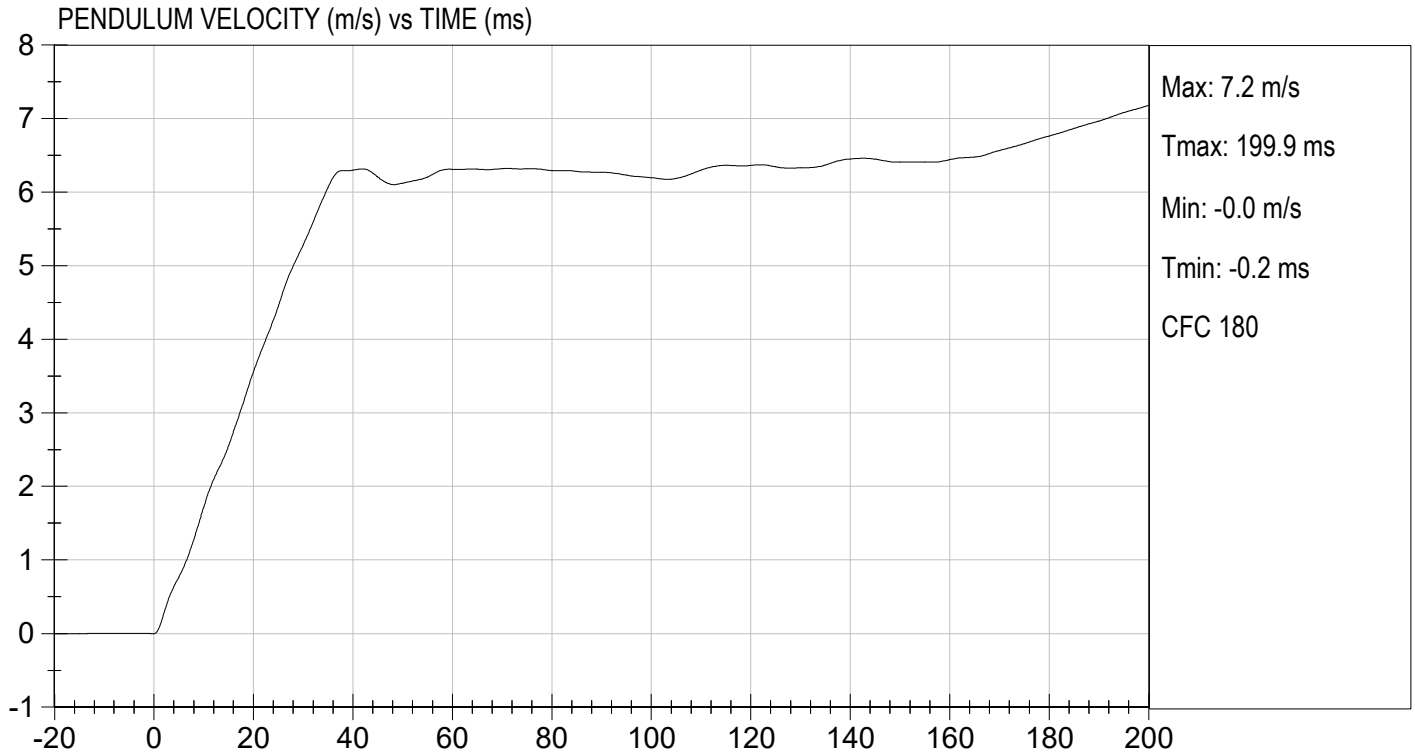
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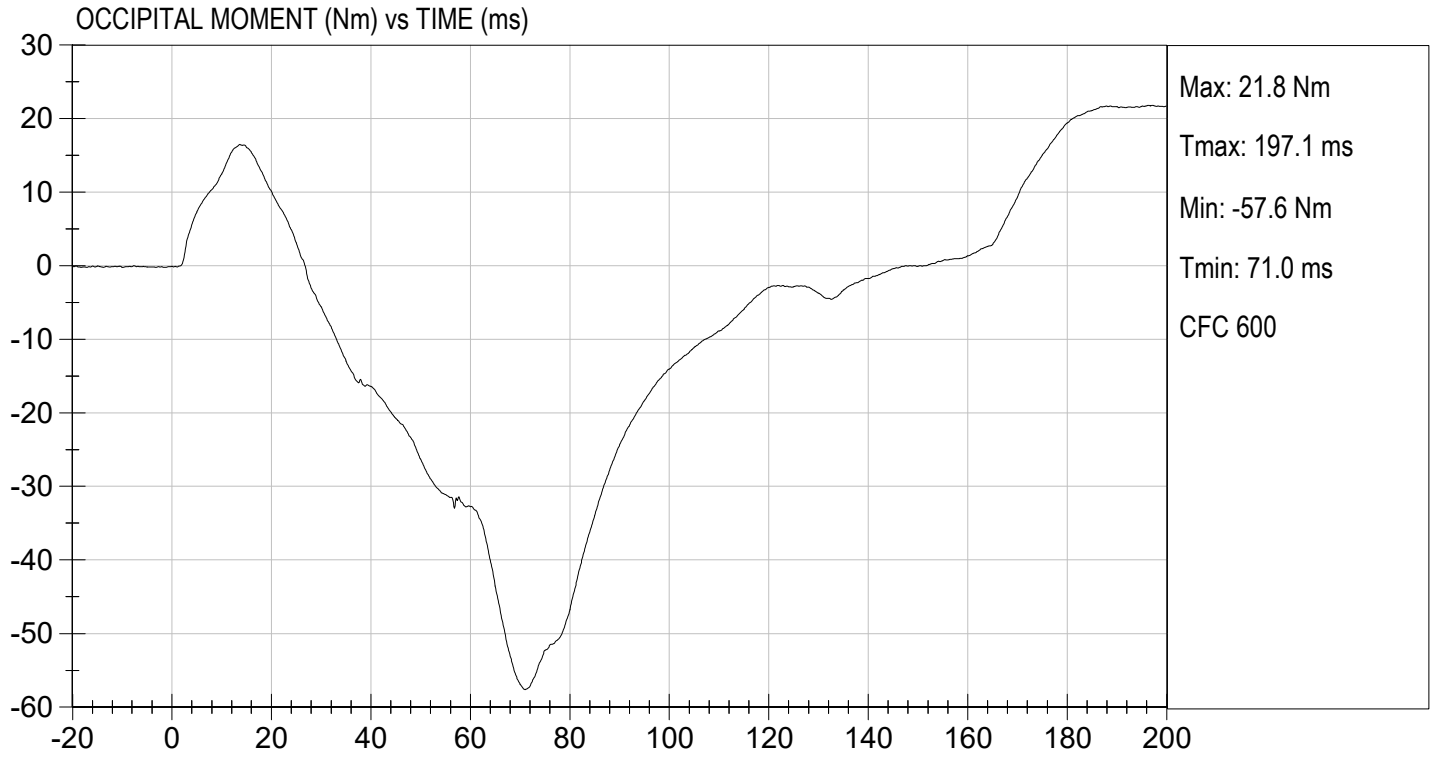
| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|-------|-------|---------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 20 | Pass |
| Pendulum Speed | | m/s | 5.95 to 6.19 | 6.12 | Pass |
| Pendulum Velocity | 10 ms | m/s | 1.5 to 1.9 | 1.7 | Pass |
| | 20 ms | m/s | 3.1 to 3.9 | 3.6 | Pass |
| | 30 ms | m/s | 4.6 to 5.6 | 5.3 | Pass |
| D Plane Rotation | Max | deg | 99 to 114 | 111 | Pass |
| Occipital Condyle Moment within Rotation Corridor | | Nm | -65 to -53 | -58 | Pass |
| Negative Moment Time Curve Decay to -10 Nm | | ms | 94 to 114 | 106 | Pass |
| Overall Results | | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date


 Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

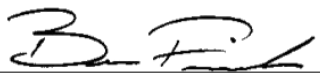
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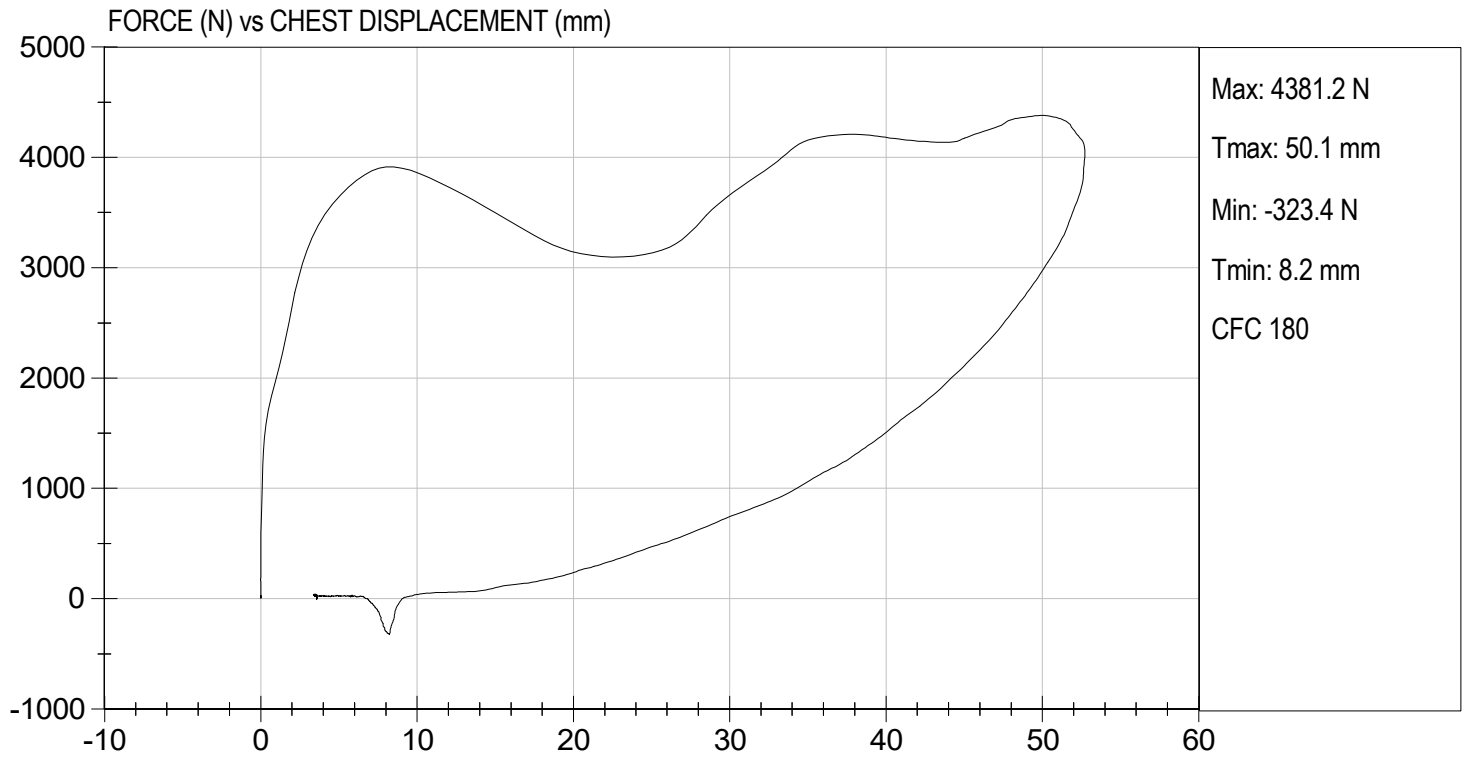
Test I.D: D220584

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Relative Humidity | % | 10 to 70 | 23 | Pass |
| Probe Speed | m/s | 6.59 to 6.83 | 6.60 | Pass |
| Peak Deflection | mm | 50 to 58 | 53 | Pass |
| Peak Resistive Force w/in Deflection Corridor | N | 3900 to 4400 | 4381 | Pass |
| Internal Hysteresis | % | 69 to 85 | 76 | Pass |
| Peak Force 18 mm - 50 mm | N | <= 4600 | 4381 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

02/28/2022
 Test Date


 Approved By



MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220585

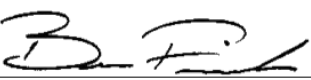
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.8 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 24 | Pass |
| Probe Speed | m/s | 2.07 to 2.13 | 2.12 | Pass |
| Maximum Force | N | 3450 to 4060 | 3763 | Pass |
| Overall Test Results | | | | Pass |



 Laboratory Technician

02/25/2022

 Test Date

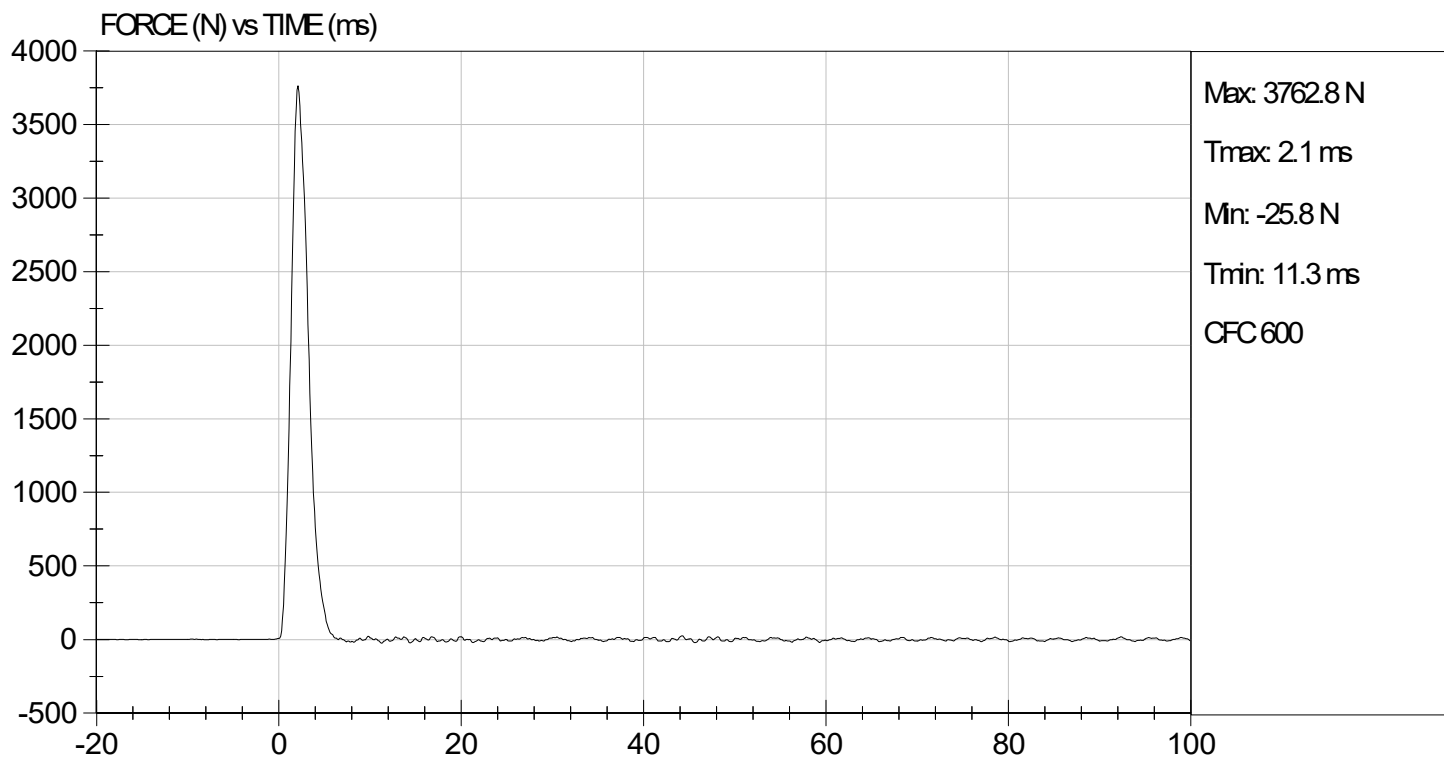


 Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.94 ft/s, 2.12 m/s

TEST DATE: 02/25/2022
TEST #: D220585



MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220586

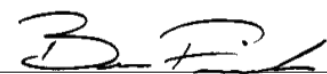
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.8 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 24 | Pass |
| Probe Speed | m/s | 2.07 to 2.13 | 2.12 | Pass |
| Maximum Force | N | 3450 to 4060 | 3788 | Pass |
| Overall Test Results | | | | Pass |



 Laboratory Technician

02/25/2022

 Test Date

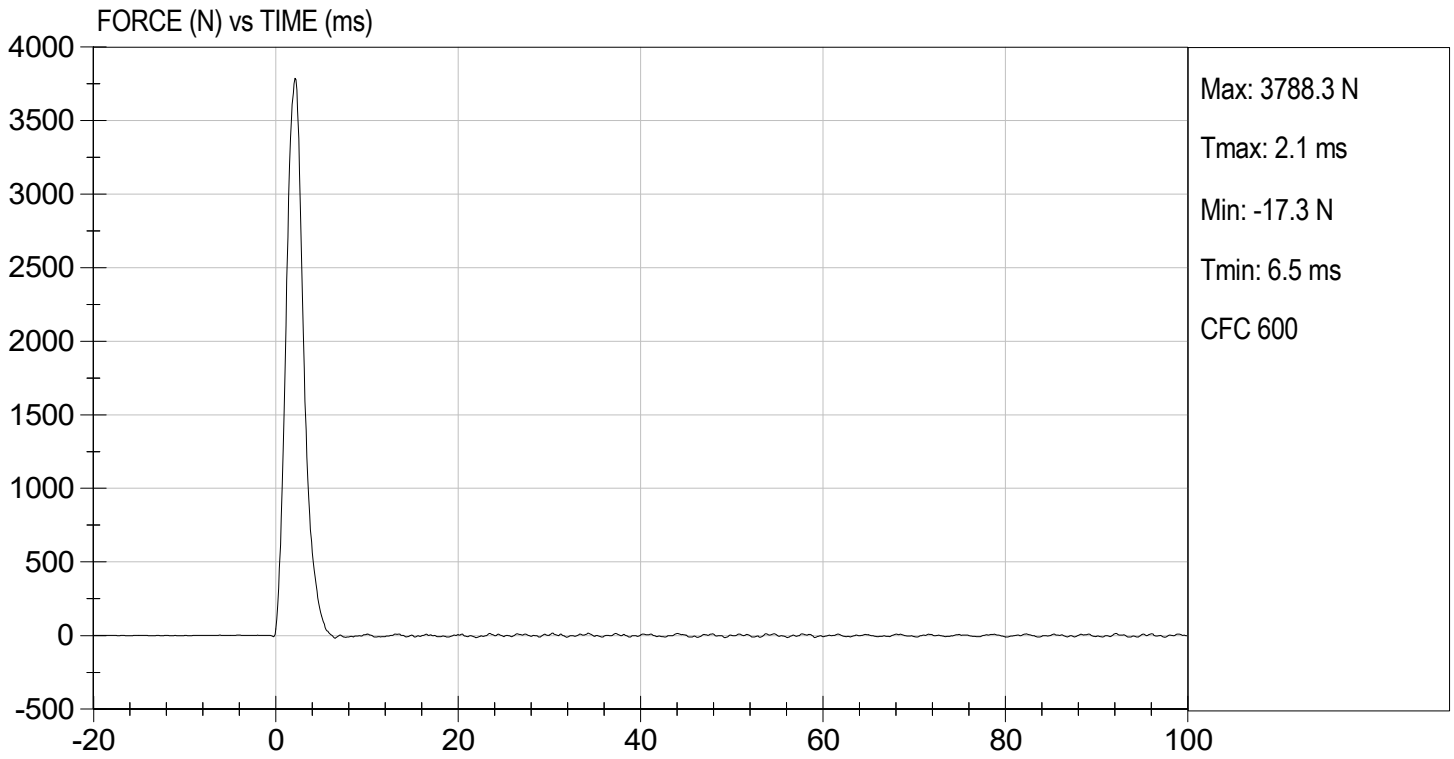


 Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.97 ft/s, 2.12 m/s

TEST DATE: 02/25/2022
TEST #: D220586



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

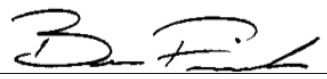
ATD Serial No: 142

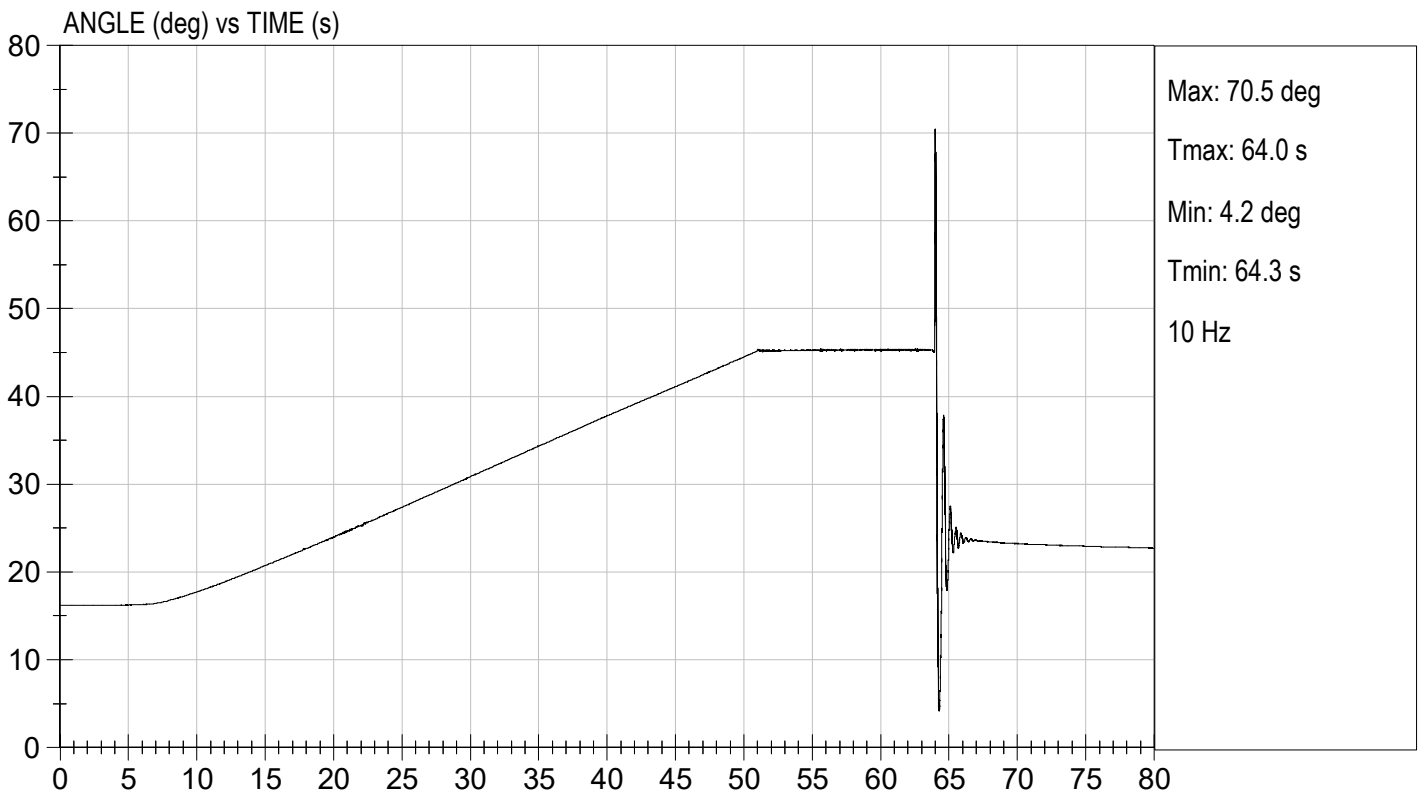
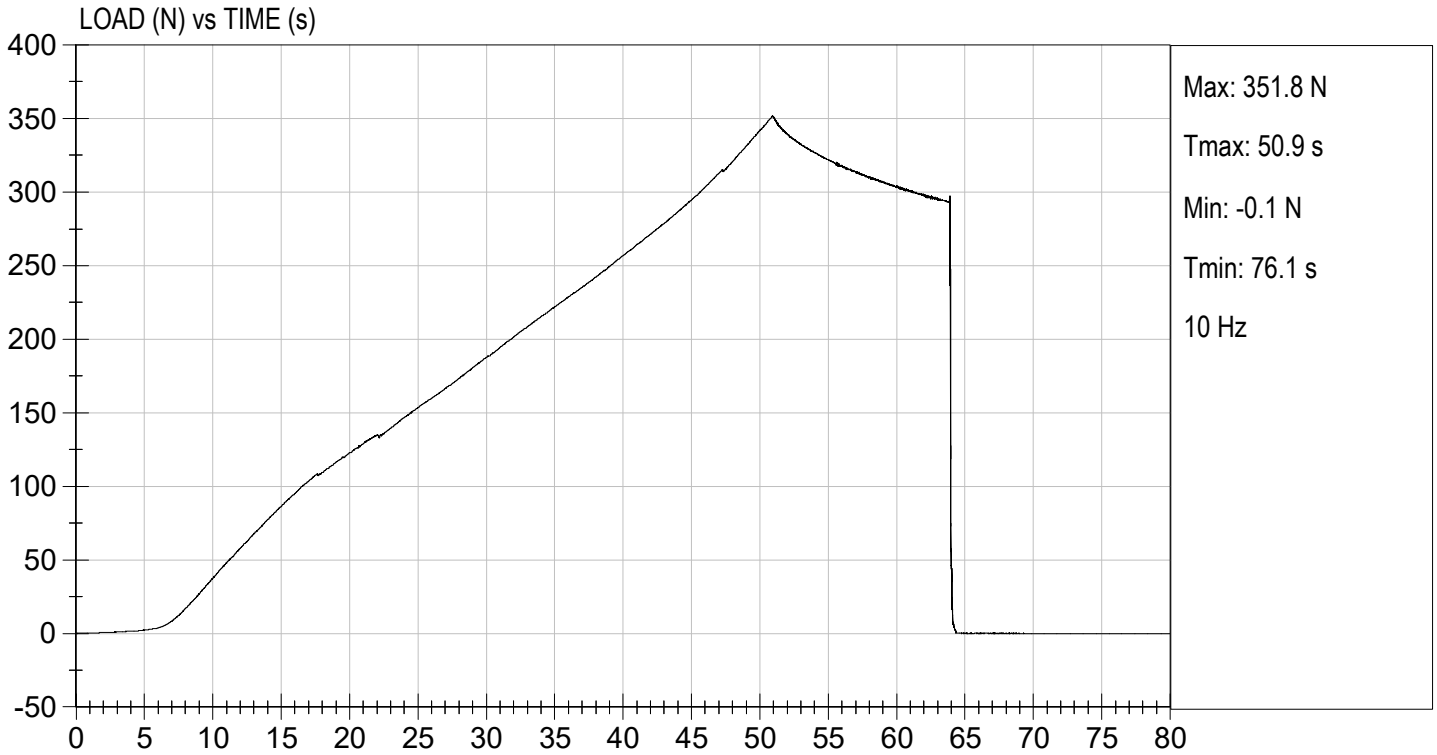
Test I.D: D220587

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-------------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.8 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 24 | Pass |
| Initial Angle | deg | 0 to 20 | 16 | Pass |
| Return Angle | deg | +/- 8 | 7 | Pass |
| Force at 45 deg | N | 320 to 390 | 352 | Pass |
| Upper Torso Deflection Rate | deg/s | 0.5 to 1.5 | 0.7 | Pass |
| Overall Result | | | | Pass |


 Laboratory Technician

02/25/2022
 Test Date


 Approved By



CALIBRATION TEST RESULTS

POST-TEST

HYBRID III 5TH PERCENTILE FEMALE - PASSENGER ATD

MGA RESEARCH CORPORATION
HEAD DROP TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test ID: D220871

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|--------------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.8 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | Pass |
| Peak Resultant Acceleration | G's | 250 to 300 | 278 | Pass |
| Peak Lateral Acceleration | G's | <= +/- 15.0 | 3.8 | Pass |
| Unimodal | N/A | Yes | Yes | Pass |
| Oscillations | N/A | within 10% of peak | Yes | Pass |
| Overall Test Results | | | | Pass |



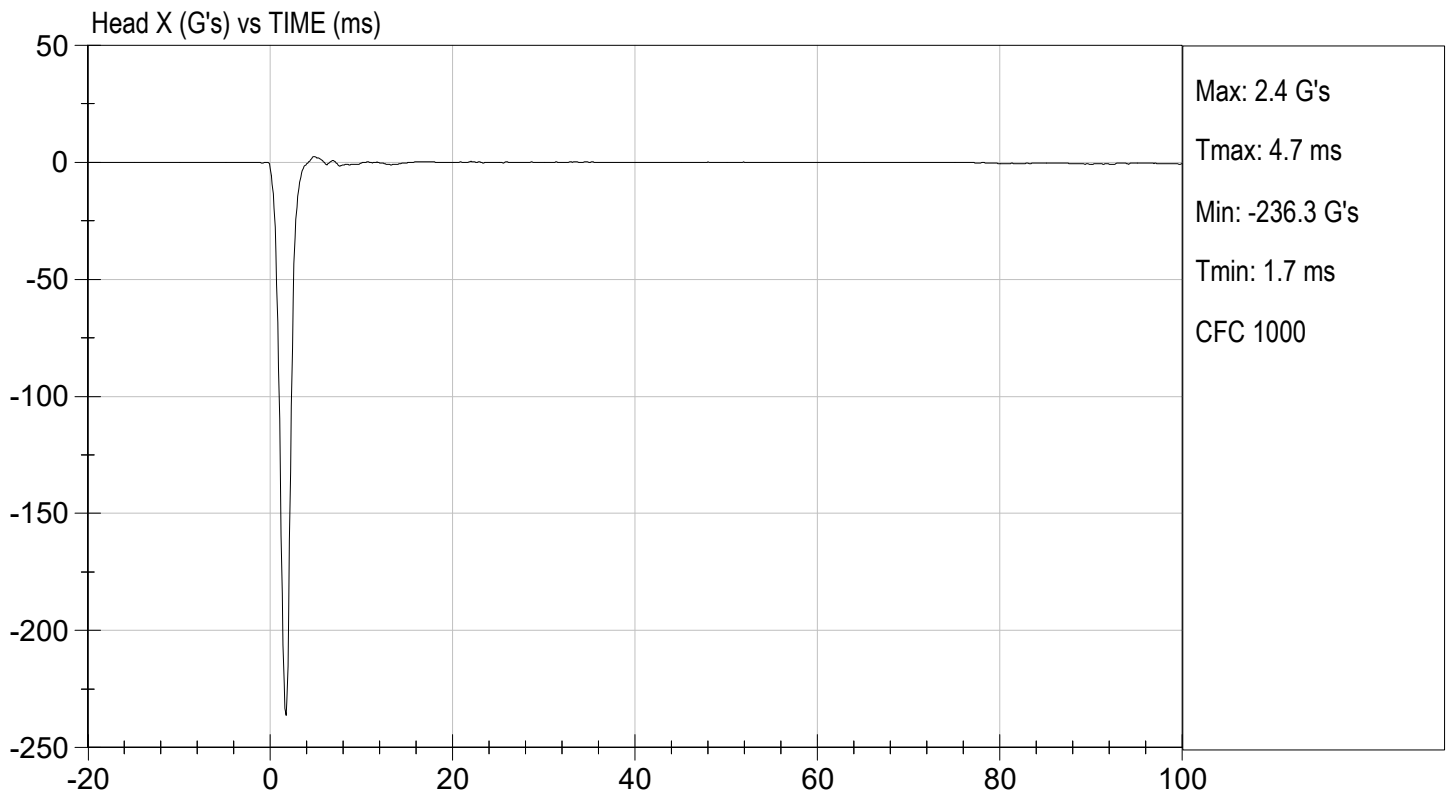
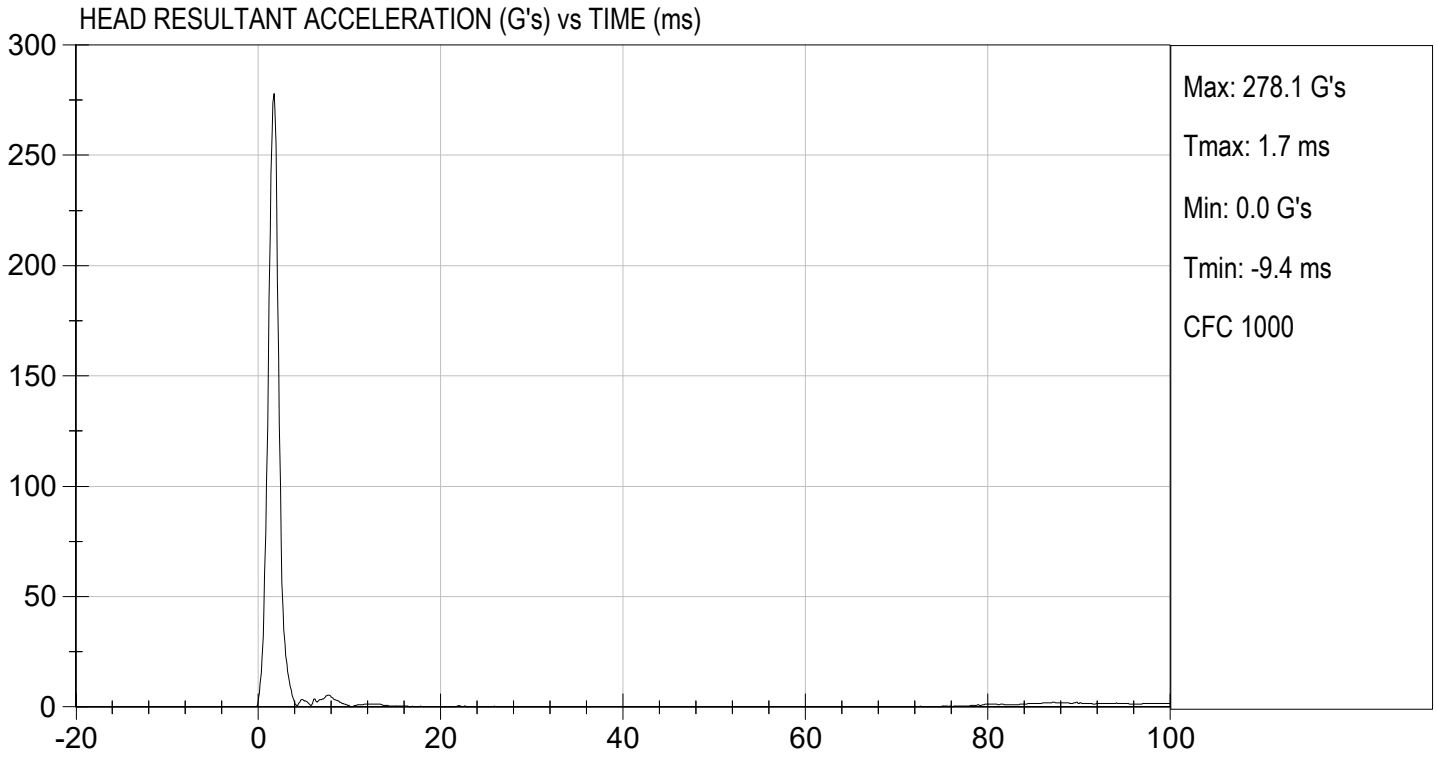
Laboratory Technician

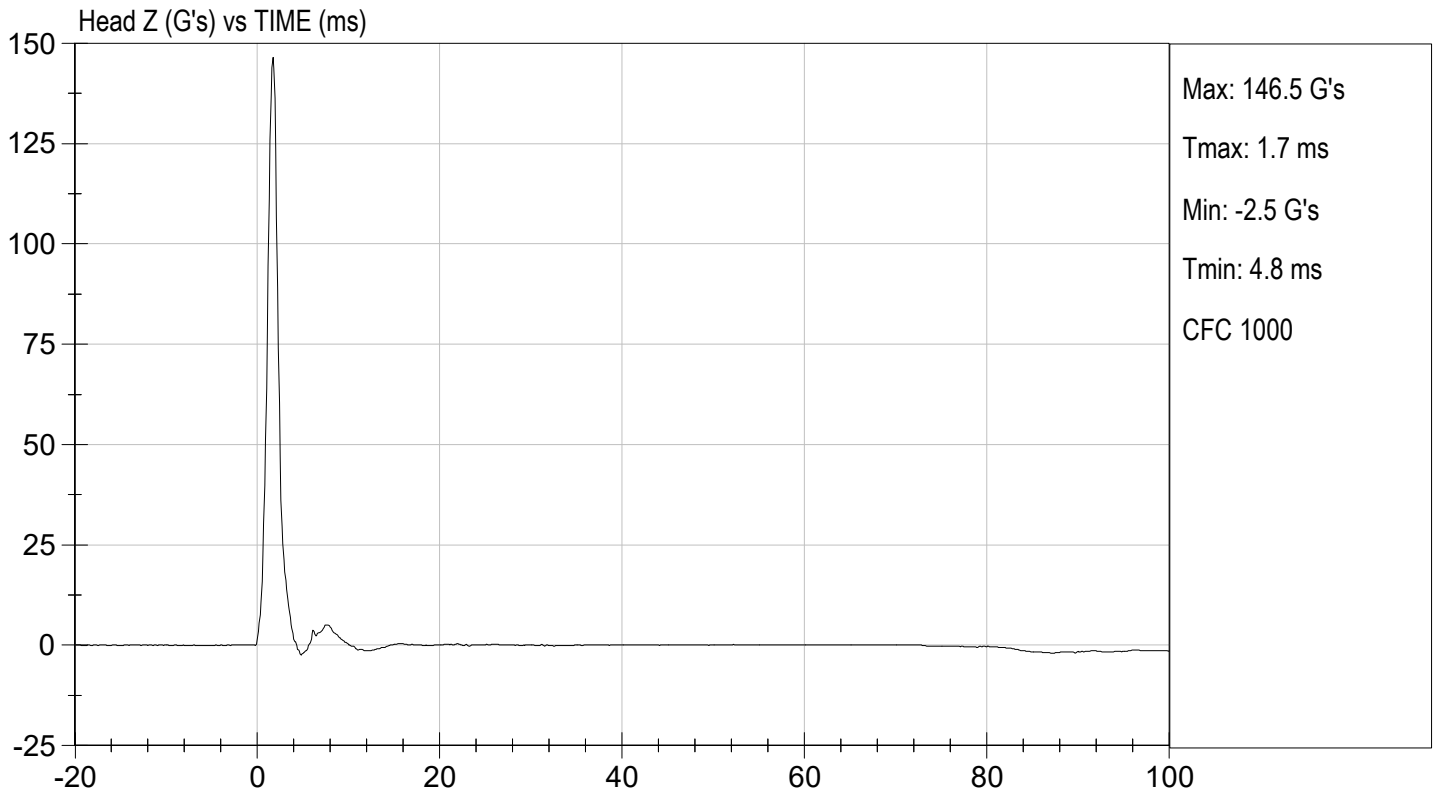
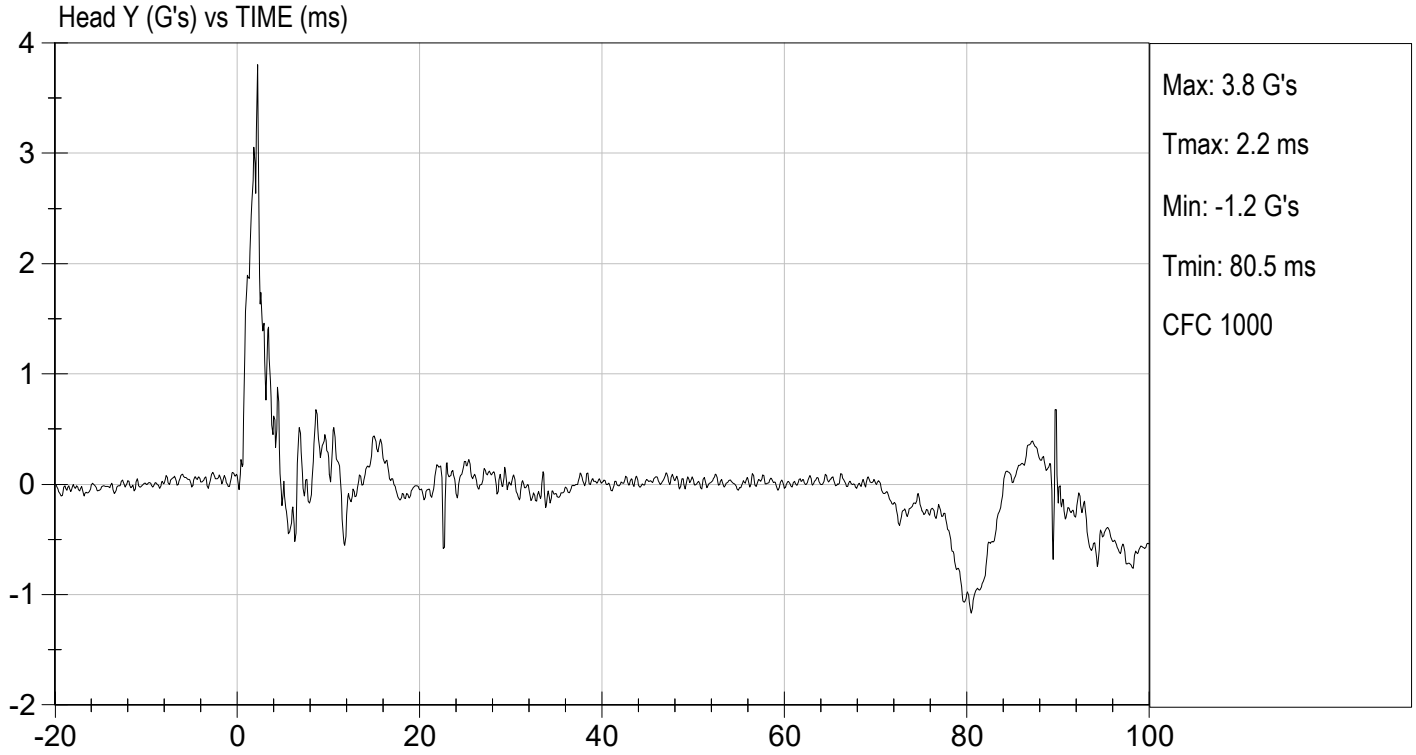
03/30/2022

Test Date



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MGA RESEARCH CORPORATION
NECK FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220872

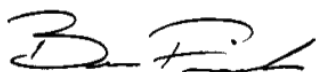
| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|-------|-------|---------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 28 | Pass |
| Pendulum Speed | | m/s | 6.89 to 7.13 | 7.06 | Pass |
| Pendulum Velocity | 10 ms | m/s | 2.1 to 2.5 | 2.3 | Pass |
| | 20 ms | m/s | 4.0 to 5.0 | 4.6 | Pass |
| | 30 ms | m/s | 5.8 to 7.0 | 6.5 | Pass |
| D Plane Rotation | Max | deg | 77 to 91 | 81 | Pass |
| Occipital Condyle Moment within Rotation Corridor | | Nm | 69 to 83 | 71 | Pass |
| Positive Moment Time Curve Decay to 10 Nm | | ms | 80 to 100 | 85 | Pass |
| Overall Results | | | | | Pass |



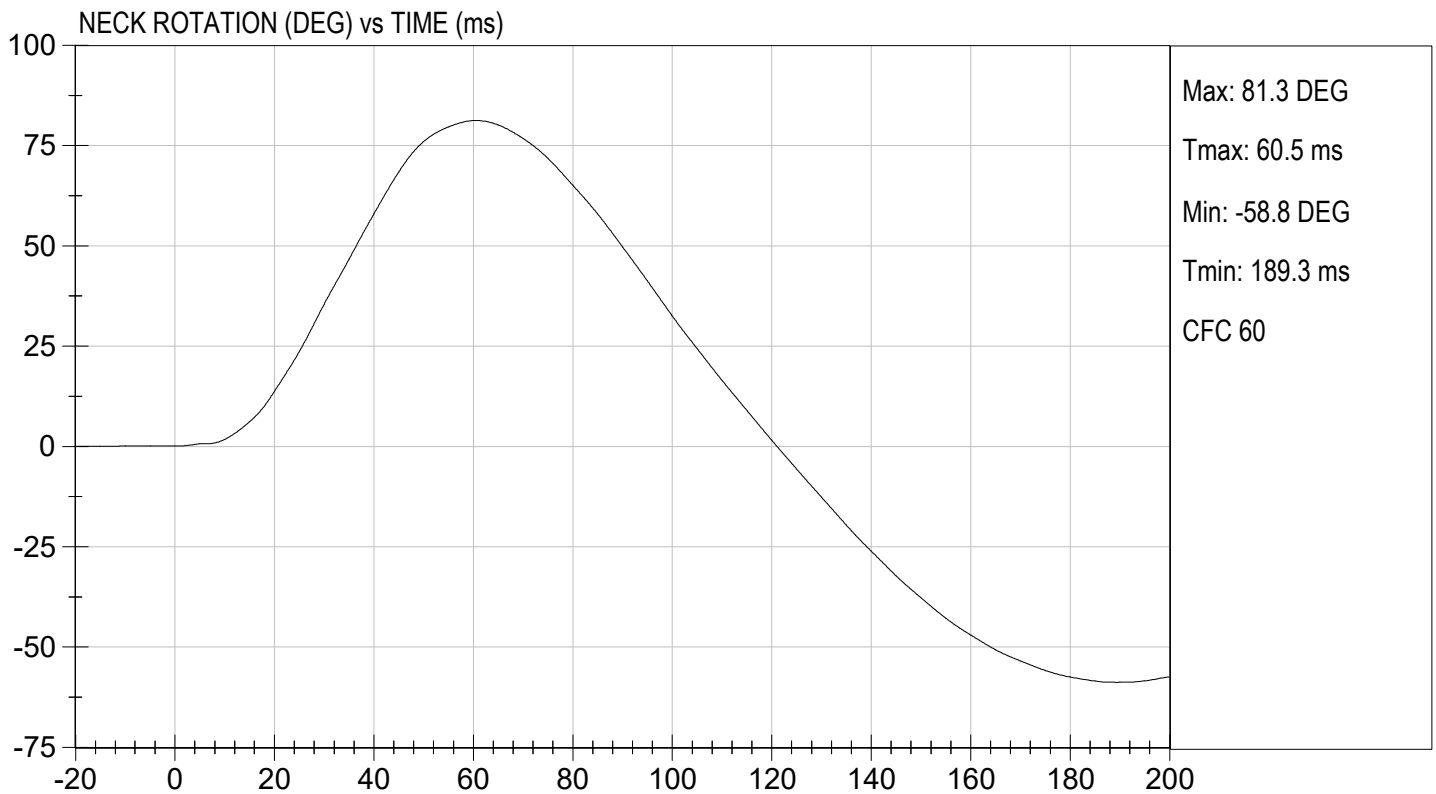
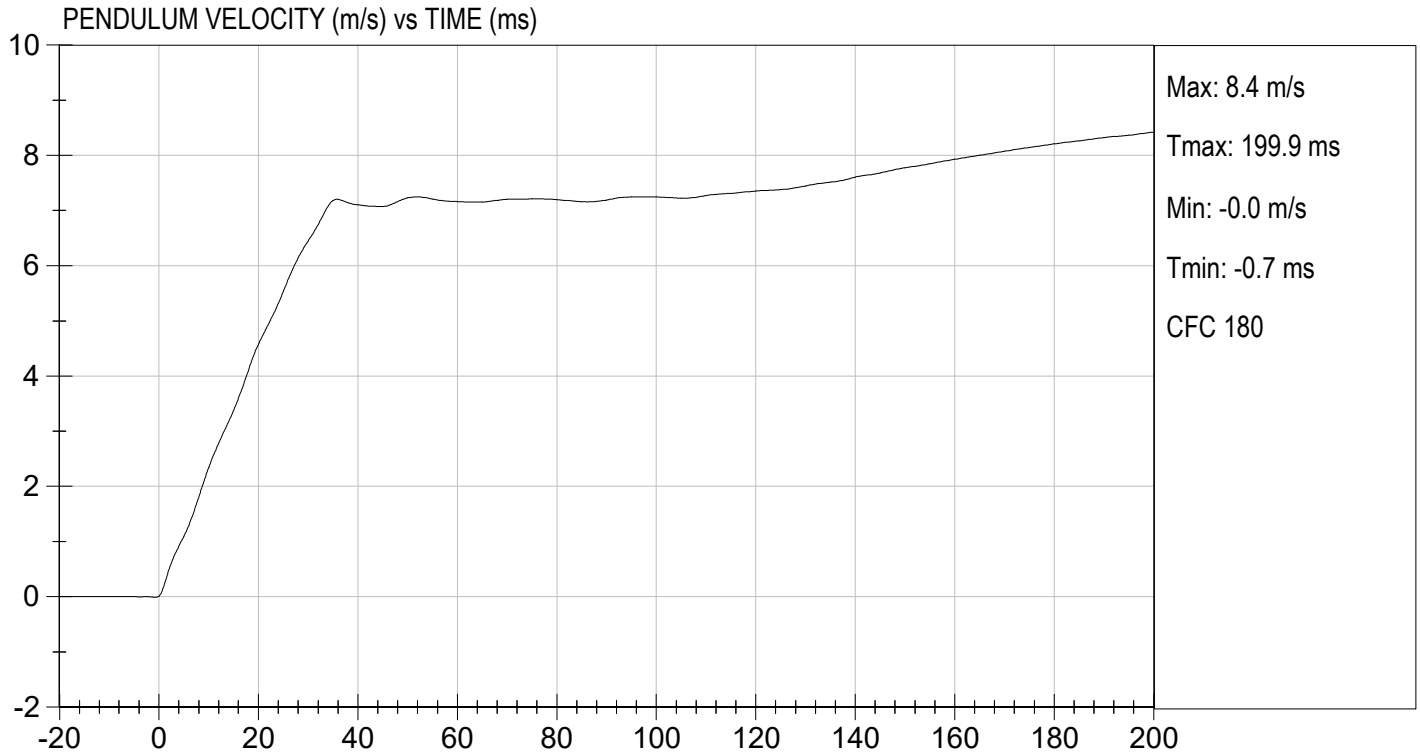
Laboratory Technician

03/30/2022

Test Date



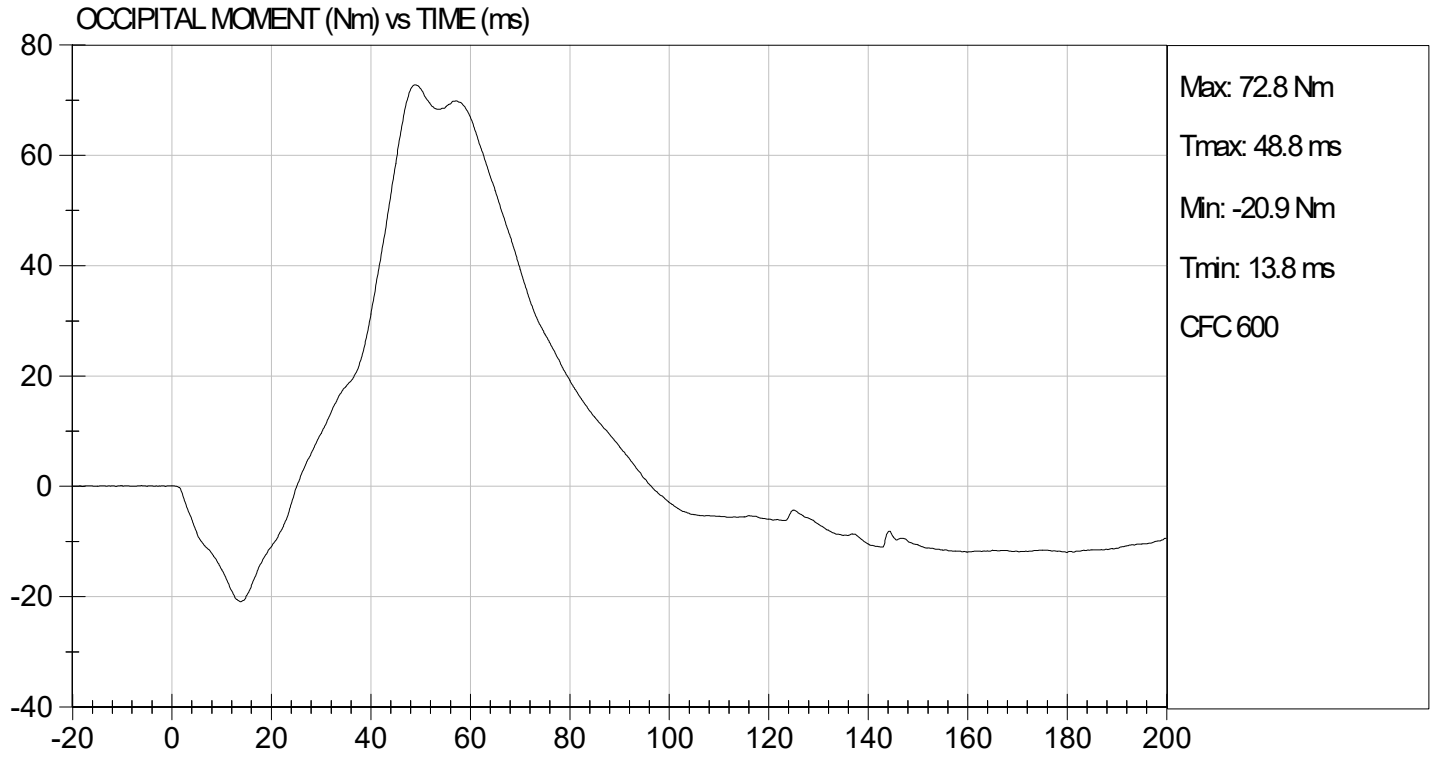
Approved By





TEST DESC: NECK FLEXION
VELOCITY: 23.15 ft/s, 7.06 m/s

TEST DATE: 03/30/2022
TEST #: D220872

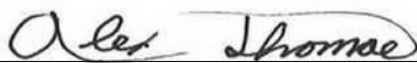


MGA RESEARCH CORPORATION
NECK EXTENSION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D.: D220873

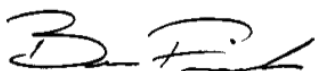
| Tested Parameter | | Units | Specification | Result | Pass/Fail |
|---|-------|-------|---------------|--------|-----------|
| Laboratory Temperature | | deg C | 20.6 to 22.2 | 21.9 | Pass |
| Laboratory Relative Humidity | | % | 10 to 70 | 28 | Pass |
| Pendulum Speed | | m/s | 5.95 to 6.19 | 6.12 | Pass |
| Pendulum Velocity | 10 ms | m/s | 1.5 to 1.9 | 1.8 | Pass |
| | 20 ms | m/s | 3.1 to 3.9 | 3.7 | Pass |
| | 30 ms | m/s | 4.6 to 5.6 | 5.3 | Pass |
| D Plane Rotation | Max | deg | 99 to 114 | 111 | Pass |
| Occipital Condyle Moment within Rotation Corridor | | Nm | -65 to -53 | -57 | Pass |
| Negative Moment Time Curve Decay to -10 Nm | | ms | 94 to 114 | 105 | Pass |
| Overall Results | | | | | Pass |



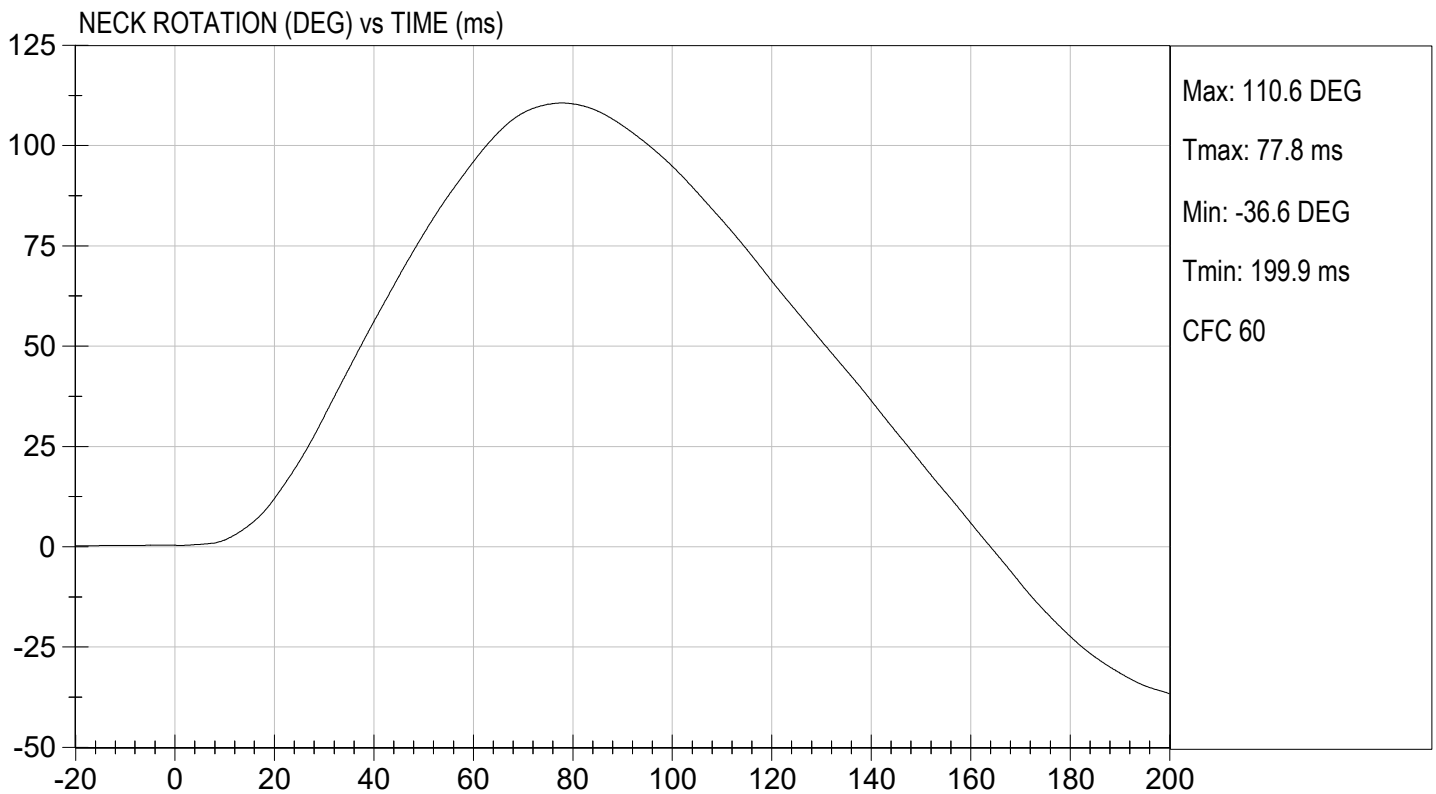
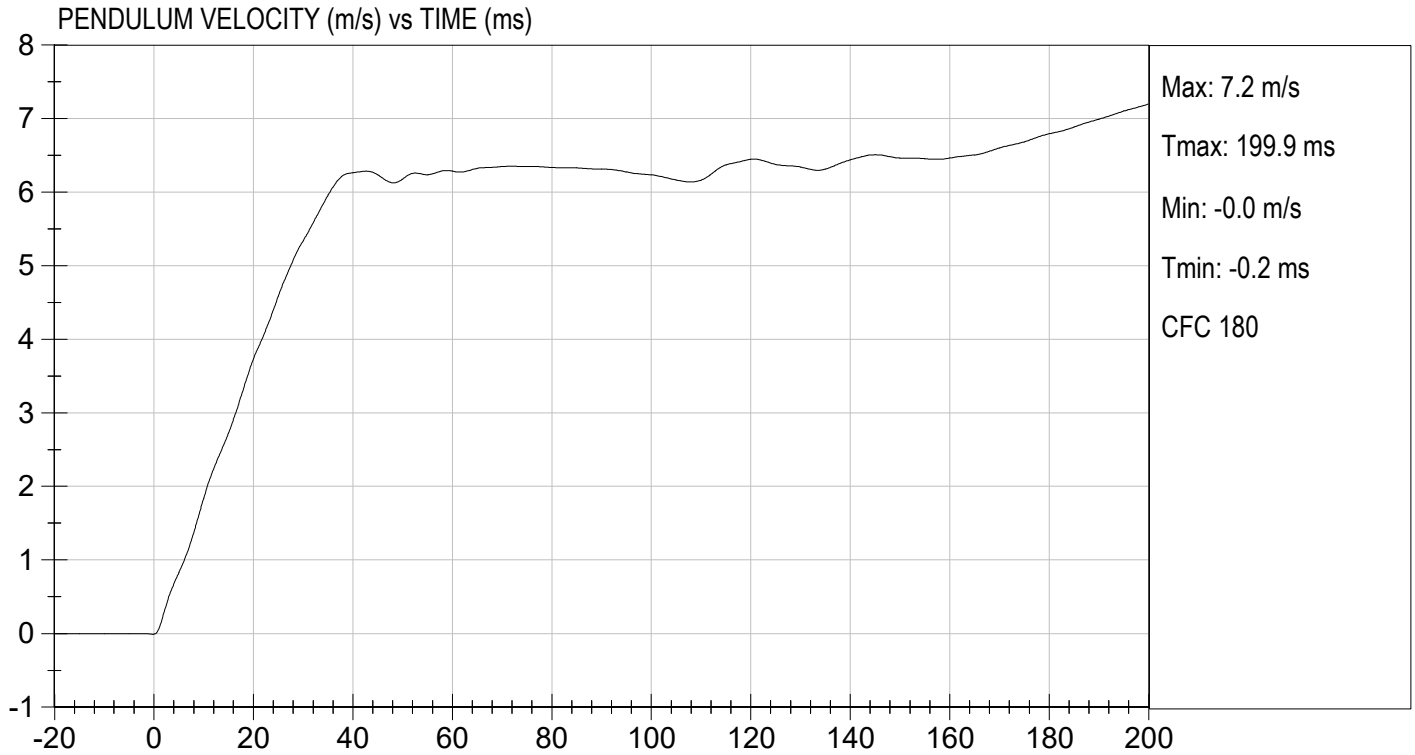
Laboratory Technician

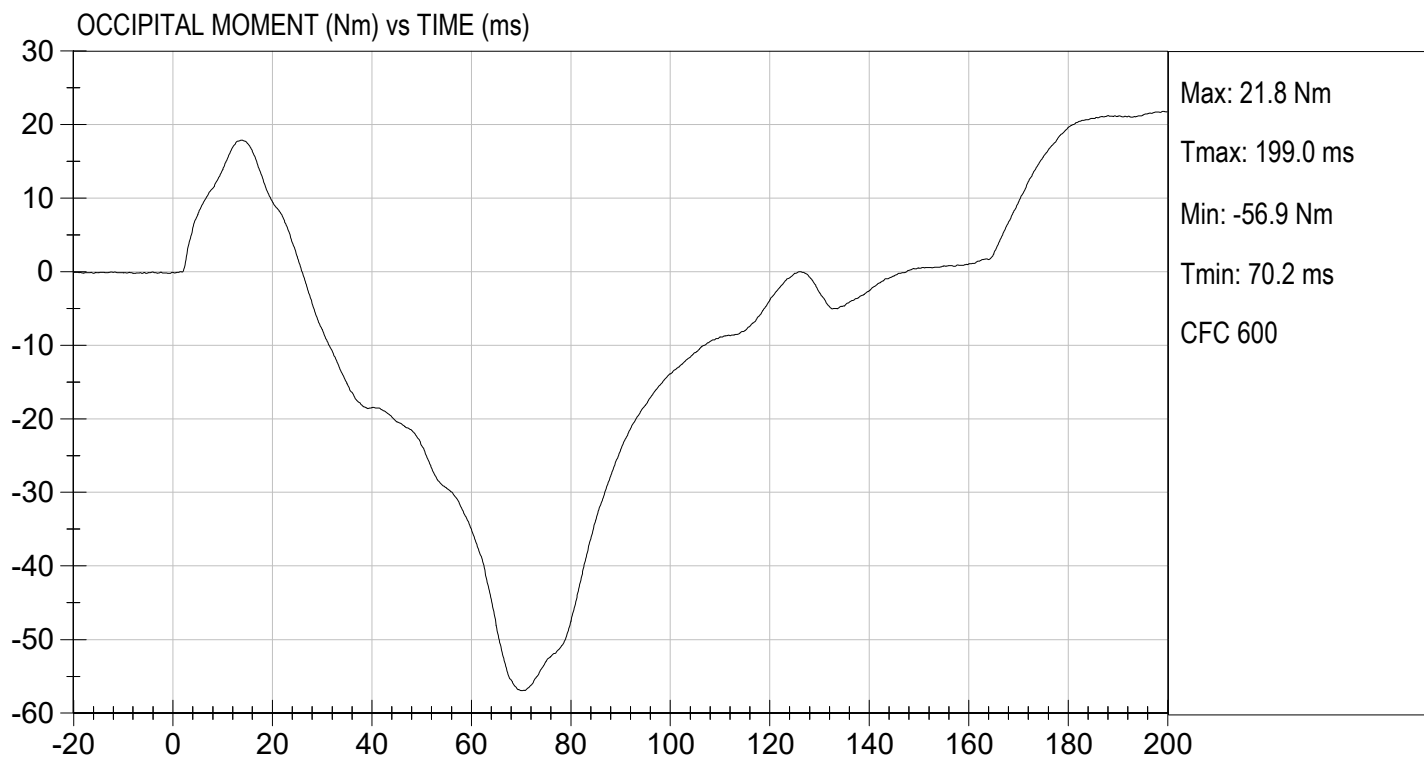
03/30/2022

Test Date



Approved By





MGA RESEARCH CORPORATION
THORAX IMPACT
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220874

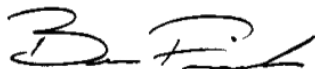
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|---|-------|---------------|--------|-----------|
| Temperature | deg C | 20.6 to 22.2 | 22 | Pass |
| Relative Humidity | % | 10 to 70 | 28 | Pass |
| Probe Speed | m/s | 6.59 to 6.83 | 6.68 | Pass |
| Peak Deflection | mm | 50 to 58 | 51 | Pass |
| Peak Resistive Force w/in Deflection Corridor | N | 3900 to 4400 | 4183 | Pass |
| Internal Hysteresis | % | 69 to 85 | 75 | Pass |
| Peak Force 18 mm - 50 mm | N | <= 4600 | 4378 | Pass |
| Overall Test Results | | | | Pass |



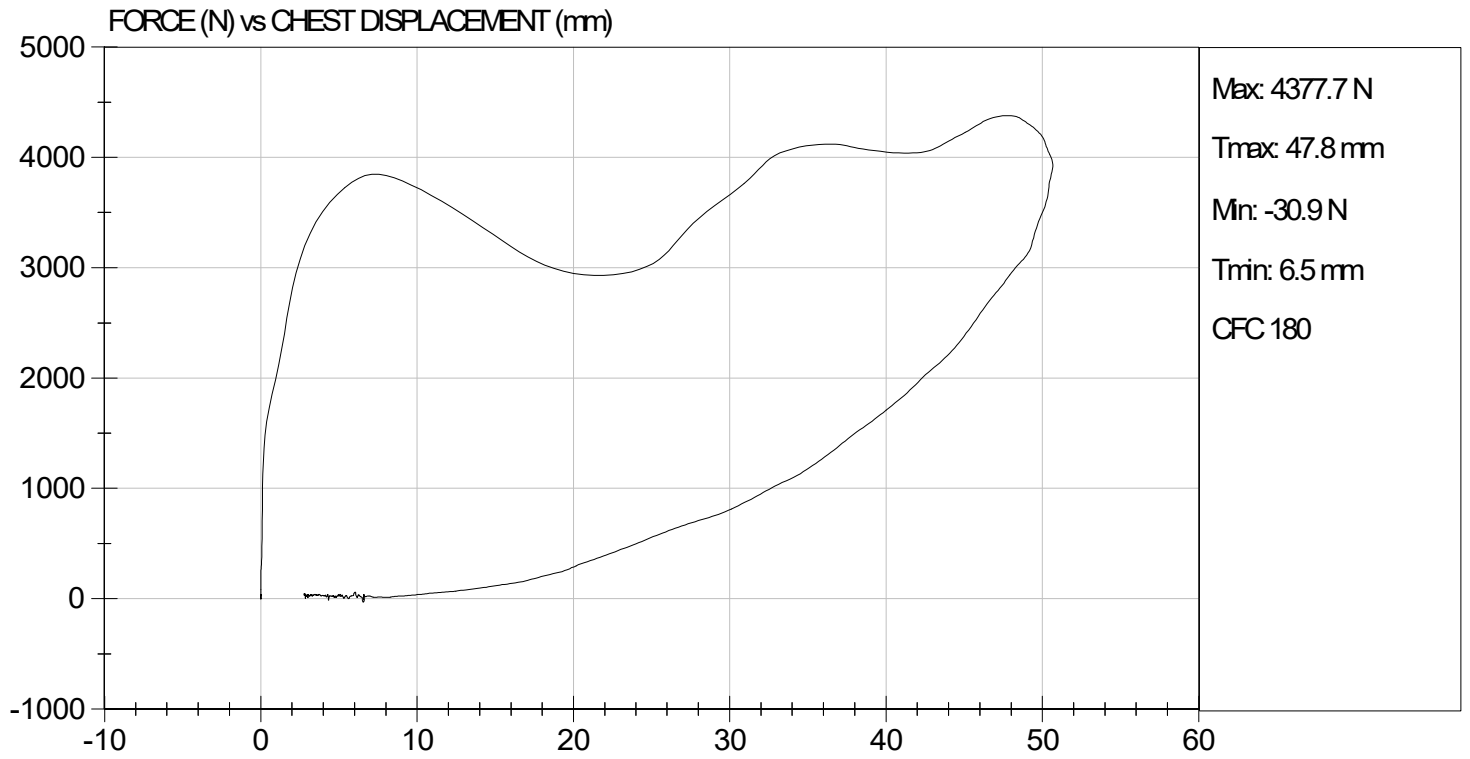
Laboratory Technician

03/30/2022

Test Date



Approved By




MGA RESEARCH CORPORATION
RIGHT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220875

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | Pass |
| Probe Speed | m/s | 2.07 to 2.13 | 2.08 | Pass |
| Maximum Force | N | 3450 to 4060 | 3813 | Pass |
| Overall Test Results | | | | Pass |


 Laboratory Technician

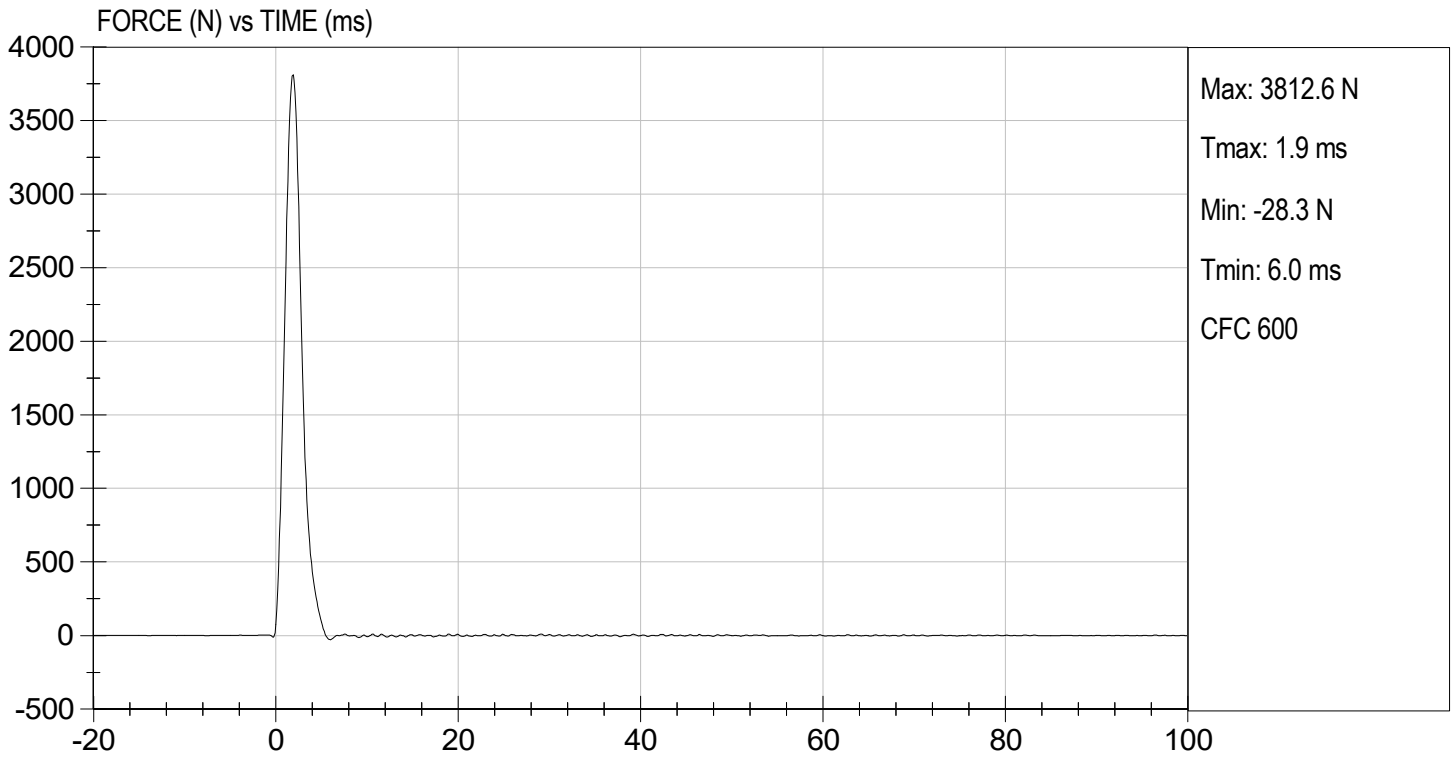
03/30/2022
 Test Date


 Approved By



TEST DESC: RIGHT KNEE
VELOCITY: 6.83 ft/s, 2.08 m/s

TEST DATE: 03/30/2022
TEST #: D220875




MGA RESEARCH CORPORATION
LEFT KNEE IMPACT TEST
HYBRID III 5TH PERCENTILE

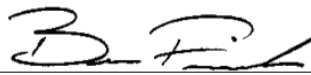
ATD Serial No: 142

Test I.D: D220876

| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-----------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.9 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | Pass |
| Probe Speed | m/s | 2.07 to 2.13 | 2.08 | Pass |
| Maximum Force | N | 3450 to 4060 | 3870 | Pass |
| Overall Test Results | | | | Pass |


Laboratory Technician

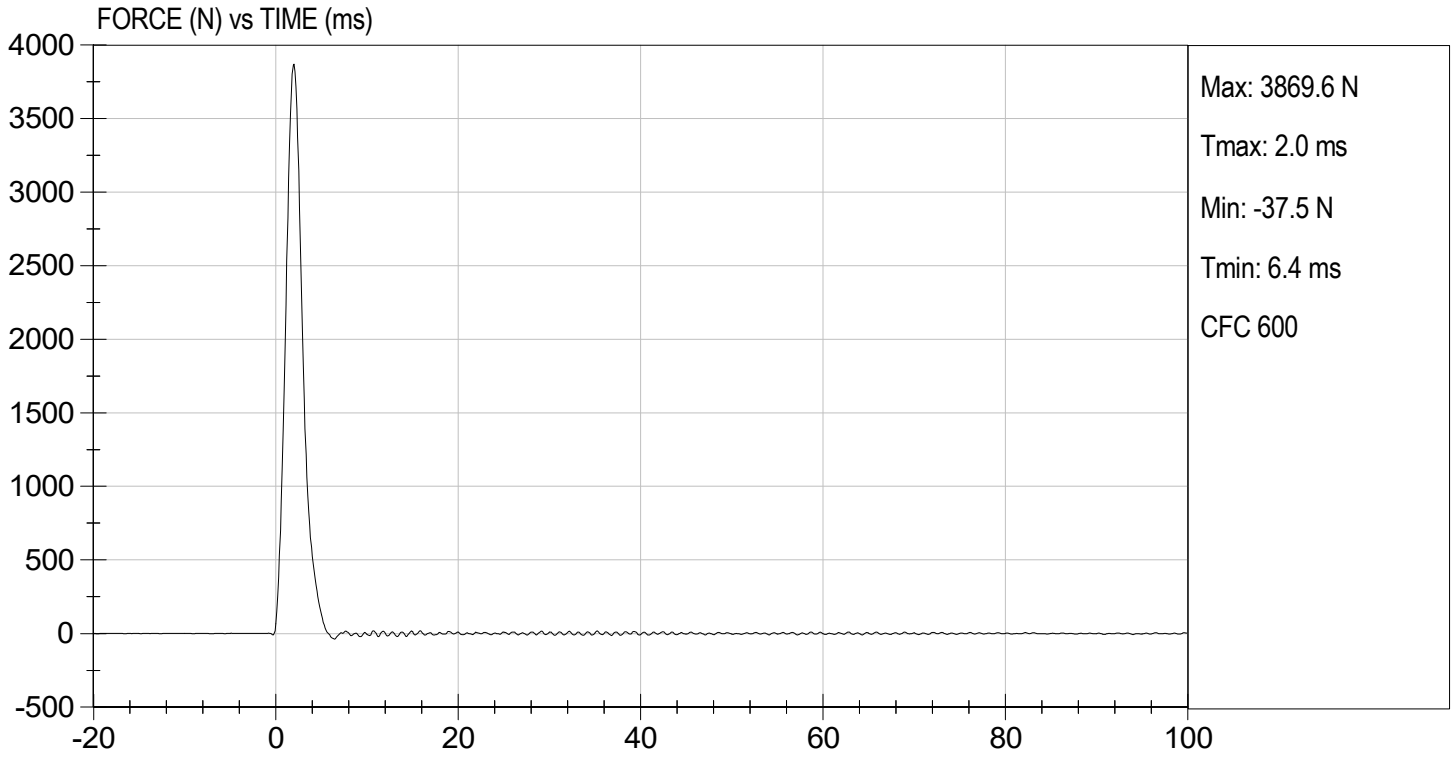
03/30/2022
Test Date


Approved By



TEST DESC: LEFT KNEE
VELOCITY: 6.83 ft/s, 2.08 m/s

TEST DATE: 03/30/2022
TEST #: D220876



MGA RESEARCH CORPORATION
TORSO FLEXION TEST
HYBRID III 5TH PERCENTILE

ATD Serial No: 142

Test I.D: D220877

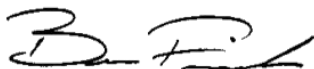
| Tested Parameter | Units | Specification | Result | Pass/Fail |
|------------------------------|-------|---------------|--------|-------------|
| Laboratory Temperature | deg C | 18.9 to 25.6 | 21.8 | Pass |
| Laboratory Relative Humidity | % | 10 to 70 | 29 | Pass |
| Initial Angle | deg | 0 to 20 | 20 | Pass |
| Return Angle | deg | +/- 8 | 2 | Pass |
| Force at 45 deg | N | 320 to 390 | 349 | Pass |
| Upper Torso Deflection Rate | deg/s | 0.5 to 1.5 | 0.8 | Pass |
| Overall Result | | | | Pass |



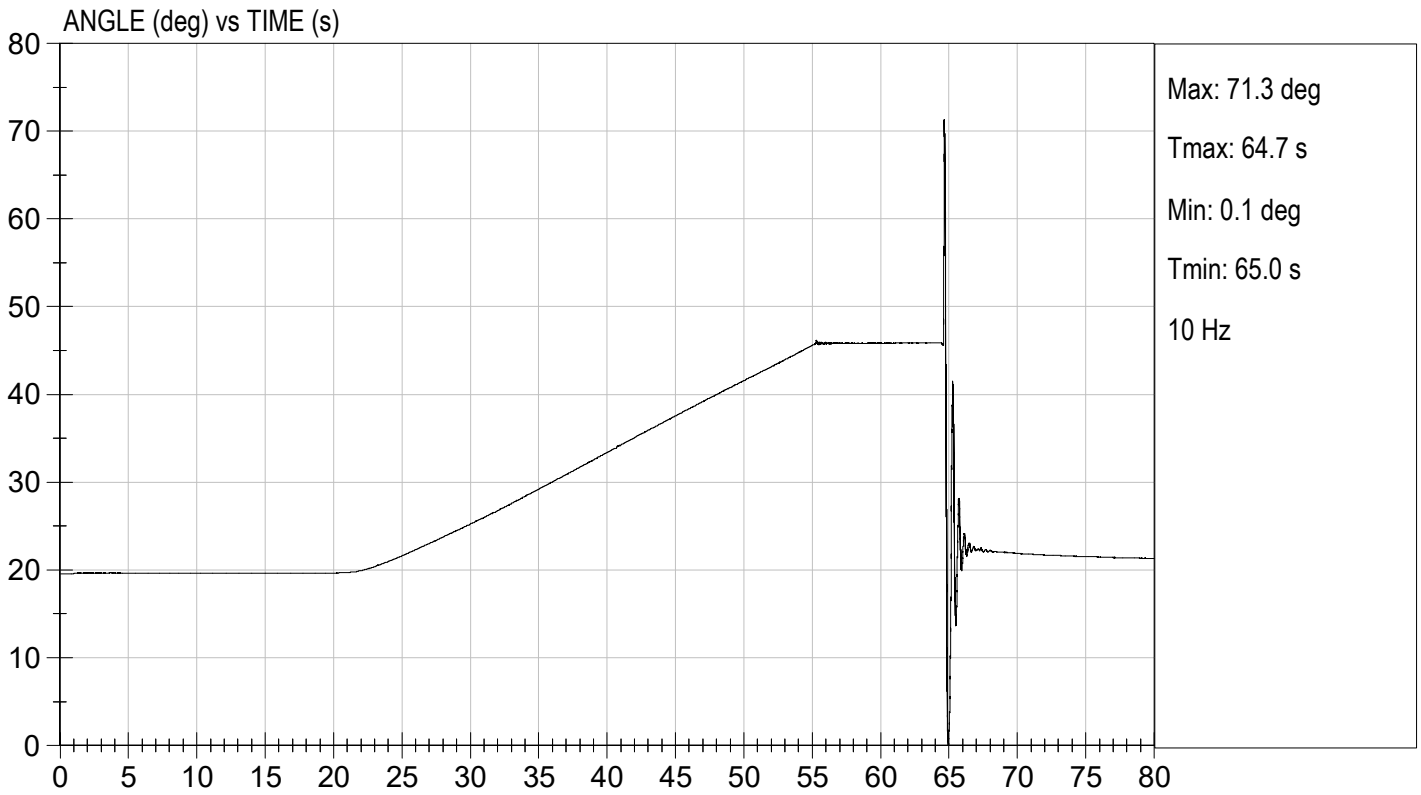
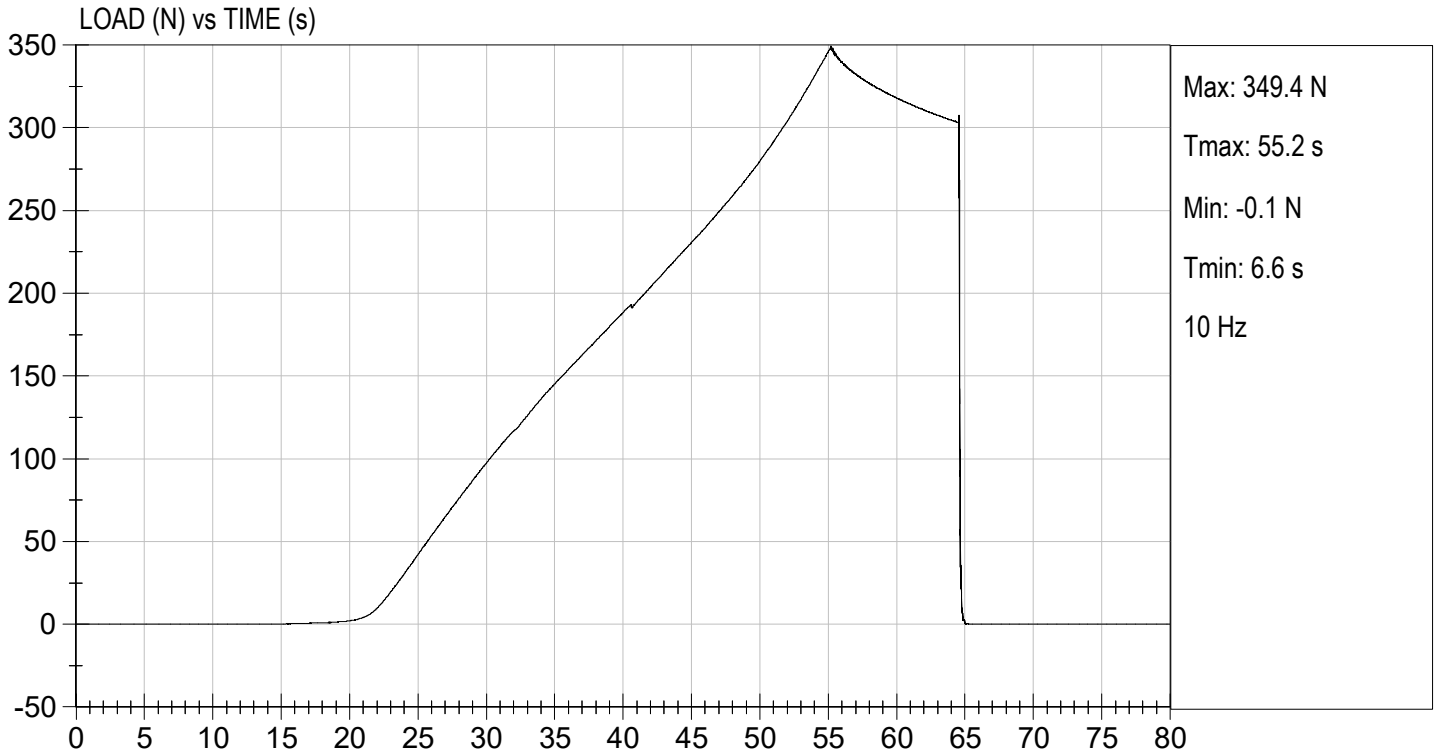
Laboratory Technician

03/30/2022

Test Date



Approved By



APPENDIX D
TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

TABLE 1 – DRIVER DUMMY INSTRUMENTATION

| Instrument Location | | | Axis | Hybrid III 50 th S/N 351 | | |
|---------------------------|-----------|-----------|--------------------------|-------------------------------------|--------------|------------------|
| | | | | Serial Number | Manufacturer | Calibration Date |
| Head Accelerometers | Primary | X | P79741 | Endevco | 01/25/2022 | |
| | | Y | P79743 | Endevco | 01/25/2022 | |
| | | Z | P79744 | Endevco | 01/25/2022 | |
| | Redundant | X | P94834 | Endevco | 01/25/2022 | |
| | | Y | P94856 | Endevco | 01/25/2022 | |
| | | Z | P97412 | Endevco | 01/25/2022 | |
| Head Angular Rate Sensors | | | X | ARS7325 | DTS | 08/09/2021 |
| | | | Y | ARS7340 | DTS | 08/09/2021 |
| | | | Z | ARS7354 | DTS | 08/09/2021 |
| Upper Neck Load Cell | | | Fx, Fy, Fz Mx, My, Mz | NG1915 | Denton | 01/18/2022 |
| Chest Accelerometers | Primary | X | P86792 | Endevco | 01/25/2022 | |
| | | Y | P86793 | Endevco | 01/25/2022 | |
| | | Z | P88348 | Endevco | 01/25/2022 | |
| | Redundant | X | P88666 | Endevco | 01/25/2022 | |
| | | Y | P88667 | Endevco | 01/25/2022 | |
| | | Z | P94109 | Endevco | 01/25/2022 | |
| Chest Potentiometer | | | X | 351 | Humanetics | 01/25/2022 |
| Pelvis Accelerometers | | | X | P95526 | Endevco | 01/25/2022 |
| | | | Y | P96038 | Endevco | 01/25/2022 |
| | | | Z | P97742 | Endevco | 01/25/2022 |
| Femur Load Cells | Right | Primary | Z | FG121P | Denton | 01/28/2022 |
| | | Redundant | Z | FG121R | Denton | 01/28/2022 |
| | Left | Primary | Z | FG122P | Denton | 01/28/2022 |
| | | Redundant | Z | FG122R | Denton | 01/28/2022 |
| Tibia Load Cells | Right | Upper | Mx, My, Fz | TG405 | Denton | 01/18/2022 |
| | | Lower | Mx, My, Fz | AG368 | Denton | 01/18/2022 |
| | Left | Upper | Mx, My, Fz | TG475 | Denton | 01/18/2022 |
| | | Lower | Mx, My, Fz | AG504 | Denton | 01/18/2022 |
| Foot Accelerometers | Right | Rear | X | T22486 | Endevco | 01/25/2022 |
| | | | Z | P97382 | Endevco | 01/25/2022 |
| | | Front | Z | P82120 | Endevco | 01/25/2022 |
| | Left | Rear | X | T16468 | Endevco | 01/25/2022 |
| | | | Z | T16496 | Endevco | 01/25/2022 |
| | | Front | Z | T16501 | Endevco | 01/25/2022 |
| Seat Belt Load Cells | | | Lap | | | |
| | | | Shoulder | | | |

TABLE 2 – FRONT PASSENGER DUMMY INSTRUMENTATION

| Instrument Location | | | Axis | Hybrid III 5 th S/N 142 | | |
|---------------------------|-----------|-----------|--------------------------|------------------------------------|--------------|------------------|
| | | | | Serial Number | Manufacturer | Calibration Date |
| Head Accelerometers | Primary | | X | P97377 | Endevco | 10/04/2021 |
| | | | Y | P94800 | Endevco | 10/04/2021 |
| | | | Z | P94802 | Endevco | 10/04/2021 |
| | Redundant | | X | P94799 | Endevco | 10/04/2021 |
| | | | Y | P94801 | Endevco | 10/04/2021 |
| | | | Z | P94803 | Endevco | 10/04/2021 |
| Head Angular Rate Sensors | | | X | ARS7516 | DTS | 08/09/2021 |
| | | | Y | ARS7357 | DTS | 08/09/2021 |
| | | | Z | ARS7391 | DTS | 08/09/2021 |
| Upper Neck Load Cell | | | Fx, Fy, Fz Mx, My, Mz | NG2256 | Denton | 04/27/2021 |
| Chest Accelerometers | Primary | | X | P94793 | Endevco | 10/04/2021 |
| | | | Y | P95322 | Endevco | 10/04/2021 |
| | | | Z | P88719 | Endevco | 10/04/2021 |
| | Redundant | | X | P94794 | Endevco | 10/04/2021 |
| | | | Y | P95370 | Endevco | 10/04/2021 |
| | | | Z | P94785 | Endevco | 10/04/2021 |
| Chest Potentiometer | | | X | 142 | Humanetics | 10/18/2021 |
| Pelvis Accelerometers | | | X | P94798 | Endevco | 10/04/2021 |
| | | | Y | P97705 | Endevco | 10/04/2021 |
| | | | Z | P82646 | Endevco | 10/04/2021 |
| Femur Load Cells | Right | Primary | Z | FG126P | Denton | 10/04/2021 |
| | | Redundant | Z | FG126R | Denton | 10/04/2021 |
| | Left | Primary | Z | FG127P | Denton | 10/04/2021 |
| | | Redundant | Z | FG127R | Denton | 10/04/2021 |
| Tibia Load Cells | Right | Upper | Mx, My, Fz | TG467 | Denton | 04/28/2021 |
| | | Lower | Mx, My, Fz | AG491 | Denton | 04/28/2021 |
| | Left | Upper | Mx, My, Fz | TG478 | Denton | 04/28/2021 |
| | | Lower | Mx, My, Fz | AG500 | Denton | 04/28/2021 |
| Foot Accelerometers | Right | Rear | X | P94795 | Endevco | 10/04/2021 |
| | | | Z | P94796 | Endevco | 10/04/2021 |
| | | Front | Z | P94797 | Endevco | 10/04/2021 |
| | Left | Rear | X | P83167 | Endevco | 10/04/2021 |
| | | | Z | P83168 | Endevco | 10/04/2021 |
| | | Front | Z | P83169 | Endevco | 10/04/2021 |
| Seat Belt Load Cells | | | Lap | | | |
| | | | Shoulder | | | |

TABLE 3 – VEHICLE INSTRUMENTATION

| Instrument Location | | | Axis | Serial Number | Manufacturer | Calibration Date |
|--|-------|-----------|------|---------------|--------------|------------------|
| Crossmember / Rear Seat Accelerometers | Left | Primary | X | A391161 | MSI | 02/23/2022 |
| | | | Z | 10839 | Endevco | 11/22/2021 |
| | | Redundant | X | A382567 | MSI | 10/22/2021 |
| | Right | Primary | X | A395066 | MSI | 02/23/2022 |
| | | | Z | A391076 | MSI | 02/22/2022 |
| | | Redundant | X | A395079 | MSI | 02/23/2022 |
| Engine Accelerometers | | Top | X | A391074 | MSI | 02/21/2022 |
| | | Bottom | X | A390900 | MSI | 02/21/2022 |