**REPORT NUMBER: NCAP-KAR-18-009**

# NEW CAR ASSESSMENT PROGRAM (NCAP)
# FRONTAL BARRIER IMPACT TEST

## DAIMLER AG STUTTGART
## 2018 MERCEDES-BENZ GLC300 4MATIC 5-DOOR MPV

**NHTSA NUMBER: M20184300**

**PREPARED BY:**
**KARCO ENGINEERING, LLC.**
**9270 HOLLY ROAD**
**ADELANTO, CA 92301**

**DECEMBER 27, 2017**

**FINAL REPORT**

**U.S. DEPARTMENT OF TRANSPORTATION**
**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION**
**OFFICE OF CRASHWORTHINESS STANDARDS**
**1200 NEW JERSEY AVE, SE**
**ROOM W43-410**
**WASHINGTON, DC 20590**

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NHTSA, Office of Crashworthiness Standards

Date: _____

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NHTSA, Office of Crashworthiness Standards

Date: _____

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| Final Report of New Car Assessment Program Testing of a<br>2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV<br>NHTSA No. M20184300 | December 27, 2017 |
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**15. Supplementary Notes**

**16. Abstract**

A 56.3 km/h NCAP Frontal Impact Test was conducted on a 2018 Mercedes-Benz GLC300 4MATIC 5-door MPV in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and footwell intrusion performance. The test was conducted at the KARCO Engineering, LLC. facility in Adelanto, California on December 12, 2017.

The impact velocity of the vehicle was 55.78 km/h and the ambient temperature at the barrier face at the time of impact was 18.9°C. The target vehicle's post-test maximum crush was 409 mm at DPD4 to the right of the vehicle's centerline. The test vehicle's performance is as follows:

| Measurement Description | Units | Driver ATD | | Passenger ATD | |
|---|---|---|---|---|---|
| | | Threshold | Result | Threshold | Result |
| Head Injury Criteria ($HIC_{15}$) | N/A | 700 | 119.6 | 700 | 113.4 |
| Maximum Chest Compression | mm | 63 | -19 | 52 | -18 |
| Nij | N/A | 1 | 0.23 | 1 | 0.24 |
| Neck Tension | N | 4170 | 788.1 | 2620 | 514.4 |
| Neck Compression | N | 4000 | -385.2 | 2520 | -512.5 |
| Left Femur Force | N | 10000 | -1680.5 | 6800 | -127.7 |
| Right Femur Force | N | 10000 | -1978.6 | 6800 | -303.9 |

| 17. Key Words | 18. Distribution Statement |
|---|---|
| 35 mph Frontal Barrier Impact Test<br>New Car Assessment Program (NCAP) | Copies of this report are available from:<br>National Highway Traffic Safety Administration<br>Technical Information Services Division, NPO-411<br>1200 New Jersey Ave., SE<br>Washington, DC 20590<br>e-mail: tis@nhtsa.dot.gov<br>FAX: 202-493-2833 |

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## 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 DTNH22-12-D-00259. 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 test was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure, dated October 2015.

### SUMMARY

A load cell barrier consisting of 176 load cells was impacted by a 2018 Mercedes-Benz GLC300 4MATIC 5-door MPV at a velocity of 55.78 km/h. The test was performed at KARCO Engineering, LLC. on December 12, 2017. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A of this report.

Three (3) real-time cameras and two (2) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in Data Sheet 6 of this report.

One Part 572E 50$^{th}$ percentile male anthropomorphic test device (ATD) was placed in the driver seating position and one Part 572O 5$^{th}$ percentile female ATD was placed in the right-front passenger seating position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck force transducers, right / left femur load cells, and lower leg instrumentation. The driver (position 1) ATD (Serial No. 360) and the right-front passenger (position 2) ATD (Serial No. 630) were calibrated prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 106 channels of dummy and vehicle response data were recorded on an on-board data acquisition system. Appendix B contains the dummy response data traces.

There was 100% windshield retention and no intrusion into the protected zone of the windshield during the event.

After impact, fluid spillage from the vehicle's underbody was observed. The fluid was found to be windshield washer fluid and gear oil. There was no Stoddard solvent spillage as a result of the impact.

The maximum static crush was 409 mm at DPD4 to the right of the vehicle's centerline. 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 ATD's head contacted the frontal airbag and headrest. The upper torso contacted the frontal airbag. Both the left and right knees contacted the knee airbag.

The passenger's visible contact points were as follows: The passenger ATD's head contacted the frontal airbag and headrest. The upper torso contacted the frontal airbag. The right knee contacted the knee bolster.

The occupant data is summarized below:

| ATD Position | $HIC_{15}$ | $T^1$ (ms) | $T^2$ (ms) | Chest Disp. (mm) | Nij | Neck Tension (N) | Neck Comp. (N) | Left Femur (N) | Right Femur (N) |
|---|---|---|---|---|---|---|---|---|---|
| Driver (50th) | 119.6 | 78.4 | 93.4 | -19 | 0.23 | 788.1 | -385.2 | -1680.5 | -1978.6 |
| Passenger (5th) | 113.4 | 65.5 | 80.5 | -18 | 0.24 | 514.4 | -512.5 | -127.7 | -303.9 |

## SECTION 2

## OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### CONVERSION FACTORS

| Quantity | Typical Application | Std Units | Metric Unit | Multiply By |
|---|---|---|---|---|
| Mass | Vehicle Weight | lb | kg | 0.4536 |
| Linear Velocity | Impact Velocity | miles/hr | km/hr | 1.609344 |
| Length or Distance | Measurements | in | mm | 25.4 |
| Volume | Fuel Systems | gal | liter | 3.785 |
| Volume | Small Fluids | oz | mL | 29.574 |
| Pressure | Tire Pressures | $lbf/in^2$ | kPa | 6.895 |
| Temperature | General Use | $^oF$ | $^oC$ | =(Tf -32)/1.8 |
| Force | Dynamic Forces | lbf | N | 4.448 |
| Moment | Torque | lbf-ft | N•m | 1.355 |

## DATA SHEET NO. 1

## GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### TEST VEHICLE INFORMATION AND OPTIONS

| | |
|---|---|
| NHTSA Number | M20184300 |
| Model Year | 2018 |
| Make | Mercedes-Benz |
| Model | GLC300 4MATIC |
| Body Style | 5-Door MPV |
| VIN | WDC0G4KB0JV020264 |
| Body Color | Brilliant Blue Metallic |
| Odometer Reading (km / mi) | 230 / 143 |
| Engine Displacement (L) | 2.0 |
| Type / No. of Cylinders | Inline 4 |
| Engine Placement | Longitudinal |
| Transmission Type | Automatic |
| Transmission Speeds | 9 |
| Overdrive | Yes |
| Final Drive | AWD |
| Roof Rack | Yes |
| Sunroof / T-Top | No |
| Running Boards | No |
| Tilt Steering Wheel | Yes |
| Power Seats | Yes |
| Anti-Lock Brakes (ABS) | Yes |
| Automatic Door Locks (ADLs) | Yes |

| | |
|---|---|
| Traction Control System | Yes |
| Power Steering | Yes |
| Power Window Auto-Reverse | Yes |
| Driver Frontal Airbag | Yes |
| Driver Curtain Airbag | Yes |
| Driver Head/Torso Airbag | No |
| Driver Torso Airbag | No |
| Driver Torso/Pelvis Airbag | Yes |
| Driver Pelvis Airbag | No |
| Driver Knee Airbag | Yes |
| Front Pass. Frontal Airbag | Yes |
| Front Pass. Curtain Airbag | Yes |
| Front Pass. Head/Torso Airbag | No |
| Front Pass. Torso Airbag | No |
| Front Pass. Torso/Pelvis Airbag | Yes |
| Front Pass. Pelvis Airbag | No |
| Front Pass. Knee Airbag | No |
| Driver Seat Belt Pretensioner | Yes |
| Driver Load Limiter | Yes |
| Front Pass. Seat Belt Pretensioner | Yes |
| Front Pass. Load Limiter | Yes |
| Other Safety Restraint | No |

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

### DATA FROM CERTIFICATION LABEL

| | |
|---|---|
| Manufactured By | DAIMLER AG STUTTGART |
| Date of Manufacture | Jul-17 |

| | |
|---|---|
| GVWR (kg) | 2365 |
| GAWR Front (kg) | 1110 |
| GAWR Rear (kg) | 1255 |

### VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

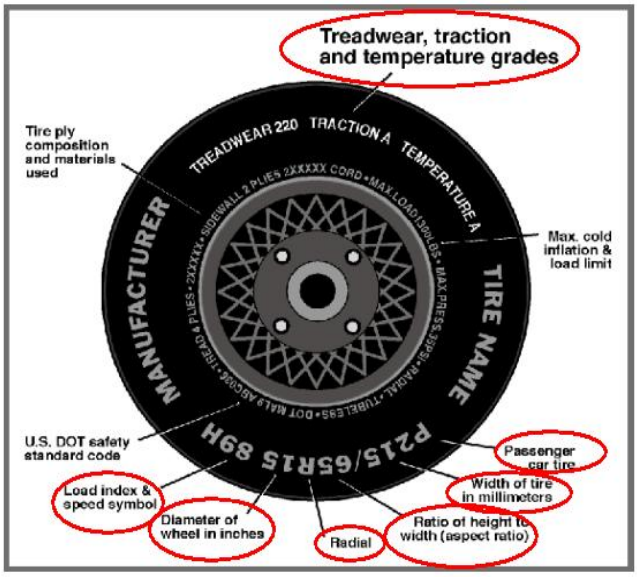
| Measured Parameter | Front | Rear | Third | Total |
|---|---|---|---|---|
| Type of Seats | Bucket | Bench | | |
| Designated Seating Capacity | 2 | 3 | | 5 |
| Capacity Weight (VCW) (kg) | | | | 432.0 |
| DSC x 68.04 (kg) | | | | 340.2 |
| Cargo Weight (RCLW) (kg) | | | | 91.8 |

**DATA SHEET NO. 1 … (CONTINUED)**

**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17




**VEHICLE TIRE INFORMATION**

| Measured Parameter | Front | Rear |
|---|---|---|
| Max. Tire Pressure (kPa) | 350 | 350 |
| Cold Pressure (kPa) | 240 | 240 |
| Recommended Tire Size | P235/60/R18 | P235/60/R18 |
| Tire Size on Vehicle | P235/60/R18 | P235/60/R18 |
| Tire Manufacturer | Pirelli | Pirelli |
| Tire Model | Scorpion Verde Run Flat | Scorpion Verde Run Flat |
| Treadwear | 600 | 600 |
| Traction | A | A |
| Temperature Grades | A | A |
| Tire Plies Sidewall | 1 Rayon | 1 Rayon |
| Tire Plies Body | 1 Rayon, 2 Steel, 1 Polyamide | 1 Rayon, 2 Steel, 1 Polyamide |
| Load Index / Speed Symbol | 103H | 103H |
| Tire Material | Rayon, Steel, Polyamide | Rayon, Steel, Polyamide |
| DOT Safety Code Left | 93K3 T899 2217 | 93K3 T899 2317 |
| DOT Safety Code Right | 93K3 T899 2217 | 93K3 T899 2317 |

## DATA SHEET NO. 1 … (CONTINUED)

## GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### TEST VEHICLE WEIGHTS

| | Units | As Delivered Weights (UVW) | | | As Tested Weights (ATW) | | |
|---|---|---|---|---|---|---|---|
| | | Front Axle | Rear Axle | Total | Front Axle | Rear Axle | Total |
| Left | kg | 471.0 | 418.0 | | 518.5 | 499.5 | |
| Right | kg | 481.5 | 416.5 | | 493.0 | 503.0 | |
| Ratio | % | 53.3% | 46.7% | 100.0% | 50.2% | 49.8% | 100.0% |
| Total | kg | 952.5 | 834.5 | 1787.0 | 1011.5 | 1002.5 | 2014.0 |

### TARGET TEST WEIGHT CALCULATION

| Measured Parameter | Units | Value | |
|---|---|---|---|
| Total Delivered Weight (UVW) | kg | 1787.0 | A |
| Weight of 1 P572E ATD & 1 P572O ATD | kg | 141.0 | B |
| Rated Cargo/Luggage Weight (RCLW) | kg | 91.8 | C |
| Calculated Vehicle Target Weight (TVTW) | kg | 2019.8 | A+B+C |

### TEST VEHICLE ATTITUDES

| Condition | Units | LF | RF | LR | RR | CG Aft of Front Axle |
|---|---|---|---|---|---|---|
| As Delivered | mm | 881 | 882 | 925 | 934 | 1343 |
| As Tested | mm | 858 | 860 | 880 | 890 | 1431 |
| Post-Test | mm | 907 | 917 | 885 | 886 | |

### GENERAL TEST VEHICLE DATA

| Measurement Description | Units | Value |
|---|---|---|
| Total Vehicle Wheelbase | mm | 2875 |
| Total Vehicle Length at Left Side | mm | 4055 |
| Total Vehicle Length at Centerline | mm | 4655 |
| Total Vehicle Length at Right Side | mm | 4047 |
| Weight of Ballast in Cargo Area | kg | 89.0 |
| Weight of Vehicle Components Removed | kg | 7.0 |
| Amount of Stoddard Solvent in Fuel Tank | L | 61.24 |

### VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

Rear Carpeting (7.0 kg)

## DATA SHEET NO. 1 … (CONTINUED)

## GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### TARGET VEHICLE STRUCTURAL MEASUREMENTS

| No. | Description | Pre-Test |
|---|---|---|
| 1 | Total Length | 4655 |
| 2 | Total Width | 1890 |
| 3 | Bumper Top Height | 703 |
| 4 | Bumper Bottom Height | 390 |
| 5 | Longitudinal Member Top Height | 643 |
| 6 | Distance Between Longitudinal Members | 790 |
| 7 | Longitudinal Member Width | 65 |
| 8 | Engine Top Height | 950 |
| 9 | Engine Bottom Height | 246 |
| 10 | Engine and Gearbox Width | 670 |
| 11 | Front Bumper to Engine Distance | 540 |
| 12 | Front Shock Absorber Fixing Height | 940 |
| 13 | Bonnet Leading Edge Height | 890 |
| 14 | Front Shock Absorber Fixing Width | 1030 |
| 15 | Front Bumper to Front Axle Distance | 825 |
| 16 | Front Axle to A-Pillar Distance | 690 |
| 17 | A-Pillar to B-Pillar Distance | 899 |
| 18 | B-Pillar to Rear Axle Distance | 1145 |
| 19 | B-Pillar to C-Pillar Distance | 895 |
| 20 | Roof Sill Bottom Height | 1490 |
| 21 | Roof Sill Top Height | 1620 |
| 22 | Floor Sill Bottom Height | 303 |
| 23 | Floor Sill Top Height | 445 |

All measurements in millimeters.

**DATA SHEET NO. 2**

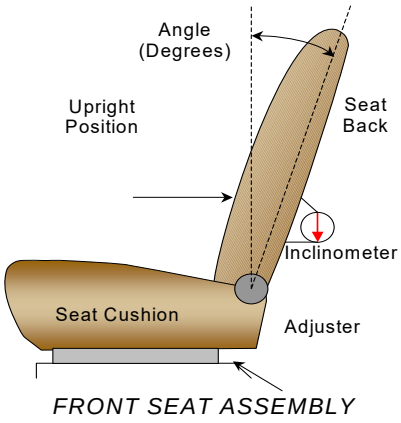
**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

## NOMINAL DESIGN RIDING POSITION

The procedure for the driver is as follows: the seat back is set to the manufacturer's designated angle. The procedure for the passenger is as follows: the seat back is set to position the transverse instrumentation platform of the dummy's head at 0° ± 0.5°. Seat back angle is measured along the seatback.



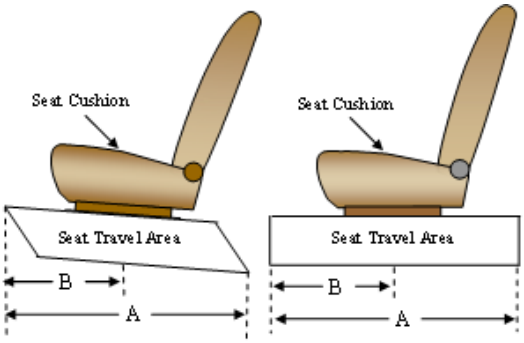
FRONT SEAT ASSEMBLY

**SEAT BACK ANGLE**

| Seating Position | Degrees |
|---|---|
| Driver Seat Back Angle | 21.0 |
| Passenger Seat Back Angle | 16.7 |

## SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rear most possible position. The driver's seat is set to the middle of the fore-aft travel. The passenger's seat is set to the forward most position where the ATD will not contact any interior panels.




**SEAT FORE/AFT POSITIONS**

| Seating Position | Total Fore-Aft Travel | Placed in Position |
|---|---|---|
| Driver Seat | 325 mm | 162.5 mm |
| Passenger Seat | 235 mm | 0 mm |

## SEAT BELT UPPER ANCHORAGE

The seat belt upper anchorage is positioned to the manufacturer's design position for a 50$^{th}$ percentile adult male ATD for the driver, and a 5$^{th}$ percentile adult female ATD for the passenger. Position "H" is the uppermost position, followed by position "M2," and position M1. Position "L" is the lowermost position.

**SEAT BELT UPPER ANCHORAGES**

| Seating Position | Total No. of Positions | Placed in Position |
|---|---|---|
| Driver Seat | 4 | H |
| Passenger Seat | 4 | H |

## DATA SHEET NO. 2 … (CONTINUED)

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

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

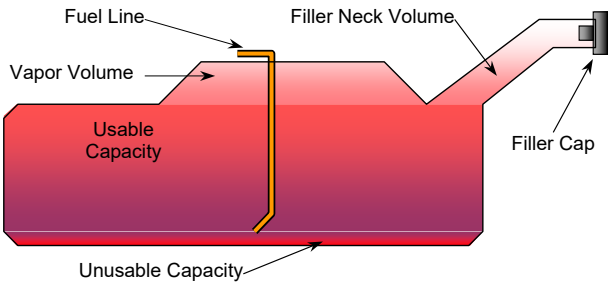
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### FUEL TANK CAPACITY

| Description | Liters |
|---|---|
| Usable Capacity of "Standard Tank" | 65.86 |
| Usable Capacity of "Optional Tank" | N/A |
| 92 - 94% of Usable Capacity | 60.59 to 61.91 |
| Actual Amount of Stoddard Solvent Used | 65.24 |
| 1/3 of Usable Capacity | 21.95 |

### FUEL PUMP

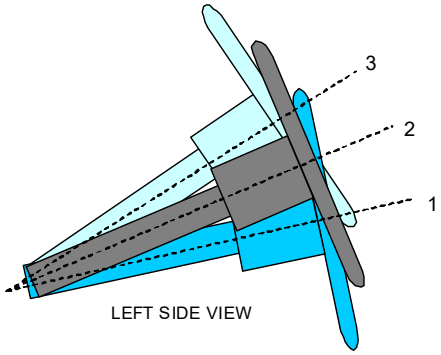
The vehicle is equipped with an electric fuel pump. The fuel pump operates when the starter or engine is activated. The fuel pump operates after ignition switch is turned "ON". If the engine is not started the switches back to standby mode after approximately 15 seconds.




*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. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements.




*STEERING COLUMN ASSEMBLY*

### STEERING COLUMN POSITIONING

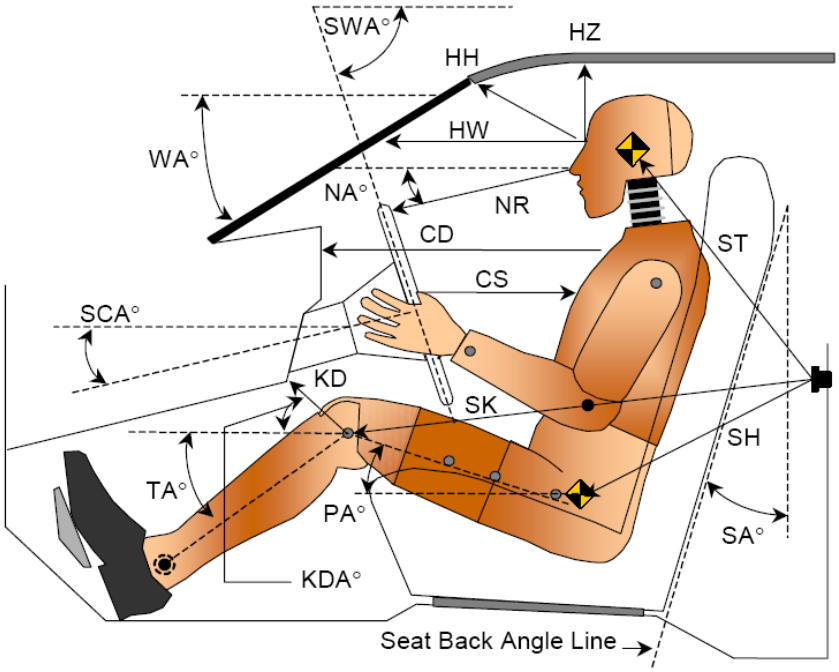
| | Degrees | Fore-Aft Position (mm) |
|---|---|---|
| Lowermost Position, No. 1 | 20.8 | 78 |
| Geometric Center Position, No. 2 | 22.9 | 105 |
| Uppermost Position, No. 3 | 24.9 | 131 |
| Telescoping Steering Wheel Travel | | 53 |
| Test Position | 22.9 | 105 |

**DATA SHEET NO. 3**

**DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17




**LEFT SIDE VIEW**

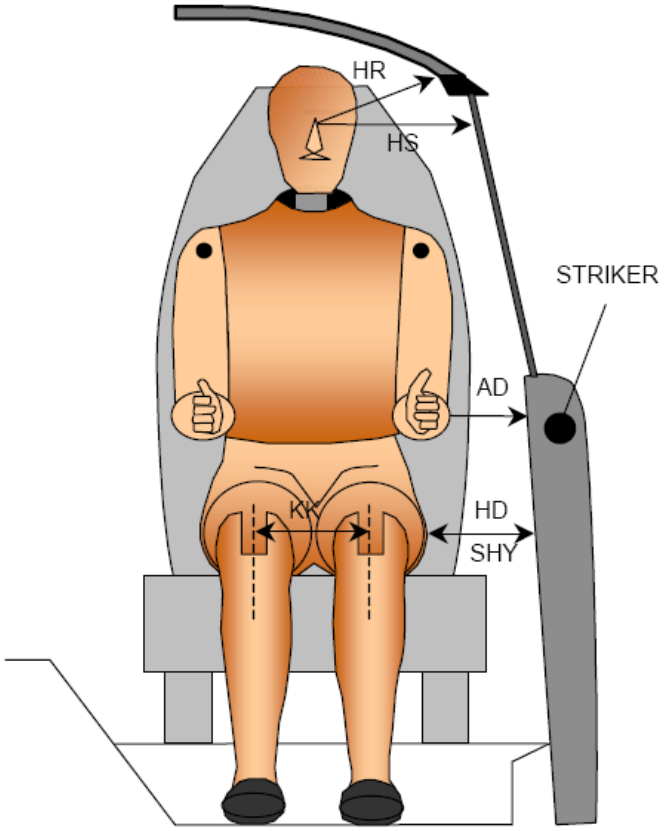
| Code | Measurement Description | Driver | | Passenger | |
|---|---|---|---|---|---|
| | | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| WA° | Windshield Angle | | 22.9 | | |
| SWA° | Steering Wheel Angle | | 67.1 | | |
| SCA° | Steering Column Angle | | 22.5 | | |
| SA° | Seat Back Angle (On Headrest Post) | | 21.0 | | 16.7 |
| HZ | Head to Roof | 262 | 90.0 | 268 | 90.0 |
| HH | Head to Header | 463 | 22.1 | 380 | 33.4 |
| HW | Head to Windshield | 675 | 0.0 | 638 | 0.0 |
| NR | Nose to Rim | 417 | 9.9 | 494 | 15.0 |
| CD | Chest to Dash | 530 | 12.9 | 434 | |
| CS | Chest to Steering Hub | 321 | 0.0 | | |
| RA | Rim to Abdomen | 219 | 0.0 | | |
| KDL | Left Knee to Dash | 194 | 21.5 | 105 | 29.5 |
| KDR | Right Knee to Dash | 154 | 25.8 | 112 | 33.7 |
| PA° | Pelvic Angle | | 22.7 | | 20.2 |
| TA° | Tibia Angle | | 39.6 | | 55.3 |
| SK | Striker to Knee | 515 | 10.5 | 600 | 7.1 |
| ST | Striker to Head | 443 | 89.3 | 417 | 74.5 |
| SH | Striker to H-Point | 249 | 58.1 | 311 | 30.7 |

**DATA SHEET NO. 4**

**DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17



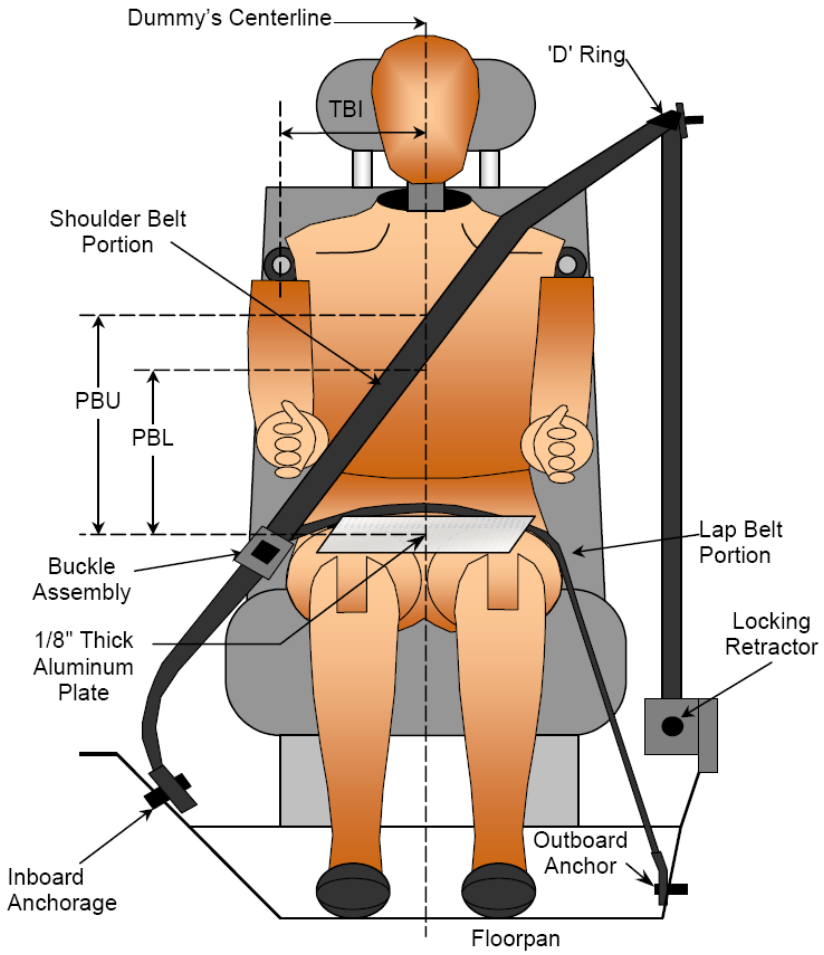

| Code | Description | Driver (mm) | Passenger (mm) |
|---|---|---|---|
| AD | Arm to Door | 101 | 99 |
| HD | H-Point to Door | 163 | 179 |
| HR | Head to Side Header | 233 | 238 |
| HS | Head to Side Window | 333 | 366 |
| KK | Knee to Knee | 338 | 220 |
| SHY | Striker to H-Point (Y-Direction) | 236 | 276 |
| AA | Ankle to Ankle | 330 | 160 |

## DATA SHEET NO. 5

## SEAT BELT POSITIONING DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17




**FRONT VIEW OF DUMMY**

### SEAT BELT POSITIONING MEASUREMENTS

| Code | Measurement Description | Units | Driver | Passenger |
|---|---|---|---|---|
| PBU | Top Surface of Aluminum Plate to Belt Upper Edge | mm | 350 | 280 |
| PBL | Top Surface of Aluminum Plate to Belt Lower Edge | mm | 265 | 180 |

### BELT LENGTH DATA

| Measurement Description | Units | Driver | Passenger |
|---|---|---|---|
| Shoulder Belt Length as Measured on ATD | mm | 878 | 877 |
| Lap Belt Length as Measured on ATD | mm | 590 | 530 |
| Remainder of Belt on Reel | mm | 1272 | 870 |
| Total Belt Length for Continuous Webbing Systems | mm | 2740 | 2277 |

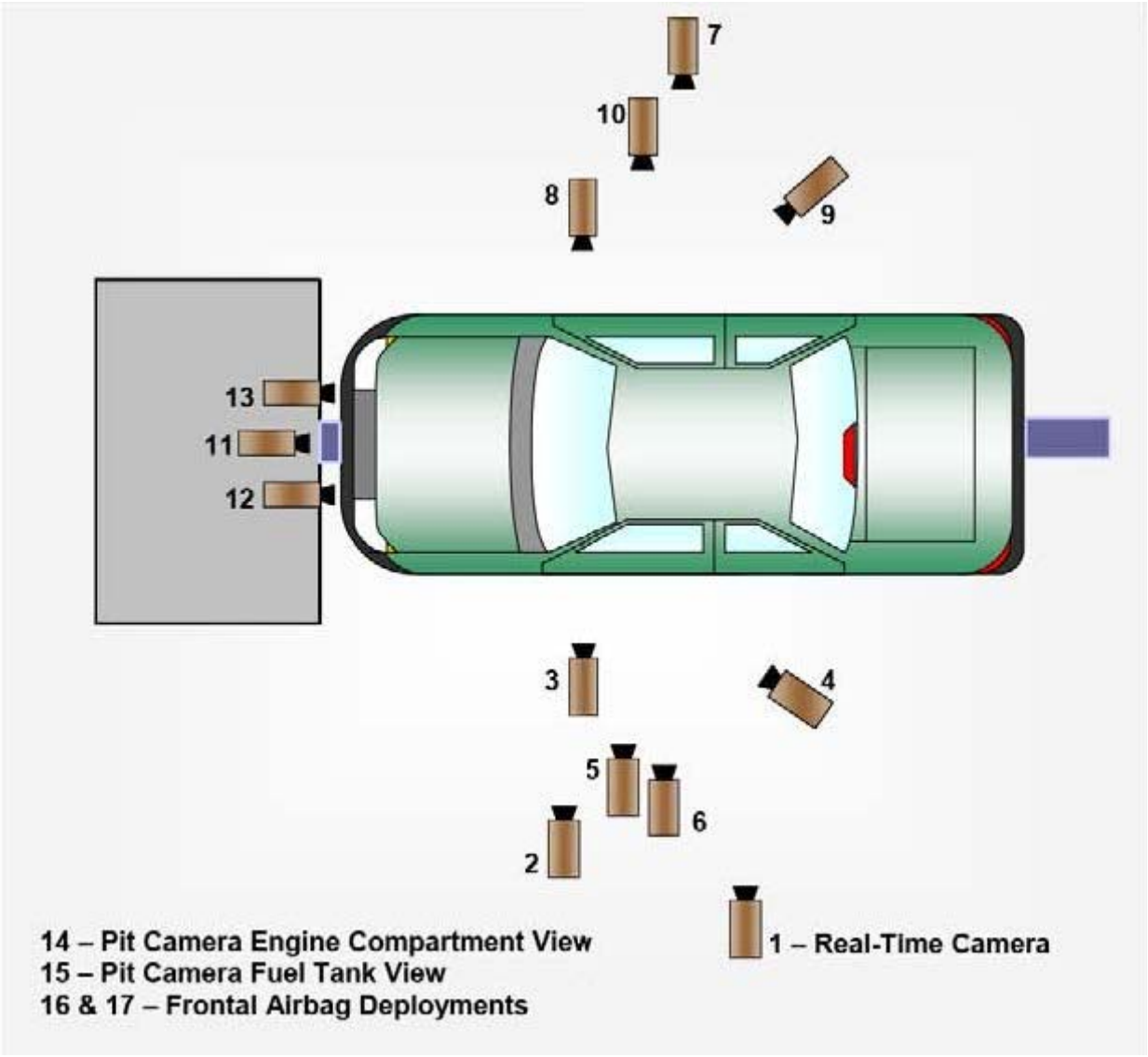
**DATA SHEET NO. 6**

**HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

**CAMERA POSITIONS FOR FRONTAL IMPACTS**



**DATA SHEET NO. 6 … (CONTINUED)**

**HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

**CAMERA LOCATIONS**

| No. | Description | Location (mm) | | | Lens (mm) | Speed (fps) |
|---|---|---|---|---|---|---|
| | | X | Y | Z | | |
| 1 | Real-Time Left Overall | | | | | |
| 2 | Driver Close-Up | | | | | |
| 3 | Left Front Half | | | | | |
| 4 | Left Angle | | | | | |
| 5 | Steering Column - Top | | | | | |
| 6 | Steering Column - Bottom | | | | | |
| 7 | Right Overall | | | | | |
| 8 | Passenger Close-Up | | | | | |
| 9 | Right Front Half | | | | | |
| 10 | Right Angle | | | | | |
| 11 | Windshield | | | | | |
| 12 | Driver Windshield | | | | | |
| 13 | Passenger Windshield | | | | | |
| 14 | Pit Front | | | | | |
| 15 | Pit Rear | | | | | |
| 16 | Onboard Driver Airbag (Optional) | -1440 | 280 | -1300 | 8 | 1000 |
| 17 | Onboard Passenger Airbag (Optional) | -1440 | -280 | -1300 | 8 | 1000 |
| 18 | Real-Time Left View of Impact | | | | | |
| 19 | Real-Time Right View of Impact | | | | | |

Coordinates: +X = forward impact plane

+Y = right of monorail center

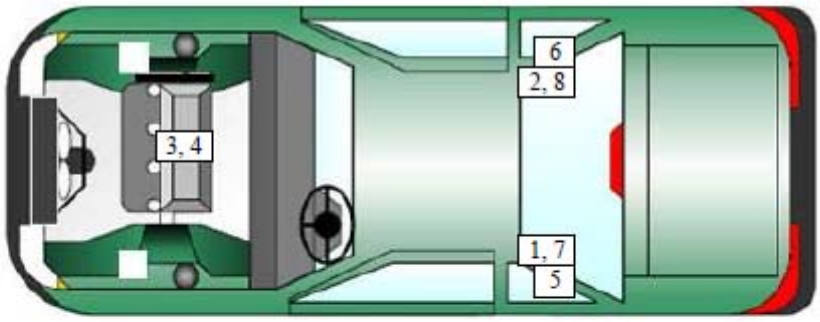
+Z = into ground

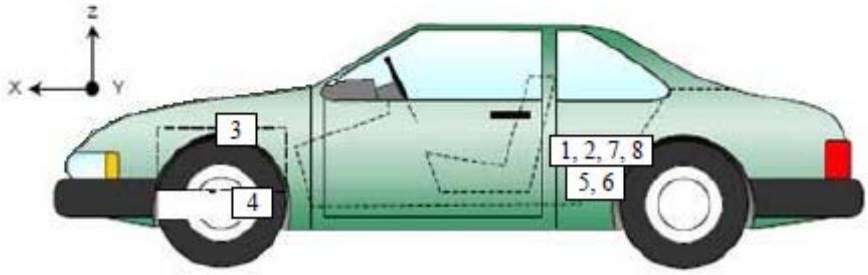
**DATA SHEET NO. 7**

**VEHICLE ACCELEROMETER LOCATIONS**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17




**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

| No. | Description | Location | | |
|---|---|---|---|---|
| | | X | Y | Z |
| 1 | Left Rear Accelerometer X-Direction | 1883 | -724 | -452 |
| 2 | Right Rear Accelerometer X-Direction | 1884 | 724 | -452 |
| 3 | Engine Top X | 4036 | 0 | -951 |
| 4 | Engine Bottom X | 3933 | 15 | -295 |
| 5 | Left Rear Accelerometer Z-Direction | N/A | N/A | N/A |
| 6 | Right Rear Accelerometer Z-Direction | N/A | N/A | N/A |
| 7 | Left Rear Accelerometer X-Direction Redundant | 1883 | -724 | -452 |
| 8 | Right Rear Accelerometer X-Direction Redundant | 1884 | 724 | -452 |

Reference Points: X – Rear Surface of Vehicle (+ forward)

Y – Vehicle Centerline (+ to right)

Z – Ground Plane (+ down)

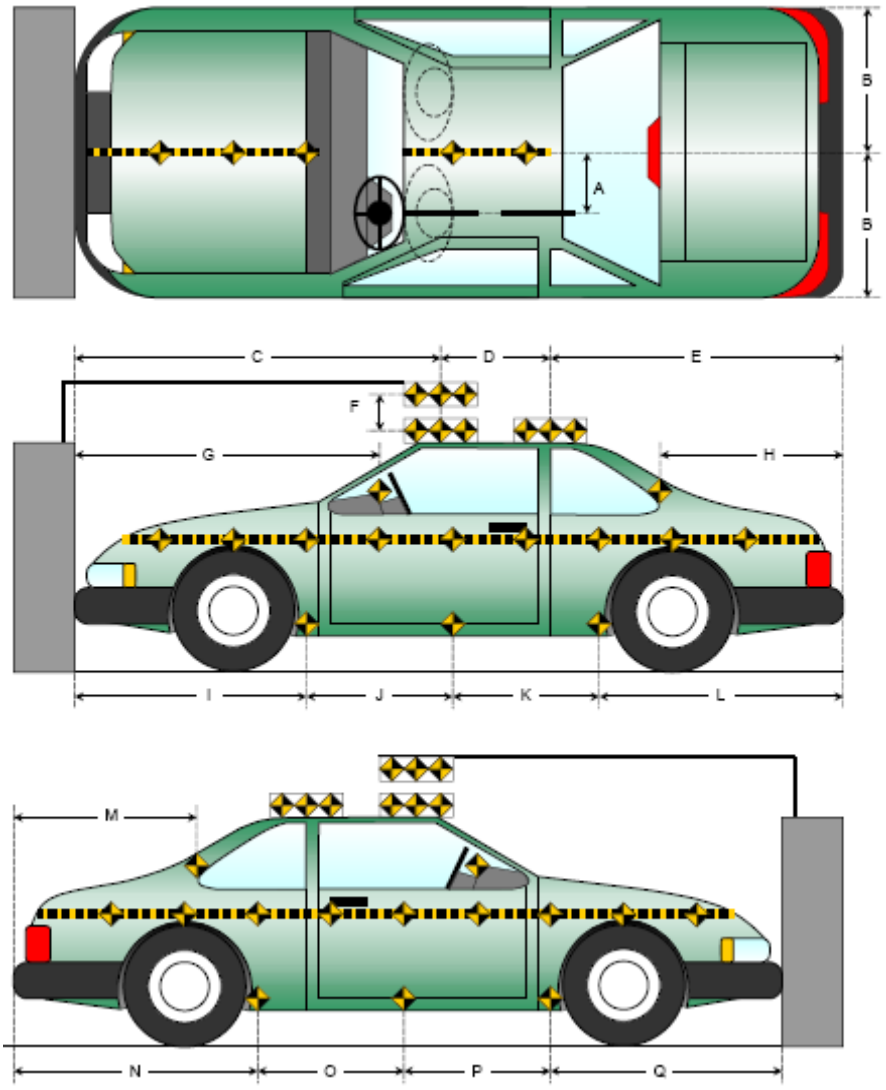
**DATA SHEET NO. 8**

**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

| Item | Value |
|---|---|
| A | 410 |
| B | 945 |
| C | 2315 |
| D | 610 |
| E | 1730 |
| F | 305 |
| G | 1875 |
| H | 540 |
| I | 1320 |
| J | 941 |
| K | 941 |
| L | 1450 |
| M | 542 |
| N | 1451 |
| O | 941 |
| P | 941 |
| Q | 1321 |



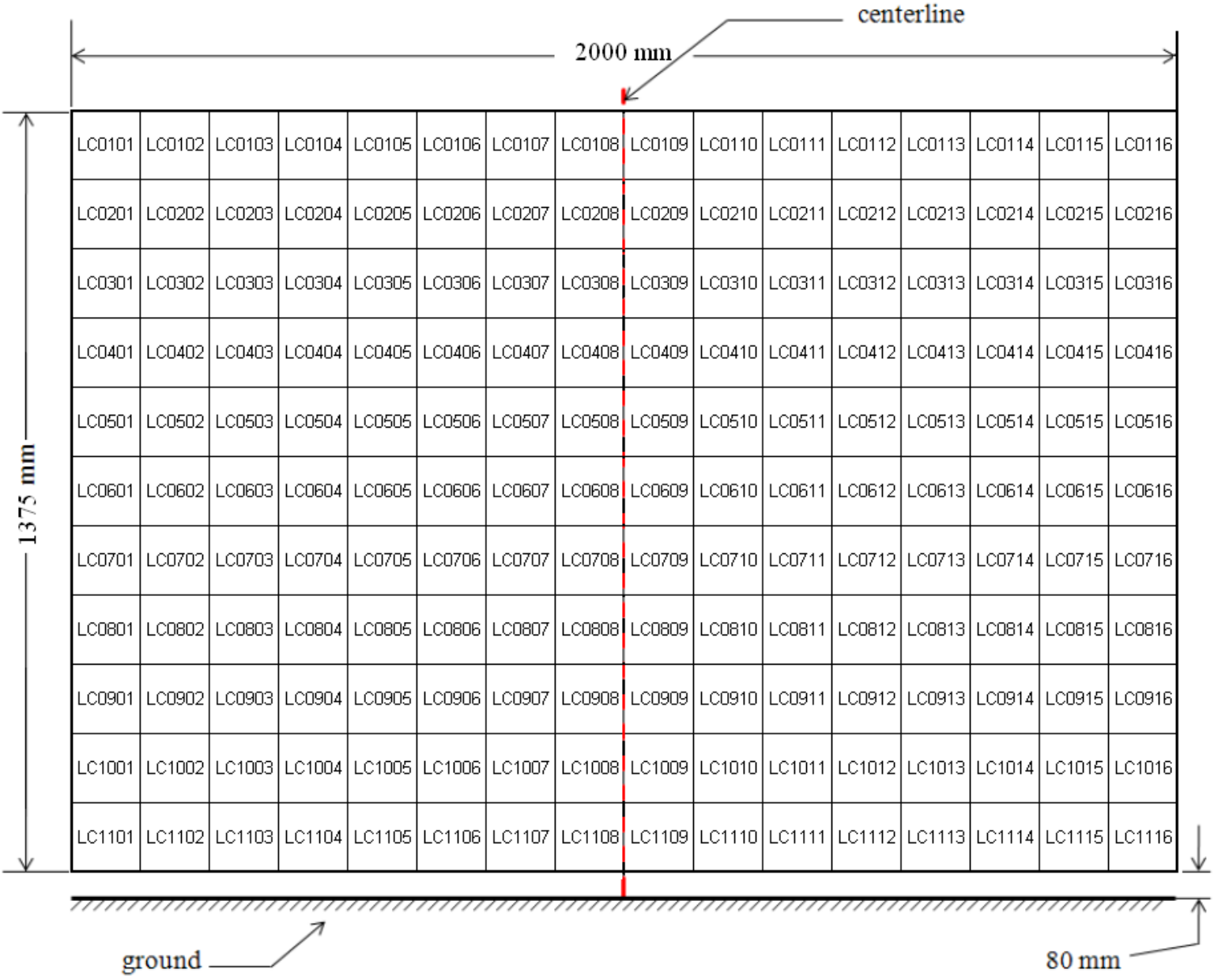

All measurements in millimeters.

**DATA SHEET NO. 9**

**LOAD CELL LOCATIONS ON FIXED BARRIER**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17



## DATA SHEET NO. 10

## TEST VEHICLE CAMERA AND INSTRUMENTATION SUMMARY

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### INSTRUMENTATION

| | |
|---|---|
| Driver Dummy Accelerometers | 47 |
| Passenger Dummy Accelerometers | 47 |
| Vehicle Structure Accelerometers | 8 |
| Seat Belt Load Cells | 4 |
| Load Cell Barrier | 528 |
| Total | 634 |

### CAMERA COVERAGE

| | |
|---|---|
| High-Speed Vehicle On Board | 2 |
| High-Speed Off Board | 0 |
| Real Time | 3 |
| Total | 5 |

## DATA SHEET NO. 11

## POST-TEST OBSERVATIONS

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### TEST DUMMY INFORMATION AND CONTACT

| Description | Driver | Passenger |
|---|---|---|
| Dummy Type/Serial No. | P572E 50th Percentile Male ATD / 360 | P572O 5th Percentile Female ATD / 630 |
| 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 | None |
| Right Knee Contact | Knee Airbag | Knee Bolster |

### DOOR OPENING AND SEAT TRACK INFORMATION

| Description | Driver | Passenger |
|---|---|---|
| Locked / Unlocked Doors | Unlocked | Unlocked |
| Front Door Opening | Remained closed and latched, operational | Remained closed and latched, operational |
| Rear Door Opening | Remained closed and latched, operational | Remained closed and latched, operational |
| Seat Track Shift (mm) | 0 | 11 |
| Seat Back Failure | None | None |
| Glazing Damage | Yes | Yes |

### POST-TEST STRUCTURAL OBSERVATIONS

| Critical Areas of Performance | Observations and Conclusions |
|---|---|
| Windshield Damage | Yes |
| Window Damage | None |
| Other Notable Effects | Spillage of windshield washer fluid and gear oil |

### VEHICLE REBOUND FROM BARRIER

| Measured Parameter | Units | Value |
|---|---|---|
| Left Side | mm | 907 |
| Center | mm | 917 |
| Right Side | mm | 885 |
| Average | mm | 886 |

### SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

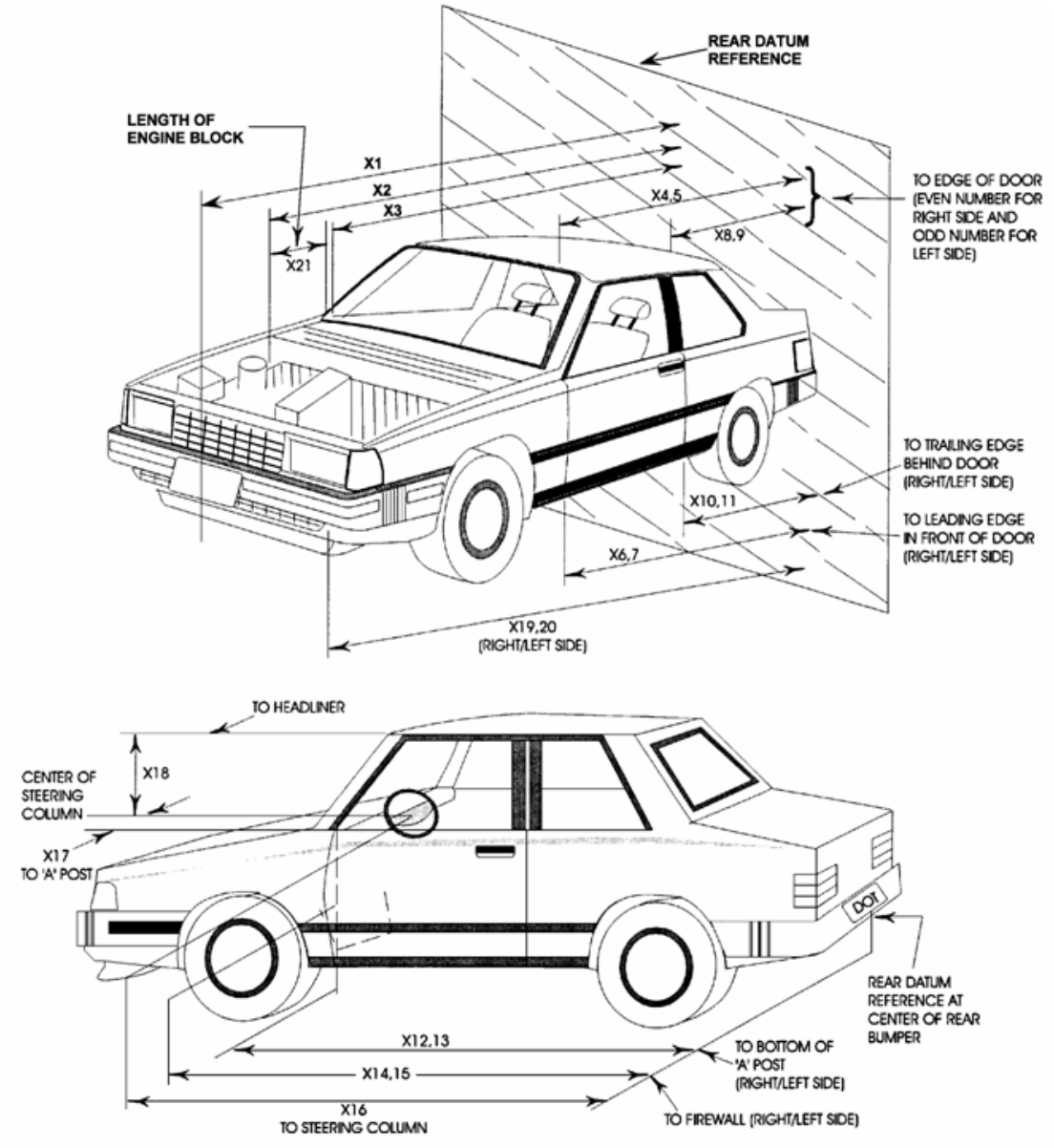
| Restraint Type | Driver | | Passenger | |
|---|---|---|---|---|
| | Installed | Operated | Installed | Operated |
| Front Airbag | Yes | Yes | Yes | Yes |
| Side Airbag 1 (Curtain) | Yes | No | Yes | No |
| Side Airbag 2 (Torso/Pelvis) | Yes | No | Yes | No |
| Knee Airbag | Yes | Yes | No | |
| Seat Belt Pretensioner | Yes | Yes | Yes | Yes |
| Seat Belt Load Limiter | Yes | Yes | Yes | Yes |

**DATA SHEET NO. 12**

**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17




the vehicle appeared to have a spillage of windshield washer fluid and gear oil.

**DATA SHEET NO. 12 … (CONTINUED)**

**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

| | | | | |
|---|---|---|---|---|
| 1 | Total Length of Vehicle at Centerline | 4655 | 4284 | -371 |
| 2 | Rear Surface of Vehicle to Front of Engine | 4115 | 3951 | -164 |
| 3 | RSOV to Firewall | 3475 | 3459 | -16 |
| 4 | RSOV to Upper Leading Edge of Right Door | 3150 | 3150 | 0 |
| 5 | RSOV to Upper Leading Edge of Left Door | 3145 | 3154 | 9 |
| 6 | RSOV to Lower Leading Edge of Right Door | 3142 | 3138 | -4 |
| 7 | RSOV to Lower Leading Edge of Left Door | 3144 | 3140 | -4 |
| 8 | RSOV to Upper Trailing Edge of Right Door | 2027 | 2025 | -2 |
| 9 | RSOV to Upper Trailing Edge of Left Door | 2023 | 2032 | 9 |
| 10 | RSOV to Lower Trailing Edge of Right Door | 2097 | 2185 | 88 |
| 11 | RSOV to Lower Trailing Edge of Left Door | 2091 | 2085 | -6 |
| 12 | RSOV to Bottom of A-Pillar, Right Side | 2986 | 2986 | 0 |
| 13 | RSOV to Bottom of A-Pillar, Left Side | 2991 | 2977 | -14 |
| 14 | RSOV to Firewall, Right Side | 3250 | 3215 | -35 |
| 15 | RSOV to Firewall, Left Side | 3250 | 3279 | 29 |
| 16 | RSOV to Steering Column | 2575 | 2665 | 90 |
| 17 | Center of Steering Column to A-Pillar | 445 | 455 | 10 |
| 18 | Center of Steering Column to Headliner | 460 | 455 | -5 |
| 19 | RSOV to Right Side of Front Bumper | 4047 | 3960 | -87 |
| 20 | RSOV to Left Side of Front Bumper | 4055 | 4010 | -45 |
| 21 | Length of Engine Block | 580 | 570 | -10 |
| RD | RSOV to Right Side of Dash Panel | 2745 | 2742 | -3 |
| CD | RSOV to Center of Dash Panel | 2650 | 2671 | 21 |
| LD | RSOV to Left Side of Dash Panel | 2760 | 2794 | 34 |

All measurements in millimeters.

## DATA SHEET NO. 13

## ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

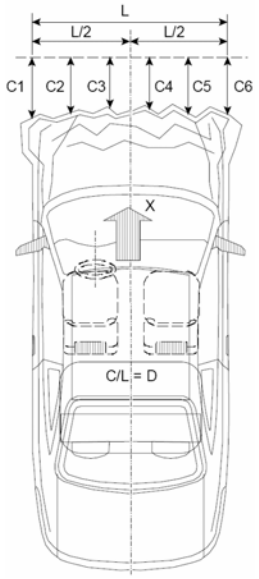
### VEHICLE INFORMATION

| | | | |
|---|---|---|---|
| VIN: | WDC0G4KB0JV020264 | Wheelbase (mm): | 2875 |
| Vehicle Size Category: | MPV | Test Weight (kg): | 2014.0 |

### ACCELEROMETER DATA

| | |
|---|---|
| Accelerometer Locations: | Left Rear Crossmember |
| Cal. Procedure/Interval: | Vibration Test / 6 months |
| Integration Algorithm: | NHTSA Standard |
| Impact Velocity (km/h): | 55.78 |
| Velocity Change (km/h): | 66.2 |
| Time of Separation (msec): | 72.2 |

Linearity: Good




### CRUSH PROFILE

| | |
|---|---|
| Collision Deformation Classification: | 12FDEW2 |
| Midpoint of Damage: | Vehicle Centerline |
| Damage Region Length (mm): | 1532 |
| Impact Mode: | Full Frontal |

| No. | Measurement Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| C1 | Crush Zone 1 at Left Side | mm | 170 | 450 | 280 |
| C2 | Crush Zone 2 at Left Side | mm | 85 | 460 | 375 |
| C3 | Crush Zone 3 at Left Side | mm | 27 | 435 | 408 |
| C4 | Crush Zone 4 at Right Side | mm | 27 | 436 | 409 |
| C5 | Crush Zone 5 at Right Side | mm | 85 | 470 | 385 |
| C6 | Crush Zone 6 at Right Side | mm | 170 | 393 | 223 |
| L | C1 to C6 | mm | 1532 | | |

## DATA SHEET NO. 14

## VEHICLE INTRUSION MEASUREMENTS

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

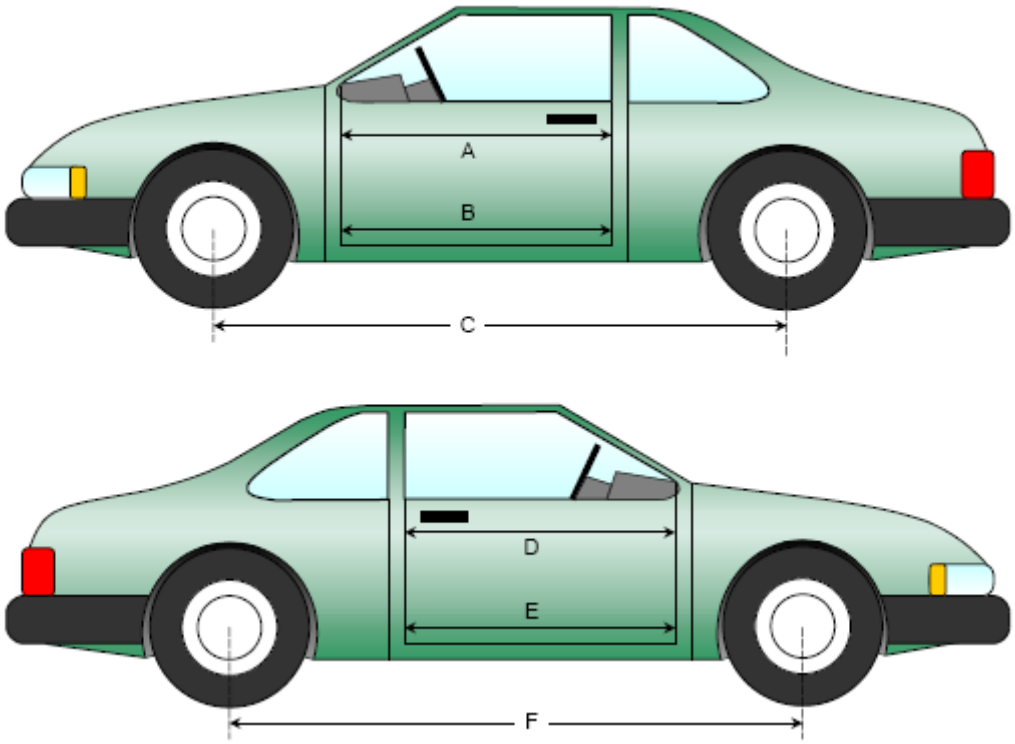
Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### DOOR OPENING WIDTH

| Item | Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| A | Left Side Upper | mm | 899 | 883 | 16 |
| B | Left Side Lower | mm | 803 | 797 | 6 |
| D | Right Side Upper | mm | 899 | 887 | 12 |
| E | Right Side Lower | mm | 821 | 800 | 21 |

### WHEELBASE MEASUREMENTS

| Item | Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| C | Left Side Wheelbase | mm | 2875 | 2786 | 89 |
| F | Right Side Wheelbase | mm | 2875 | 2793 | 82 |



## DATA SHEET NO. 14 … (CONTINUED)

## VEHICLE INTRUSION MEASUREMENTS

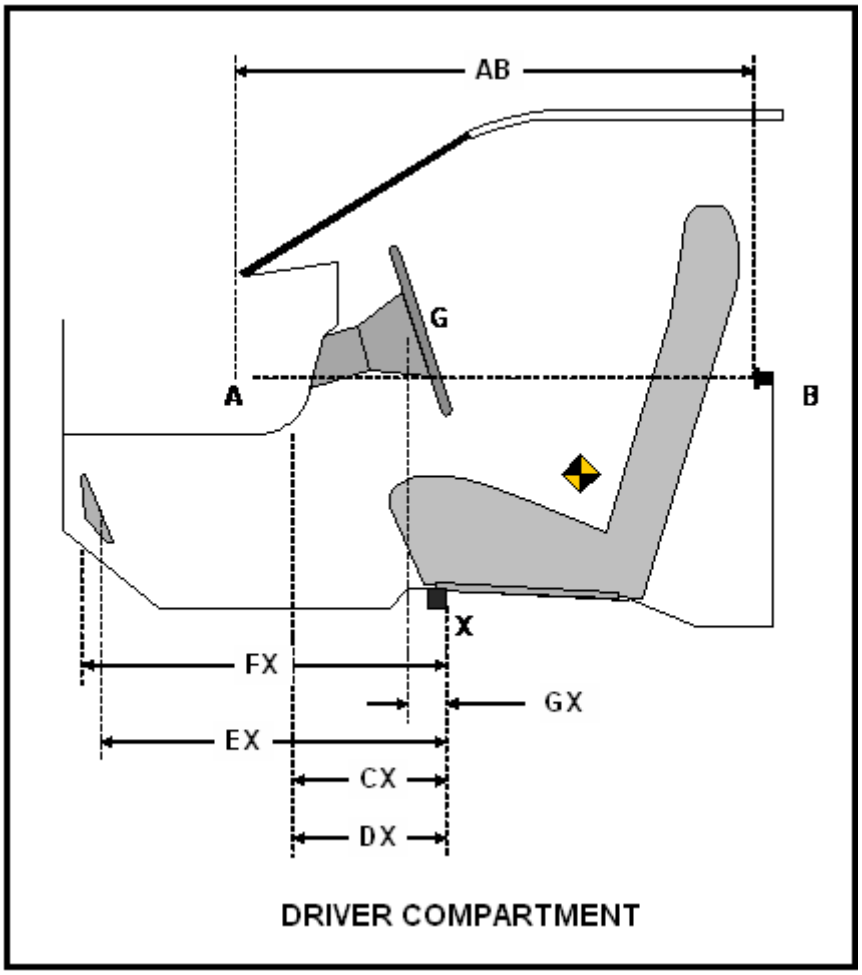
Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

### DRIVER COMPARTMENT INTRUSION

| Item | Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| AB | Door Opening (Inside Window Jam) | mm | 809 | 806 | 3 |
| CX | Left Knee Bolster to X | mm | 310 | 340 | -30 |
| DX | Right Knee Bolster to X | mm | 325 | 340 | -15 |
| EX | Brake Pedal to X | mm | 605 | 600 | 5 |
| FX | Foot Rest to X | mm | 650 | 670 | -20 |
| GX | Center of Steering Wheel Hub to X | mm | 40 | 155 | -115 |

X = Front of Seat Track (Stationary)




DRIVER COMPARTMENT

**DATA SHEET NO. 15**

**SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

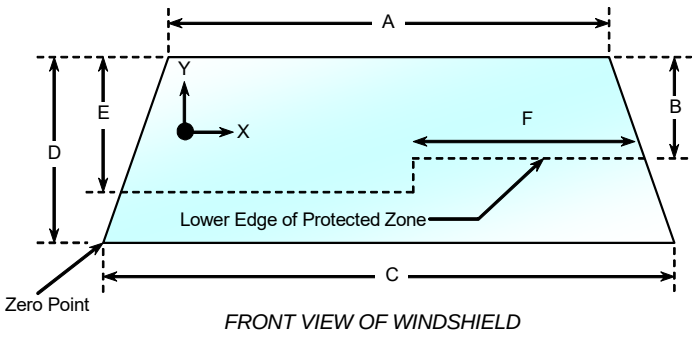
Windshield Mounting Details: Windshield glass is secured to the vehicle frame with plastic molding and rubber cement.

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

Temperature of windshield molding during test: 21.1° C

**WINDSHIELD PERIPHERY MEASUREMENTS**

| Measurement | Pre-Test (mm) | Post-Test (mm) | % Retention |
|---|---|---|---|
| Left Side | 2065 | 2065 | 100.0% |
| Right Side | 2065 | 2065 | 100.0% |
| Total | 4130 | 4130 | 100.0% |




*FRONT VIEW OF WINDSHIELD*

| Item | Units | Value |
|---|---|---|
| A | mm | 1150 |
| B | mm | 325 |
| C | mm | 1400 |
| D | mm | 790 |
| E | mm | 446 |
| F | mm | 512 |

**AREAS 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.

| 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.

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

**DATA SHEET NO. 15 … (CONTINUED)**

**SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Temperature at Time of Impact: 18.9° C Test Time: 1:30 PM

**Stoddard Solvent Spillage Measurements**

A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable = 1 oz.)

B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable = 5 oz.)

C. For the following 25 minutes: 0 oz.
(Maximum allowable = 1 oz./minute)

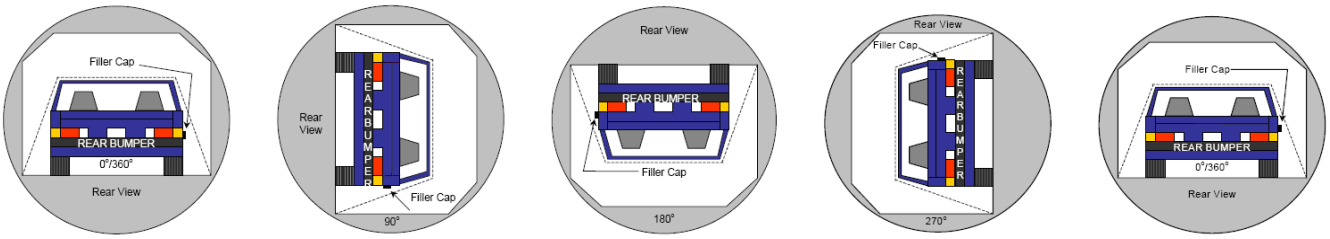
D. Spillage: There was no Stoddard solvent spillage.

**DATA SHEET NO. 16**

**FMVSS 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17




0° TO 90° 90° TO 180° 180° TO 270° 270° TO 360°

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: There was no Stoddard solvent spillage.

**SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase | Rotation Time | Hold Time | Total Time |
|---|---|---|---|
| 0° To 90° | 80 | 300 | 380 |
| 90° To 180° | 84 | 300 | 384 |
| 180° To 270° | 82 | 300 | 382 |
| 270° To 360° | 78 | 300 | 378 |

**FMVSS 301 SPILLAGE TABLE**

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

**SOLVENT SPILLAGE LOCATION TABLE**

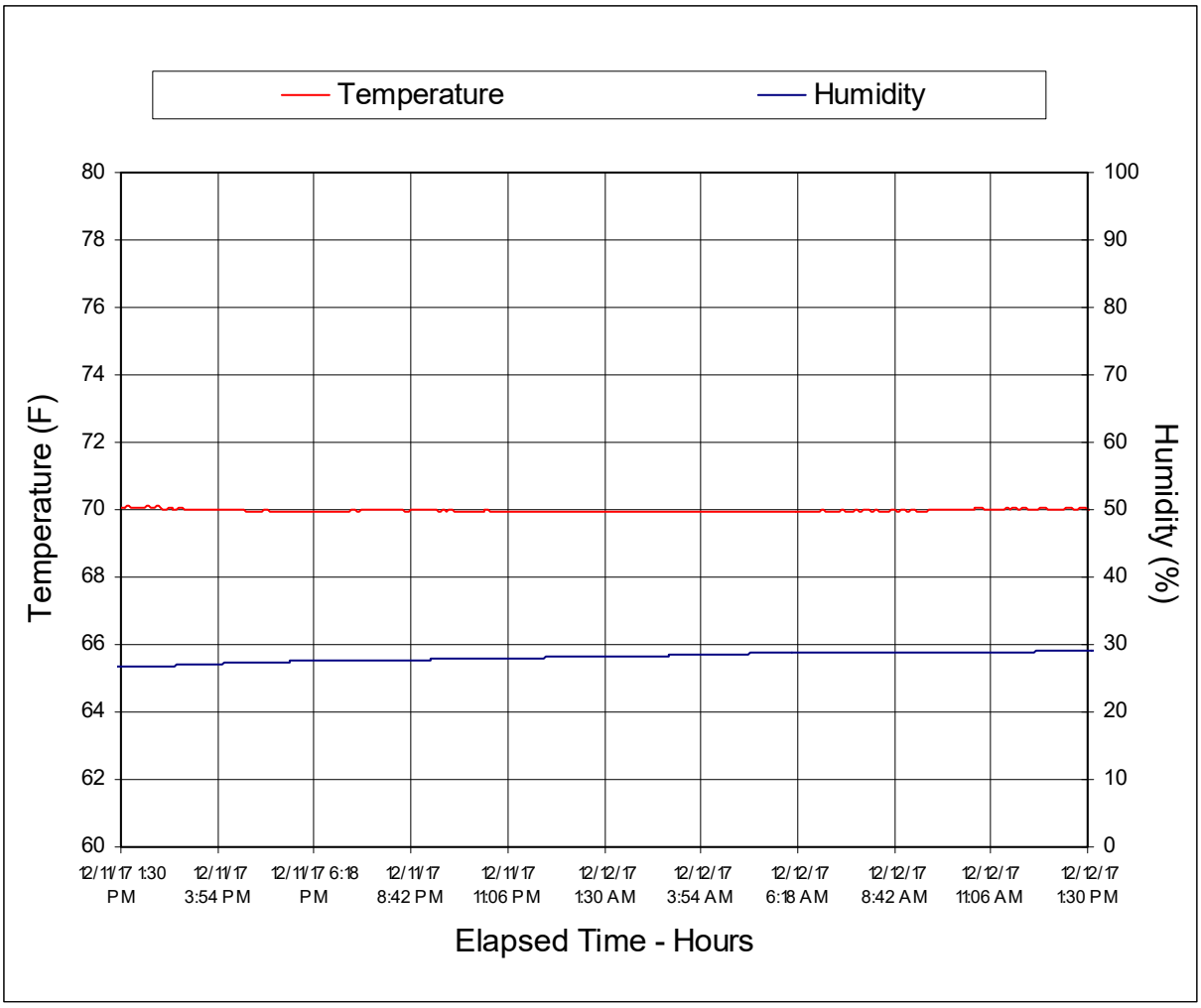
| Test Phase | Spillage Location |
|---|---|
| 0° To 90° | |
| 90° To 180° | |
| 180° To 270° | |
| 270° To 360° | |

## DATA SHEET NO. 17

## DUMMY / VEHICLE TEMPERATURE STABILIZATION CHART

Test Vehicle: 2018 Mercedes-Benz GLC300 4MATIC 5-Door MPV NHTSA No.: M20184300

Test Program: 56.3 km/h Frontal Impact NCAP Test Test Date: 12/12/17



# APPENDIX A
# PHOTOGRAPHS

## TABLE OF PHOTOGRAPHS

## TABLE OF PHOTOGRAPHS … (CONTINUED)

## TABLE OF PHOTOGRAPHS … (CONTINUED)

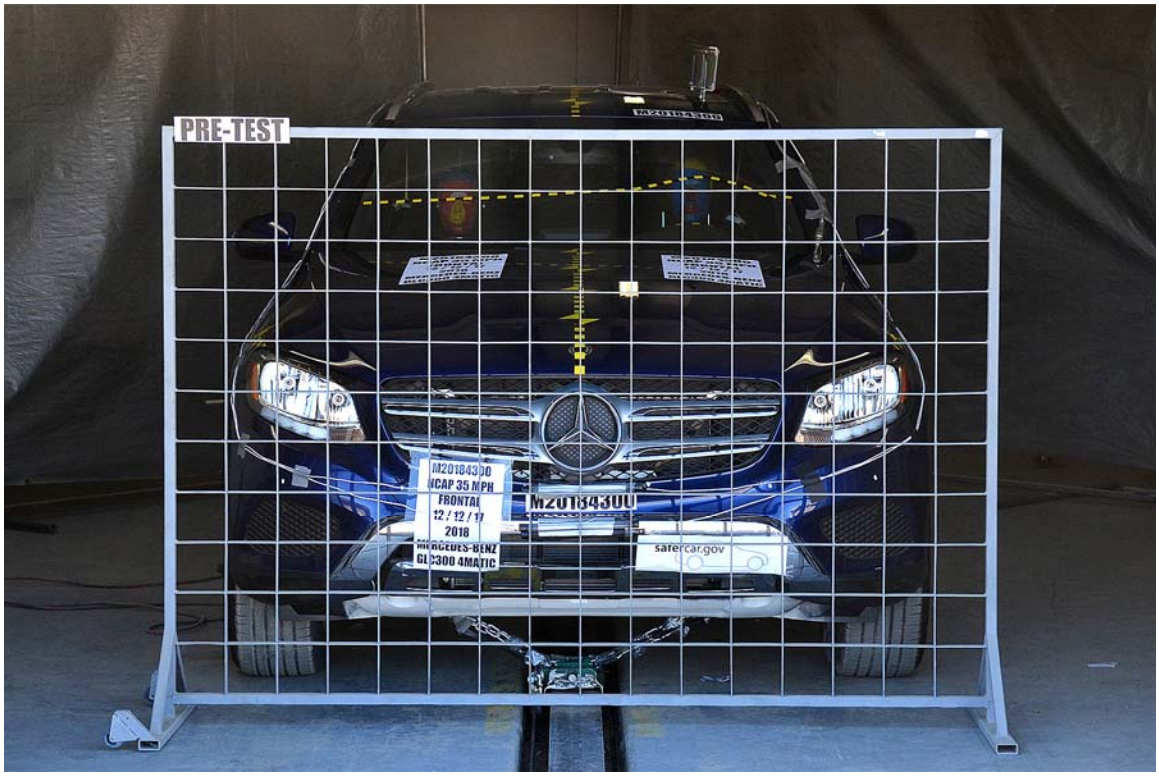



FIGURE 1. Load Cell Location

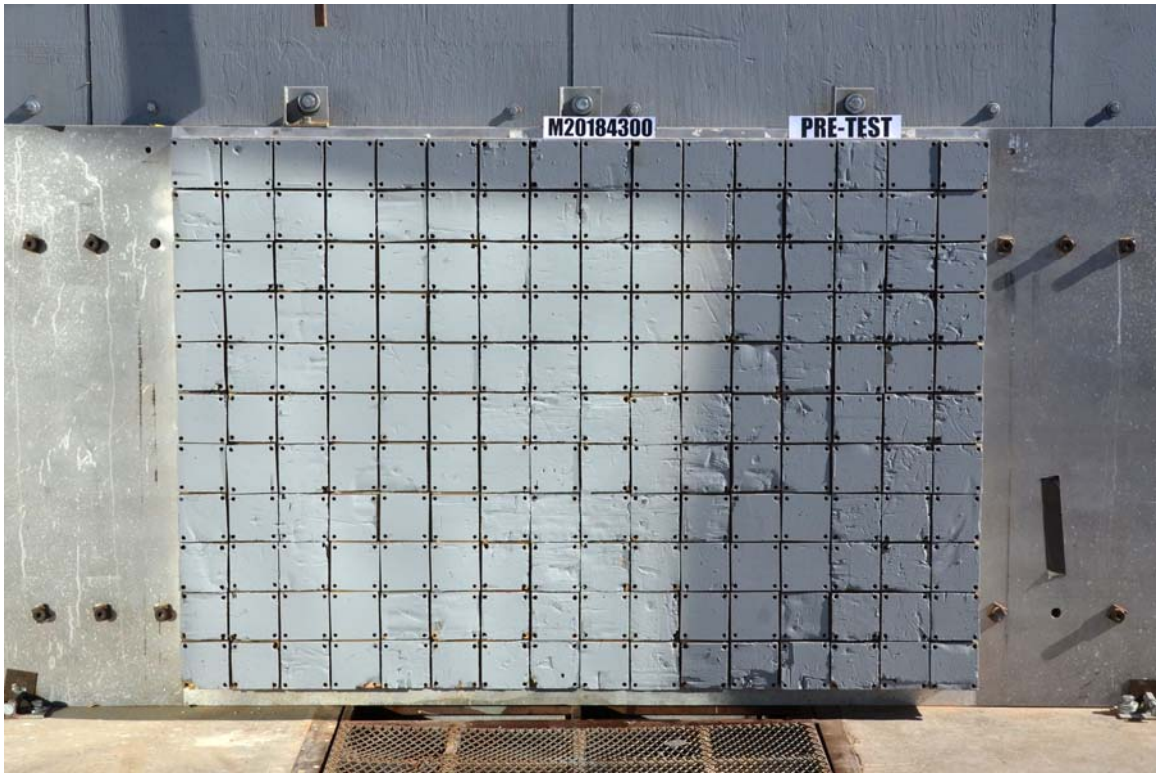



FIGURE 2. Pre-Test Load Cell Wall


FIGURE 3. Post-Test Load Cell Wall


FIGURE 4. Manufacturer's Label


FIGURE 5. Tire Placard


FIGURE 6. 2018 Mercedes-Benz GLC300 4MATIC Frontal as Delivered


FIGURE 7. Left Rear ¾ View, as Received


FIGURE 8. Pre-Test Front View of Test Vehicle


FIGURE 9. Post-Test Front View of Test Vehicle


FIGURE 10. Pre-Test Left View of Test Vehicle

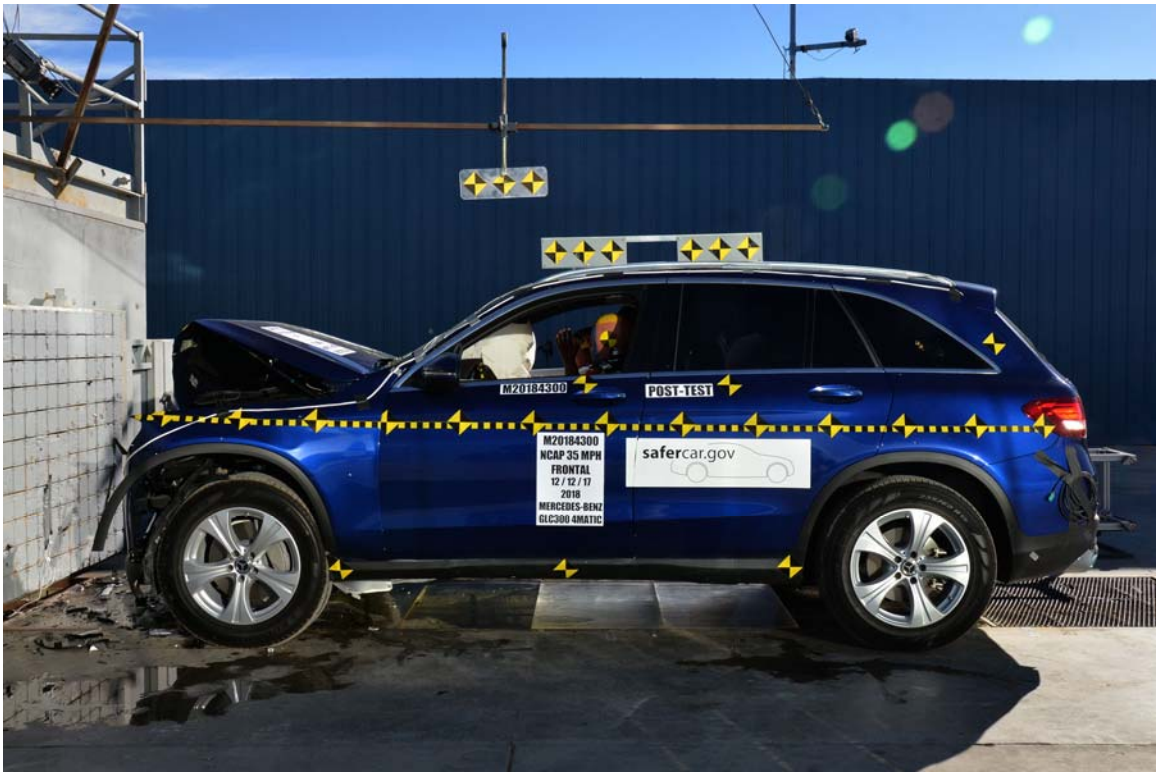



FIGURE 11. Post-Test Left View of Test Vehicle


FIGURE 12. Pre-Test Right View of Test Vehicle

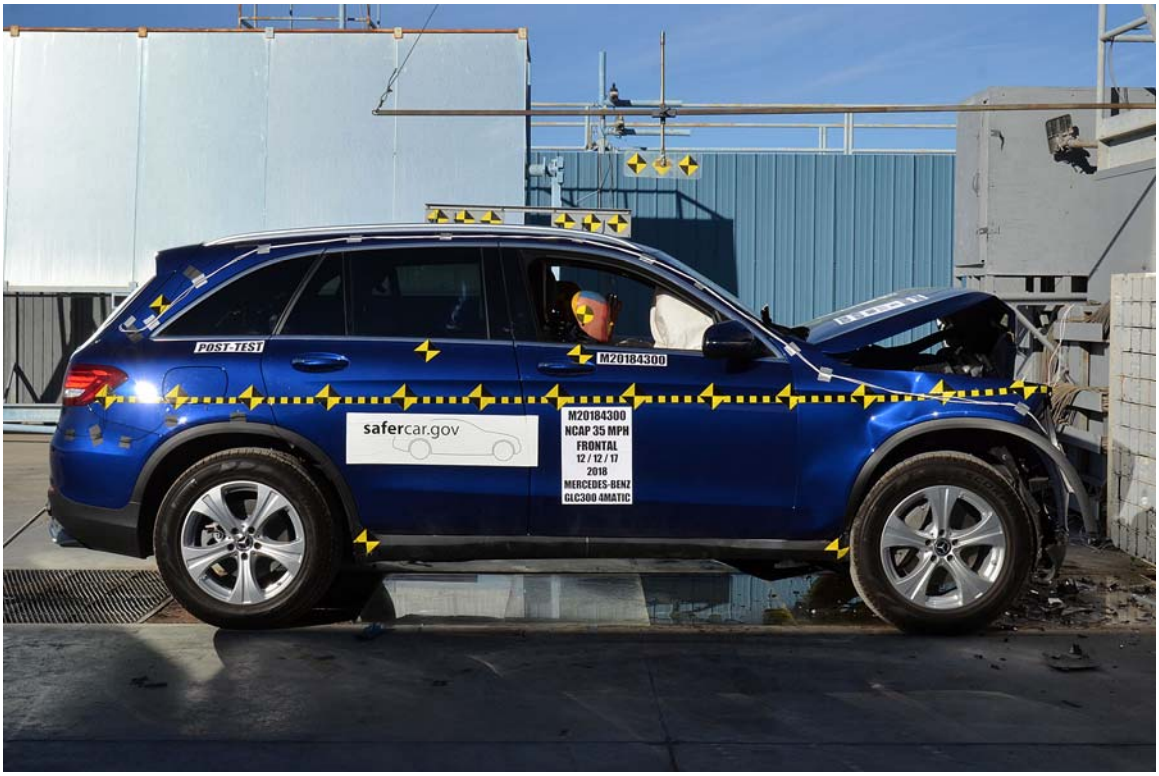



FIGURE 13. Post-Test Right View of Test Vehicle


FIGURE 14. Pre-Test Right Front ¾ View

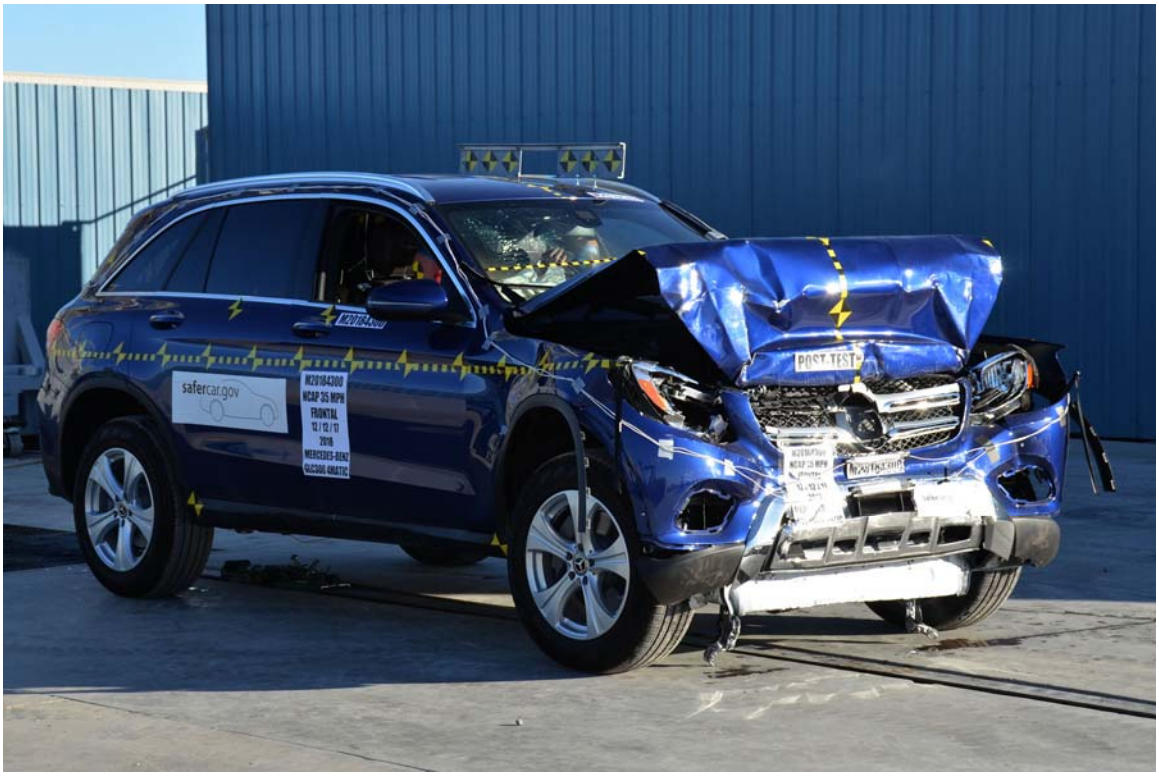



FIGURE 15. Post-Test Right Front ¾ View


FIGURE 16. Pre-Test Left Rear ¾ View


FIGURE 17. Post-Test Left Rear ¾ View


FIGURE 18. Pre-Test Windshield View


FIGURE 19. Post-Test Windshield View


FIGURE 20. Pre-Test Engine Compartment View


FIGURE 21. Post-Test Engine Compartment View


FIGURE 22. Pre-Test Fuel Filler Cap View


FIGURE 23. Post-Test Fuel Filler Cap View

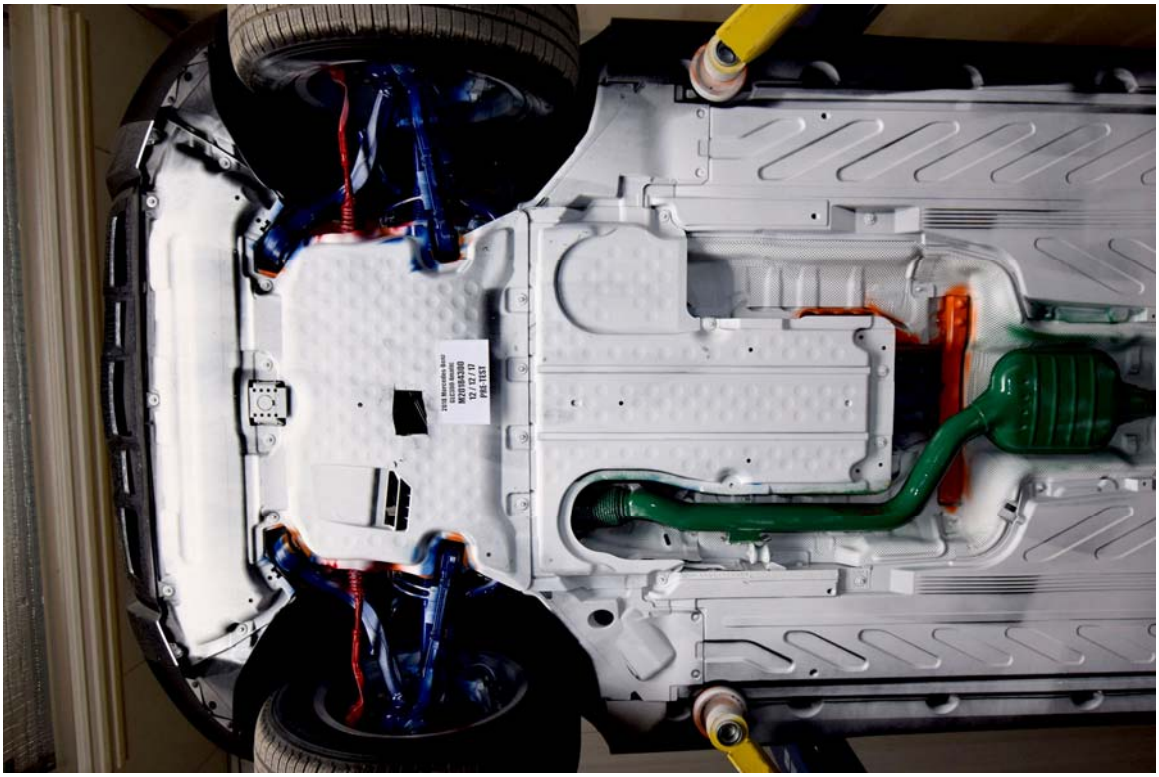


FIGURE 24. Pre-Test Front Underbody View

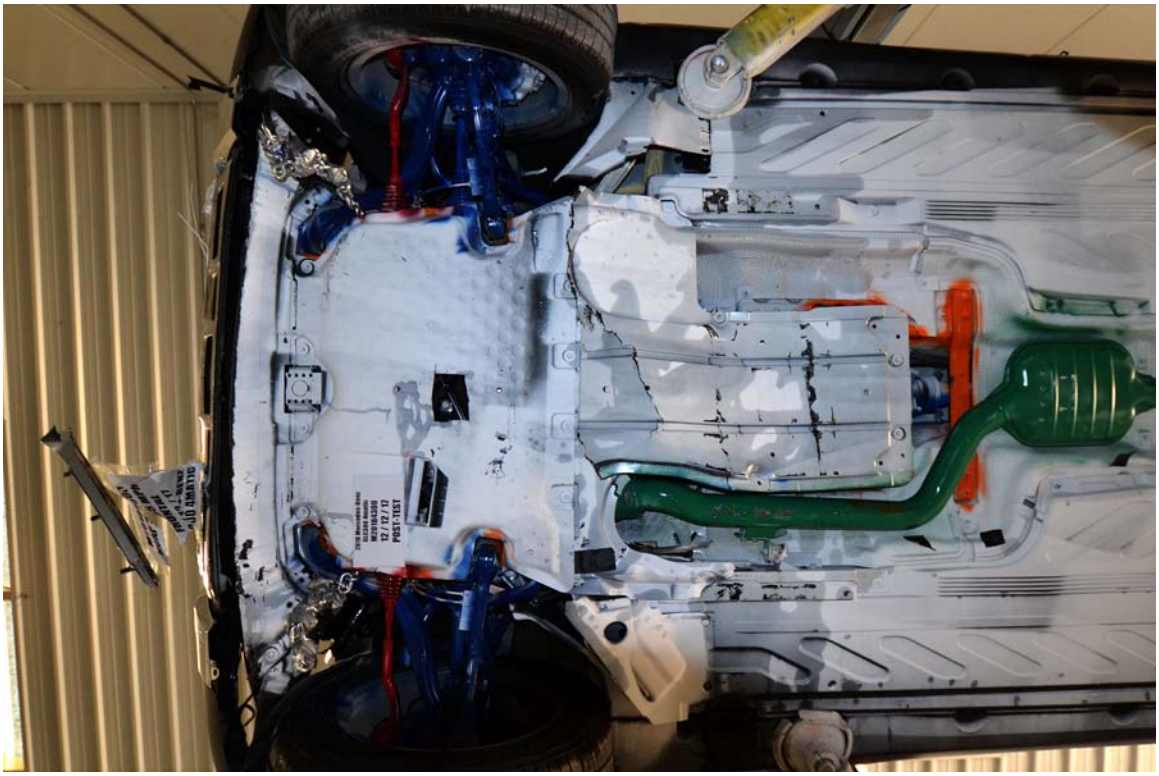


FIGURE 25. Post-Test Front Underbody View

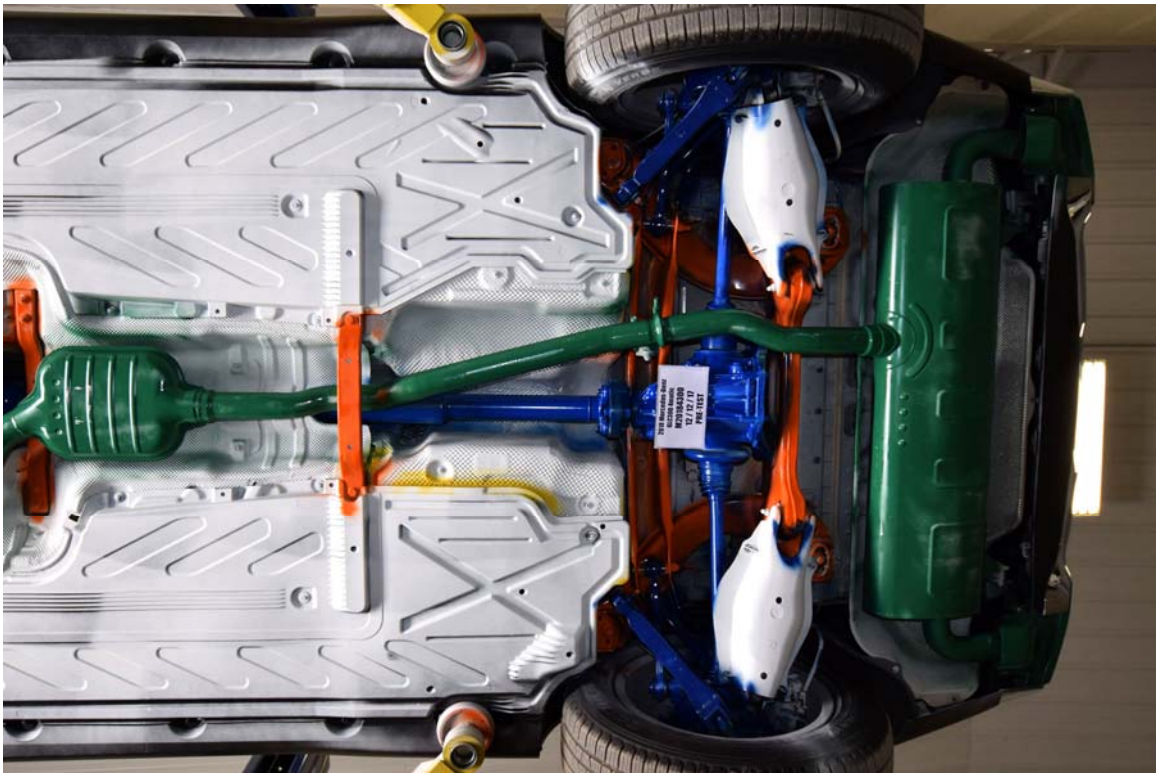


FIGURE 26. Pre-Test Rear Underbody View

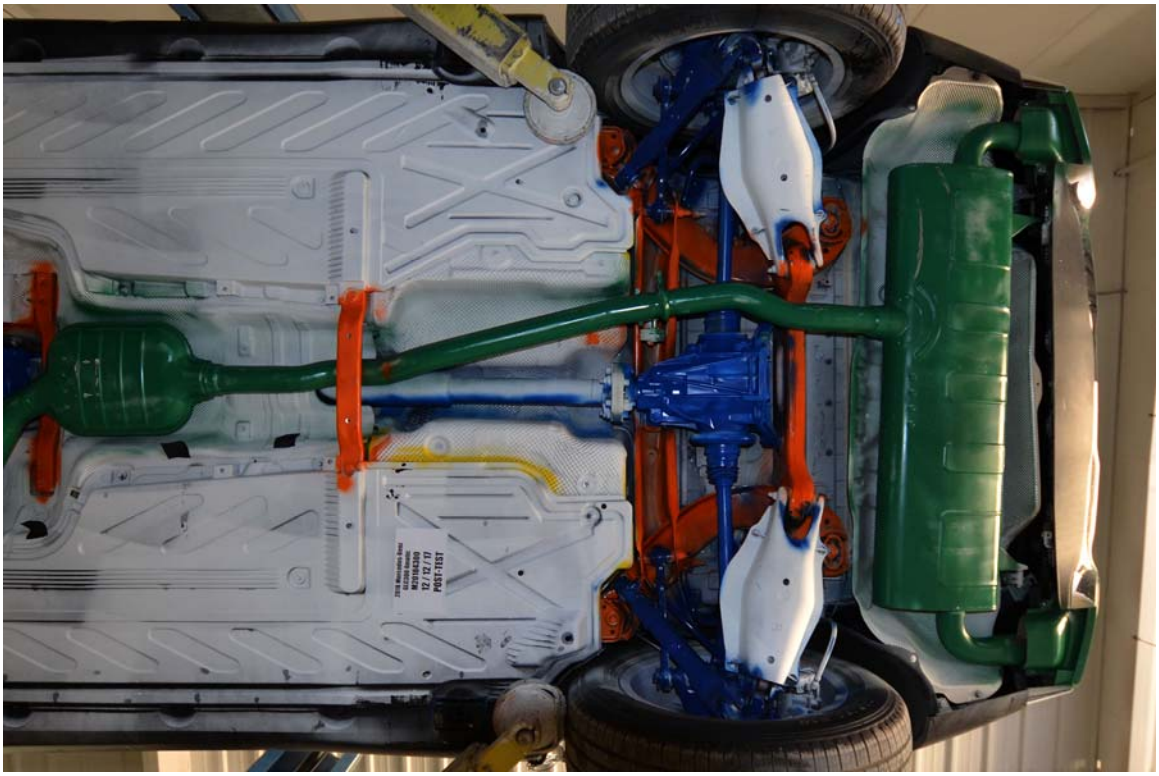



FIGURE 27. Post-Test Rear Underbody View

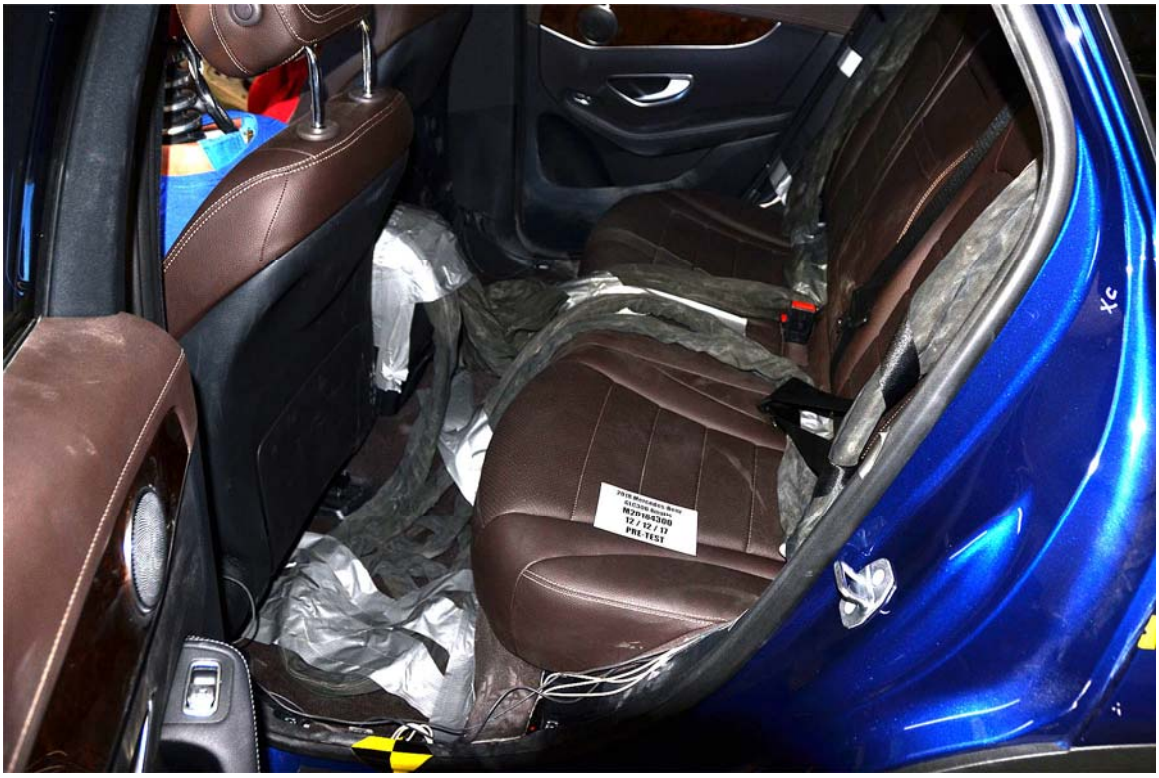



FIGURE 28. Pre-Test Dummy Cable Routing


FIGURE 29. Post-Test Dummy Cable Routing

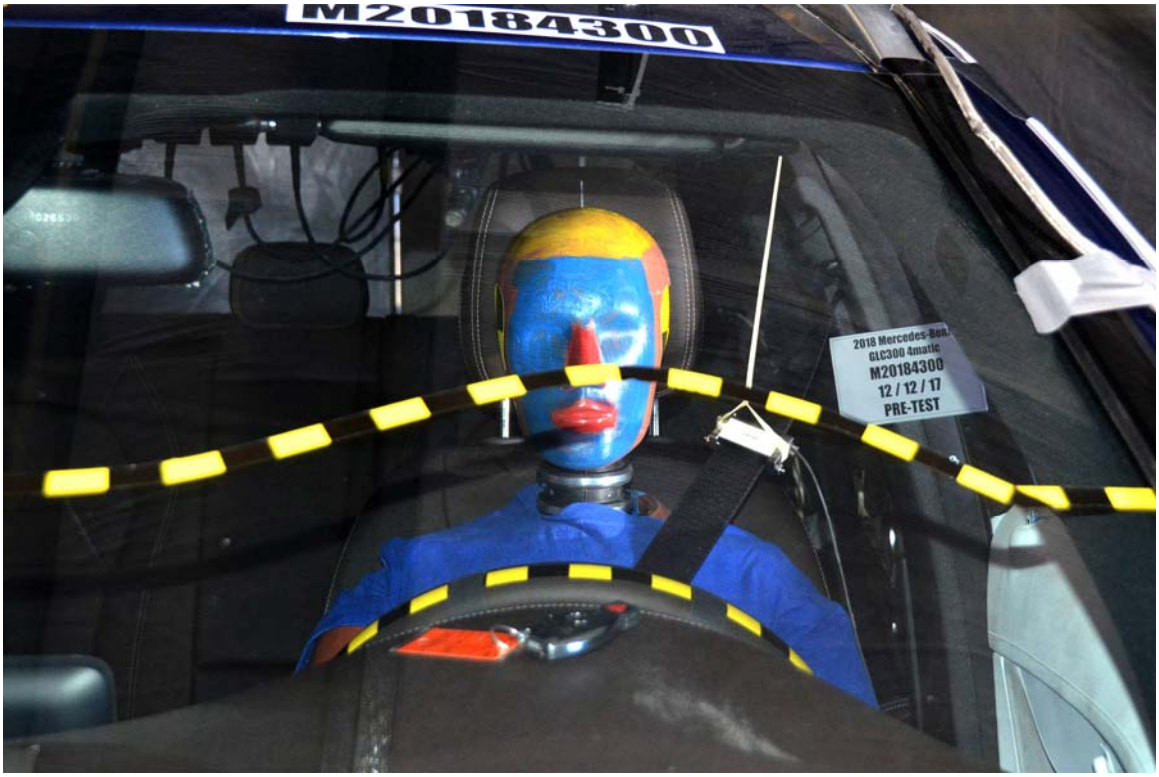



FIGURE 30. Pre-Test Driver Dummy Front View


FIGURE 31. Post-Test Driver Dummy Front View


FIGURE 32. Pre-Test Driver Dummy Window View


FIGURE 33. Post-Test Driver Dummy Window View


FIGURE 34. Pre-Test Driver Dummy and Vehicle Interior View


FIGURE 35. Post-Test Driver Dummy and Vehicle Interior View


FIGURE 36. Pre-Test Driver's Seat Fore-Aft Markings


FIGURE 37. Post-Test Driver's Seat Fore-Aft Markings


FIGURE 38. Pre-Test View of Belt Anchorage for Driver Dummy


FIGURE 39. Post-Test View of Belt Anchorage for Driver Dummy


FIGURE 40. Pre-Test Driver Dummy Feet

FIGURE 41. Post-Test Driver Dummy Feet


FIGURE 42. Pre-Test Driver's Side Knee Bolster


FIGURE 43. Post-Test Driver's Side Knee Bolster

Photograph Not Available

FIGURE 44. Pre-Test Driver's Side Floorpan


FIGURE 45. Post-Test Driver's Side Floorpan


FIGURE 46. Post-Test Driver Dummy Face


FIGURE 47. Post-Test Driver Dummy Contact with Airbag


FIGURE 48. Post-Test Driver Dummy Contact with Headrest


FIGURE 48a. Post-Test Driver Dummy Contact with Knee Airbag


FIGURE 49. Pre-Test View of the Steering Wheel


FIGURE 50. Post-Test View of the Steering Wheel


FIGURE 51. Pre-Test Passenger Dummy Front View


FIGURE 52. Post-Test Passenger Dummy Front View


FIGURE 53. Pre-Test Passenger Dummy Window View


FIGURE 54. Post-Test Passenger Dummy Window View


FIGURE 55. Pre-Test Passenger Dummy and Vehicle Interior View


FIGURE 56. Post-Test Passenger Dummy and Vehicle Interior View


FIGURE 57. Pre-Test Passenger's Seat Fore-Aft Markings


FIGURE 58. Post-Test Passenger's Seat Fore-Aft Markings


FIGURE 59. Pre-Test View of Belt Anchorage for Passenger Dummy


FIGURE 60. Post-Test View of Belt Anchorage for Passenger Dummy


FIGURE 61. Pre-Test Passenger Dummy Feet


FIGURE 62. Post-Test Passenger Dummy Feet


FIGURE 63. Pre-Test Passenger's Side Knee Bolster


FIGURE 64. Post-Test Passenger's Side Knee Bolster

Photograph Not Available

FIGURE 65. Pre-Test Passenger's Side Floorpan


FIGURE 66. Post-Test Passenger's Side Floorpan


FIGURE 67. Post-Test Passenger Dummy Face


FIGURE 68. Post-Test Passenger Dummy Contact with Airbag


FIGURE 69. Post-Test Passenger Dummy Contact with Headrest


FIGURE 69a. Post-Test Passenger Dummy Contact with Knee Bolster


FIGURE 70. Photograph of Ballast Installed in Vehicle

Photograph Not Applicable

No Stoddard
Solvent Spillage

FIGURE 71. Post-Test Stoddard Solvent Spillage Location View


FIGURE 72. Post-Test Speed Trap Read-Out

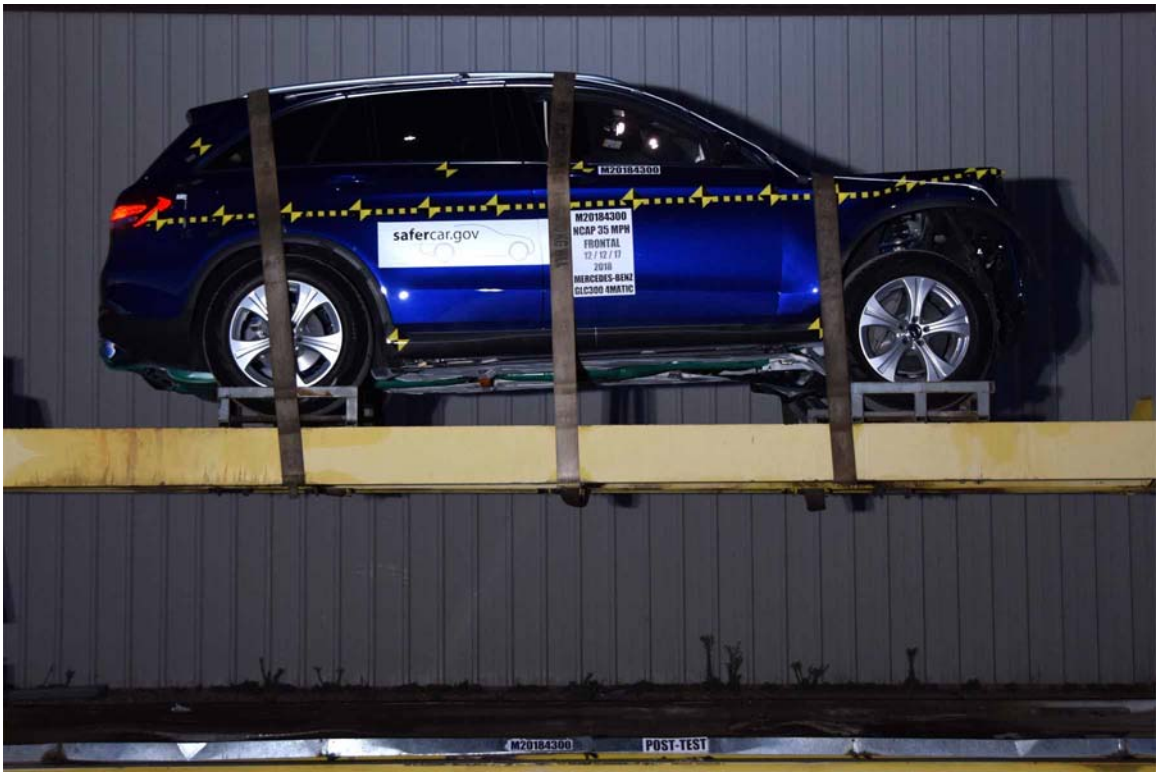



FIGURE 73. Vehicle at 0° on Static Rollover Device


FIGURE 74. Vehicle at 90° on Static Rollover Device

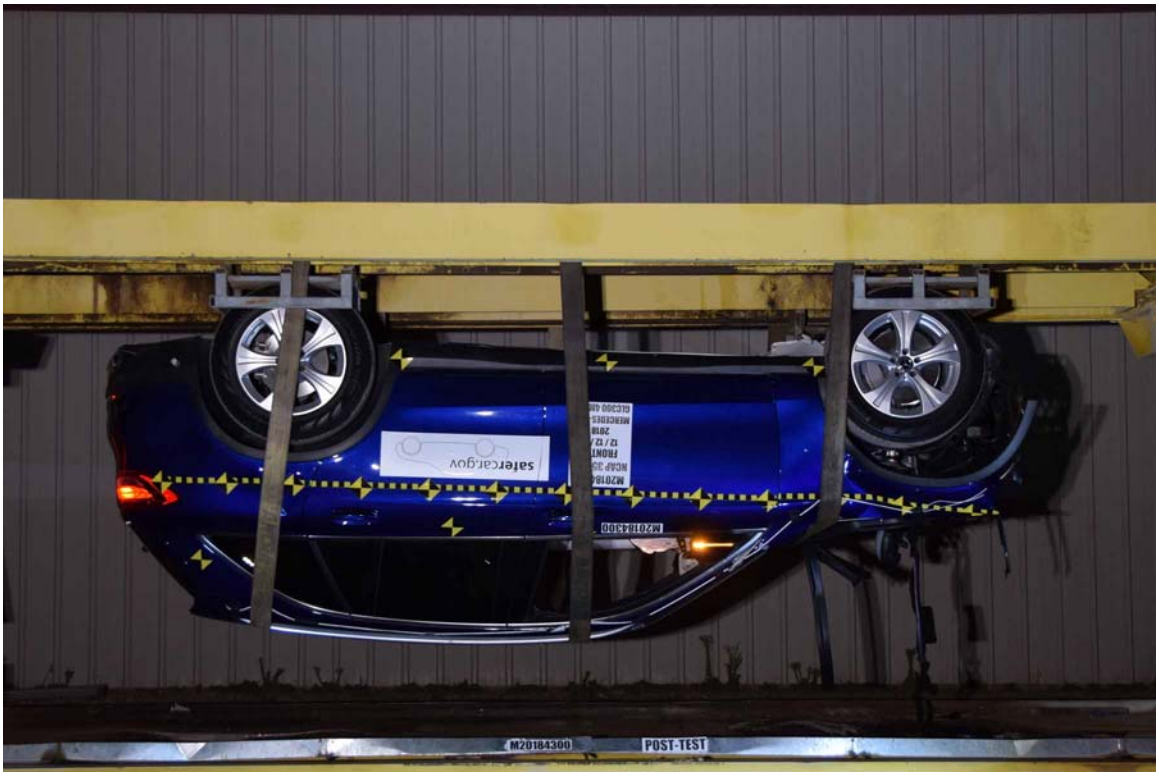



FIGURE 75. Vehicle at 180° on Static Rollover Device

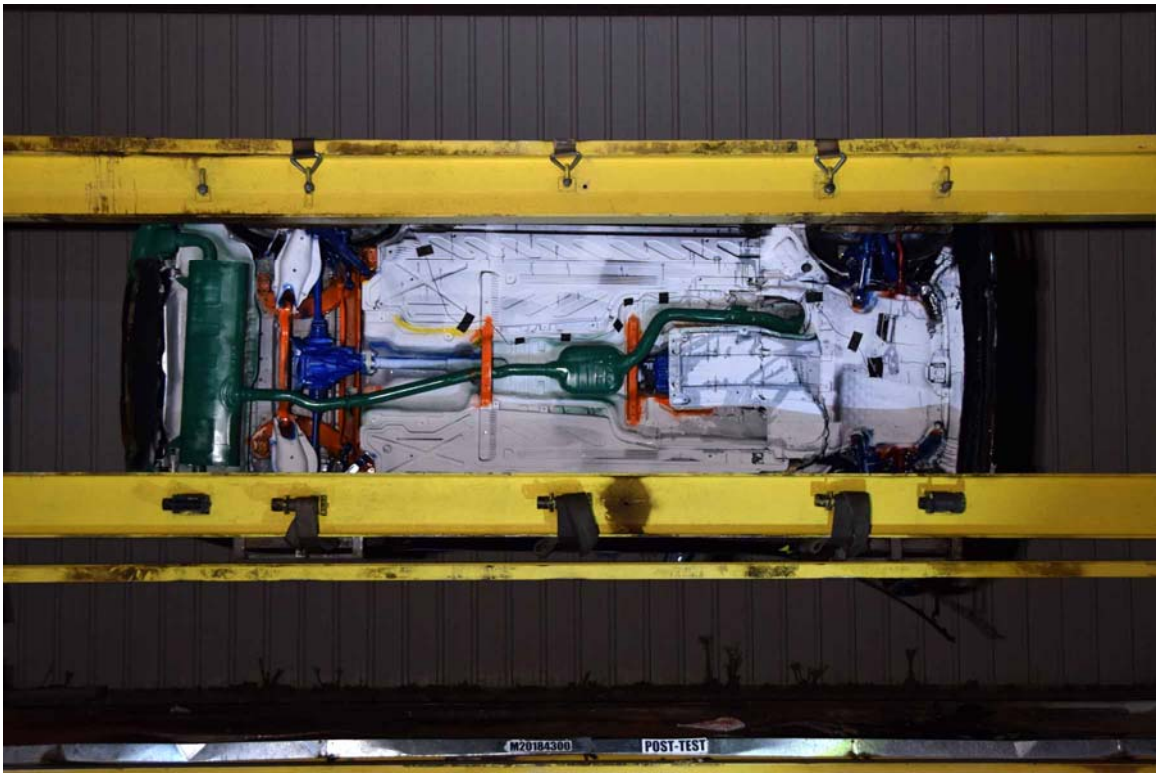



FIGURE 76. Vehicle at 270° on Static Rollover Device

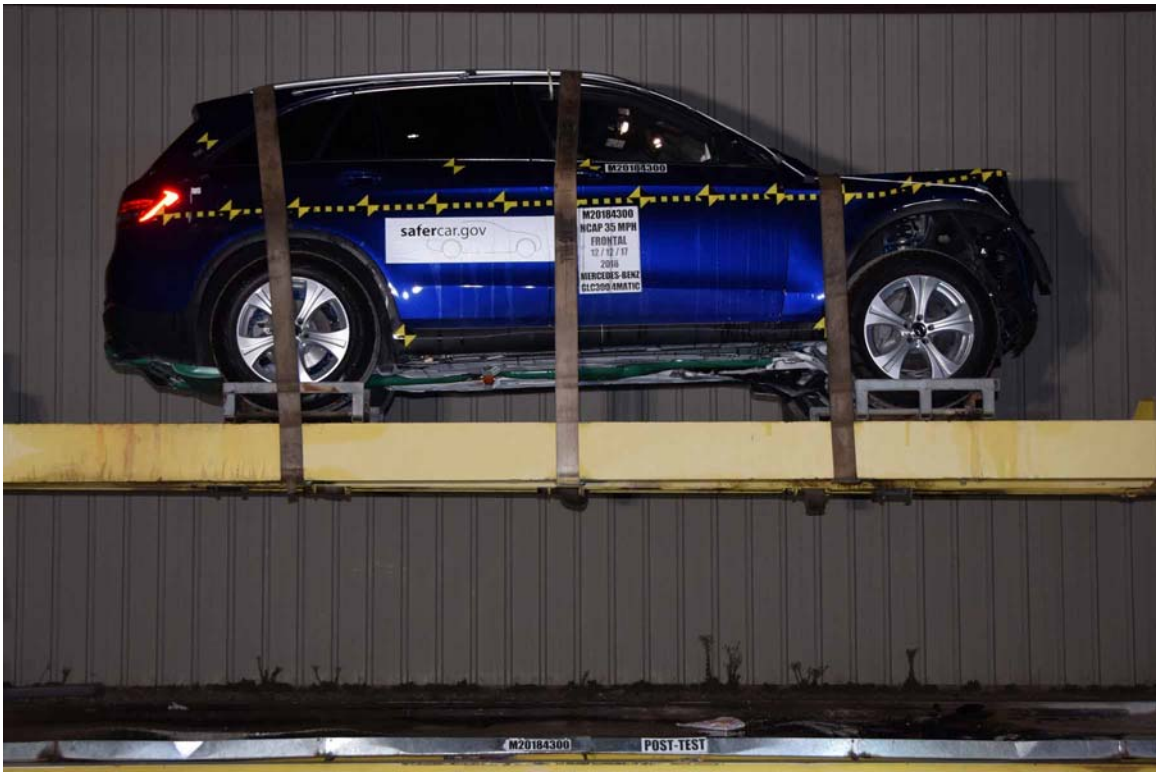
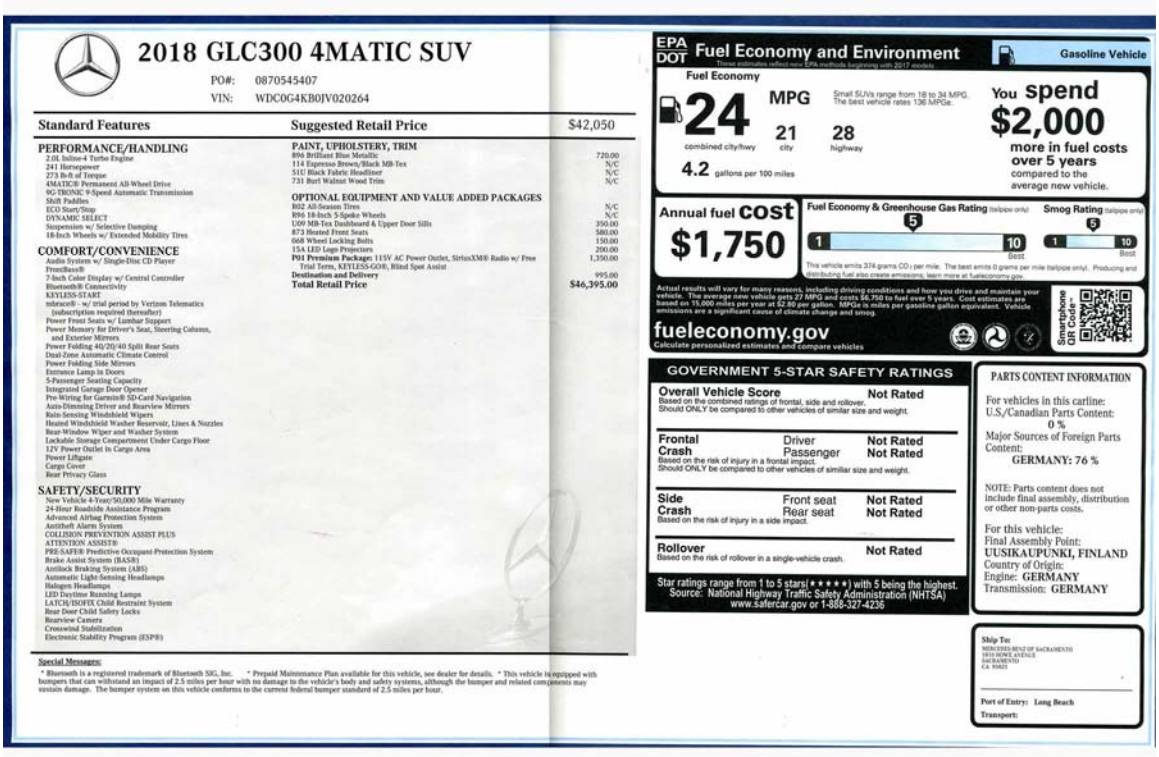



FIGURE 77. Vehicle at 360° on Static Rollover Device


FIGURE 78. 2018 Mercedes-Benz GLC300 4MATIC Frontal Impact Event



## 2018 GLC300 4MATIC SUV

PO#: 0870545407
VIN: WDC0G4KB0JV020264

| Standard Features | Suggested Retail Price | $42,050 |
|---|---|---|

**PERFORMANCE/HANDLING**
2.0L Inline-4 Turbo Engine
241 Horsepower
273 lb-ft of Torque
4MATIC® Permanent All-Wheel Drive
9G-TRONIC 9-Speed Automatic Transmission
Shift Paddles
ECO Start/Stop
DYNAMIC SELECT
Suspension w/ Selective Damping
18-Inch Wheels w/ Extended Mobility Tires

**COMFORT/CONVENIENCE**
Audio System w/ Single-Disc CD Player
FrontBass®
7-Inch Color Display w/ Central Controller
Bluetooth® Connectivity
KEYLESS-START
mbrace® - w/ trial period by Verizon Telematics (subscription required thereafter)
Power Front Seats w/ Lumbar Support
Power Memory for Driver's Seat, Steering Column, and Exterior Mirrors
Power Folding 40/20/40 Split Rear Seats
Dual-Zone Automatic Climate Control
Power Folding Side Mirrors
Entrance Lamp in Doors
5-Passenger Seating Capacity
Integrated Garage Door Opener
Pre-Wiring for Garmin® SD-Card Navigation
Auto-Dimming Driver and Rearview Mirrors
Rain-Sensing Windshield Wipers
Heated Windshield Washer Reservoir, Lines & Nozzles
Rear-Window Wiper and Washer System
Lockable Storage Compartment Under Cargo Floor
12V Power Outlet in Cargo Area
Power Liftgate
Cargo Cover
Rear Privacy Glass

**SAFETY/SECURITY**
New Vehicle 4-Year/50,000 Mile Warranty
24-Hour Roadside Assistance Program
Advanced Airbag Protection System
AntiTheft Alarm System
COLLISION PREVENTION ASSIST PLUS
ATTENTION ASSIST®
PRE-SAFE® Predictive Occupant-Protection System
Brake Assist System (BAS®)
Antilock Braking System (ABS)
Automatic Light-Sensing Headlamps
Halogen Headlamps
LED Daytime Running Lamps
LATCH/ISOFIX Child Restraint System
Rear Door Child Safety Locks
Rearview Camera
Crosswind Stabilization
Electronic Stability Program (ESP®)

**Suggested Retail Price**

**PAINT, UPHOLSTERY, TRIM**

| | |
|---|---|
| 896 Brilliant Blue Metallic | 720.00 |
| 114 Espresso Brown/Black MB-Tex | N/C |
| 51U Black Fabric Headliner | N/C |
| 731 Burl Walnut Wood Trim | N/C |

**OPTIONAL EQUIPMENT AND VALUE ADDED PACKAGES**

| | |
|---|---|
| 802 All-Season Tires | N/C |
| R96 18-Inch 5-Spoke Wheels | N/C |
| U09 MB-Tex Dashboard & Upper Door Sills | 350.00 |
| 873 Heated Front Seats | 580.00 |
| 068 Wheel Locking Bolts | 150.00 |
| 15A LED Logo Projectors | 290.00 |
| **P01 Premium Package:** 115V AC Power Outlet, SiriusXM® Radio w/ Free Trial Term, KEYLESS-GO®, Blind Spot Assist | 1,350.00 |
| **Destination and Delivery** | 995.00 |
| **Total Retail Price** | **$46,395.00** |

**Special Messages:**

* Bluetooth is a registered trademark of Bluetooth SIG, Inc. * Prepaid Maintenance Plan available for this vehicle, see dealer for details. * This vehicle is equipped with bumpers that can withstand an impact of 2.5 miles per hour with no damage to the vehicle's body and safety systems, although the bumper and related components may sustain damage. The bumper system on this vehicle conforms to the current federal bumper standard of 2.5 miles per hour.

### EPA DOT Fuel Economy and Environment

Gasoline Vehicle

These estimates reflect new EPA methods beginning with 2017 models.

**Fuel Economy**

**24** MPG combined city/hwy — 21 city — 28 highway

Small SUVs range from 18 to 34 MPG. The best vehicle rates 136 MPGe.

**4.2** gallons per 100 miles

You spend **$2,000** more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$1,750**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 5 (1 Worst, 10 Best)

Smog Rating (tailpipe only): 5 (1 Worst, 10 Best)

This vehicle emits 374 grams $CO_2$ per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at fueleconomy.gov.

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 27 MPG and costs $6,750 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.80 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

**fueleconomy.gov**
Calculate personalized estimates and compare vehicles

Smartphone QR Code

### GOVERNMENT 5-STAR SAFETY RATINGS

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

| | | |
|---|---|---|
| **Frontal Crash** | Driver | Not Rated |
| | Passenger | Not Rated |

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

| | | |
|---|---|---|
| **Side Crash** | Front seat | Not Rated |
| | Rear seat | Not Rated |

Based on the risk of injury in a side impact.

**Rollover** — Not Rated
Based on the risk of rollover in a single-vehicle crash.

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

### PARTS CONTENT INFORMATION

For vehicles in this carline:
U.S./Canadian Parts Content:
0 %
Major Sources of Foreign Parts Content:
GERMANY: 76 %

NOTE: Parts content does not include final assembly, distribution or other non-parts costs.

For this vehicle:
Final Assembly Point:
**UUSIKAUPUNKI, FINLAND**
Country of Origin:
Engine: **GERMANY**
Transmission: **GERMANY**

Ship To:
MERCEDES-BENZ OF SACRAMENTO
1010 HOWE AVENUE
SACRAMENTO
CA 95825

Port of Entry: Long Beach
Transport:

FIGURE 79. Monroney Label Photograph

# APPENDIX B
# DUMMY RESPONSE DATA TRACES

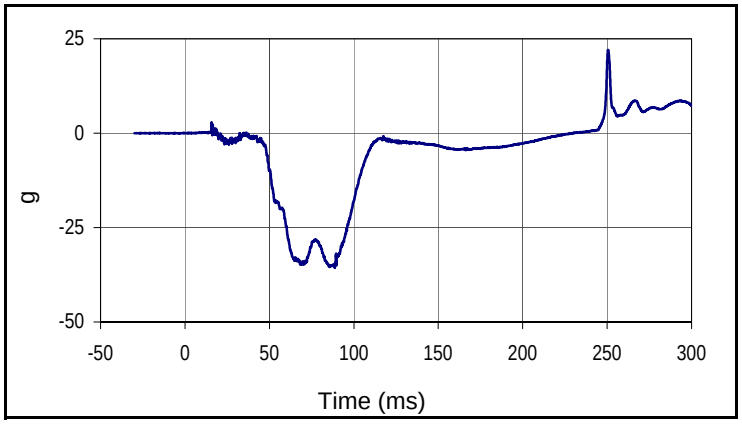
## TABLE OF DATA PLOTS

**The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at www.nhtsa.dot.gov**

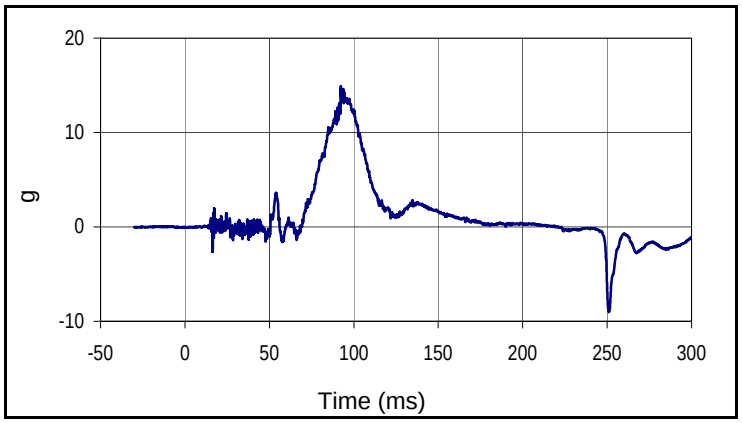
Driver Head X Acceleration Redundant
Driver Head Y Acceleration Redundant
Driver Head Z Acceleration Redundant
Driver Upper Neck Force Y
Driver Upper Neck Moment X
Driver Upper Neck Moment Z
Driver Chest X Acceleration Redundant
Driver Chest Y Acceleration Redundant
Driver Chest Z Acceleration Redundant
Driver Pelvis X
Driver Pelvis Y
Driver Pelvis Z
Driver Left Femur Force Z Redundant
Driver Right Femur Force Z 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 Shoulder Belt Force
Driver Lap Belt Force
Passenger Head X Acceleration Redundant
Passenger Head Y Acceleration Redundant
Passenger Head Z Acceleration Redundant
Passenger Upper Neck Force X
Passenger Upper Neck Force Z
Passenger Upper Neck Moment Y
Passenger Chest X Acceleration Redundant
Passenger Chest Y Acceleration Redundant
Passenger Chest Z Acceleration Redundant

Passenger Pelvis X
Passenger Pelvis Y
Passenger Pelvis Z
Passenger Left Femur Force Redundant
Passenger Right Femur Force 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 Shoulder Belt Force
Passenger Lap Belt Force
Left Rear Seat Crossmember X
Left Rear Seat Crossmember Z
Right Rear Seat Crossmember X
Right Rear Seat Crossmember Z
Left Rear Seat Crossmember X Redundant
Right Rear Seat Crossmember X Redundant
Vehicle Engine Top X
Vehicle Engine Bottom X
Load Cell Barrier Forces and Moments

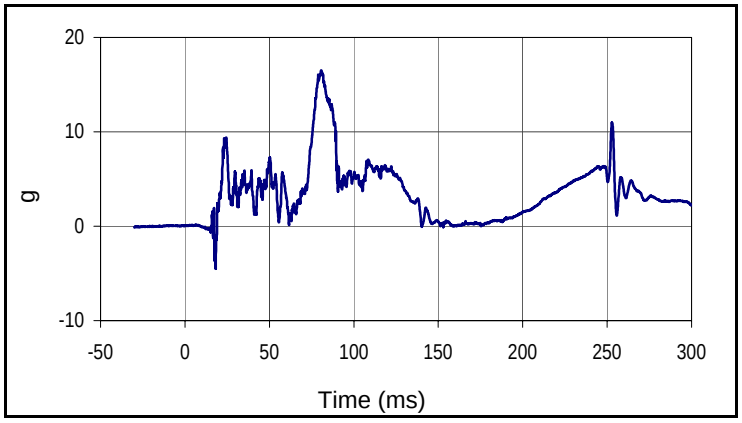
| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |



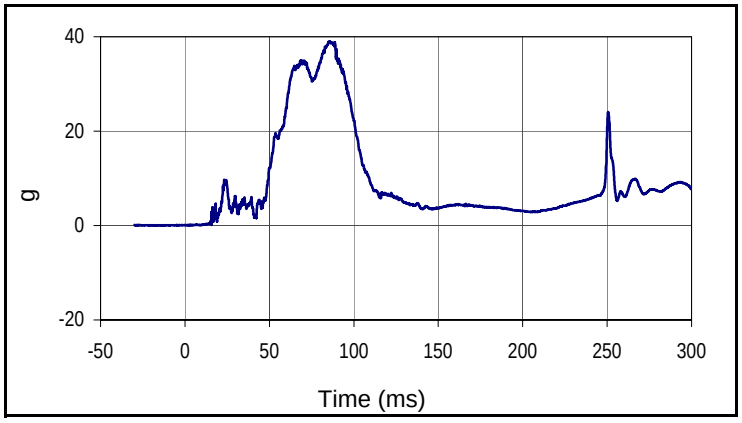

| Curve Description | | | |
|---|---|---|---|
| Driver Head Acceleration X Primary | | | |
| Plot No. | | SAE Class | Units |
| 001 | | 1000 | g |
| Max | Time | Min | Time |
| 22.0 | 250.6 | -35.6 | 88.8 |




| Curve Description | | | |
|---|---|---|---|
| Driver Head Acceleration Y Primary | | | |
| Plot No. | | SAE Class | Units |
| 002 | | 1000 | g |
| Max | Time | Min | Time |
| 14.9 | 92.3 | -9.0 | 251.1 |

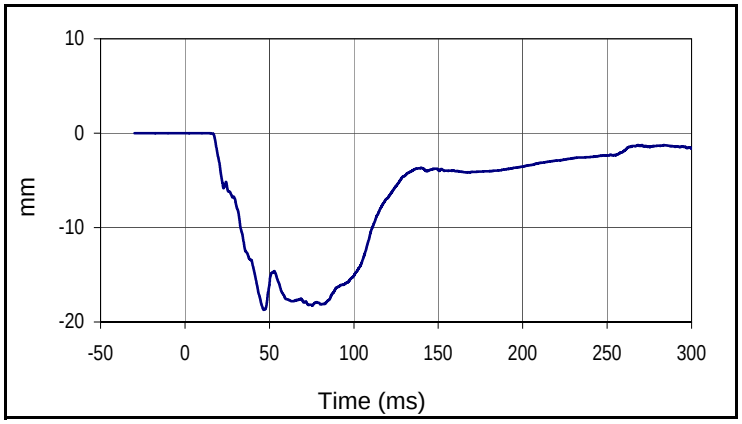



| Curve Description | | | |
|---|---|---|---|
| Driver Head Acceleration Z Primary | | | |
| Plot No. | | SAE Class | Units |
| 003 | | 1000 | g |
| Max | Time | Min | Time |
| 16.5 | 80.7 | -4.5 | 18.2 |



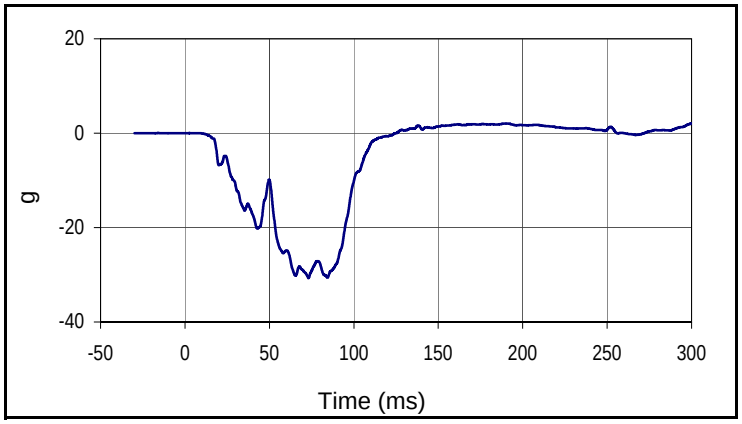

| Curve Description | | | |
|---|---|---|---|
| Driver Head Resultant Acceleration Primary | | | |
| Plot No. | | SAE Class | Units |
| 004 | | 1000 | g |
| Max | Time | Min | Time |
| 39.0 | 85.9 | 0.0 | 4.9 |

| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |

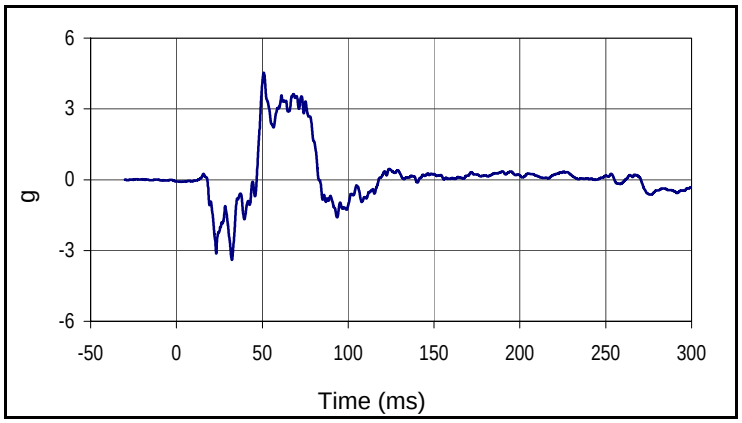



| Curve Description | | | |
|---|---|---|---|
| Driver Chest Deflection | | | |
| Plot No. | | SAE Class | Units |
| 005 | | 600 | mm |
| Max | Time | Min | Time |
| 0.0 | 2.6 | -18.7 | 46.7 |

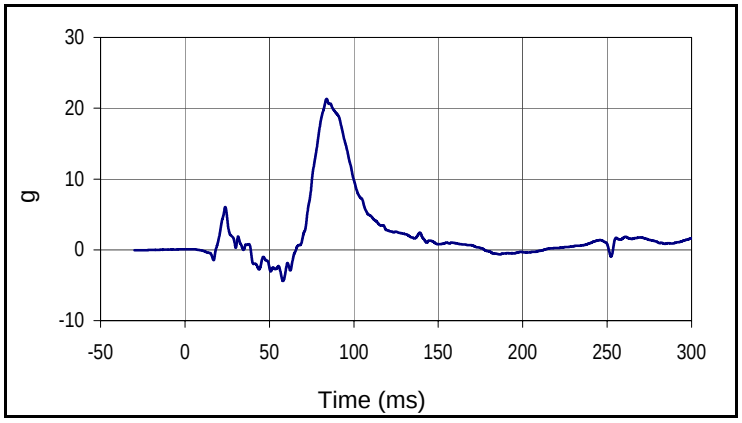
| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |



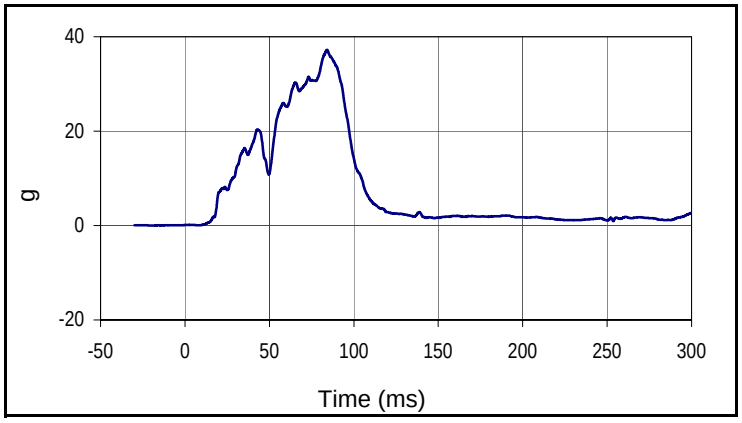

| Curve Description | | | |
|---|---|---|---|
| Driver Chest Acceleration X Primary | | | |
| Plot No. | | SAE Class | Units |
| 006 | | 180 | g |
| Max | Time | Min | Time |
| 2.1 | 299.9 | -30.7 | 73.1 |




| Curve Description | | | |
|---|---|---|---|
| Driver Chest Acceleration Y Primary | | | |
| Plot No. | | SAE Class | Units |
| 007 | | 180 | g |
| Max | Time | Min | Time |
| 4.5 | 50.9 | -3.4 | 32.3 |

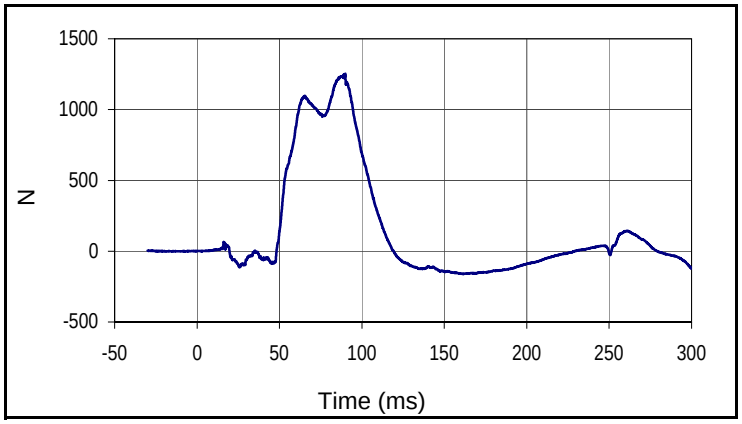



| Curve Description | | | |
|---|---|---|---|
| Driver Chest Acceleration Z Primary | | | |
| Plot No. | | SAE Class | Units |
| 008 | | 180 | g |
| Max | Time | Min | Time |
| 21.3 | 83.9 | -4.4 | 58.0 |

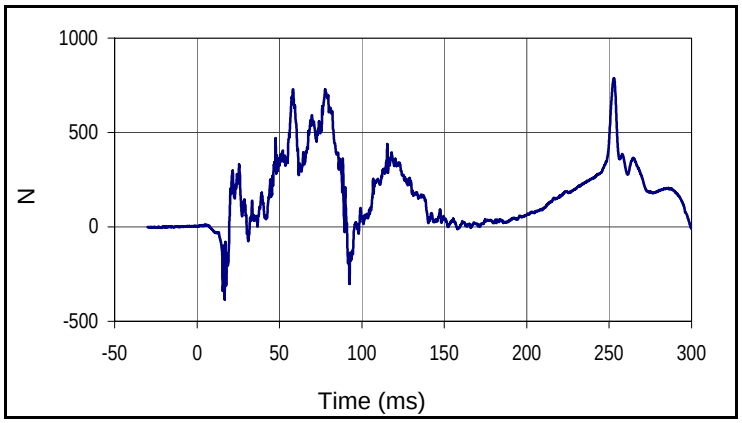



| Curve Description | | | |
|---|---|---|---|
| Driver Chest Resultant Acceleration Primary | | | |
| Plot No. | | SAE Class | Units |
| 009 | | 180 | g |
| Max | Time | Min | Time |
| 37.2 | 84.1 | 0.0 | 7.5 |

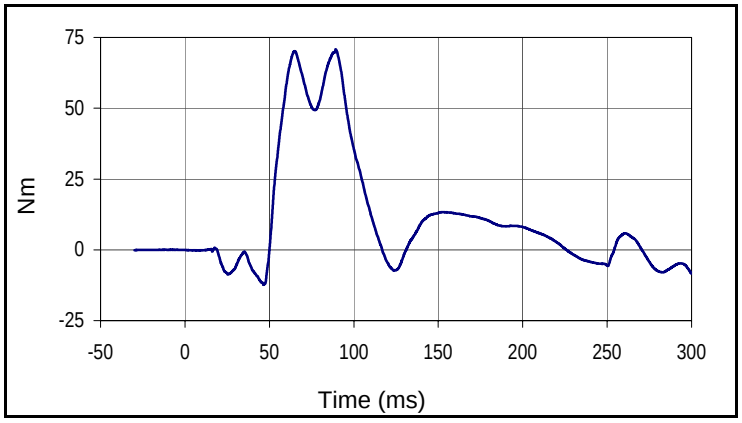
| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |



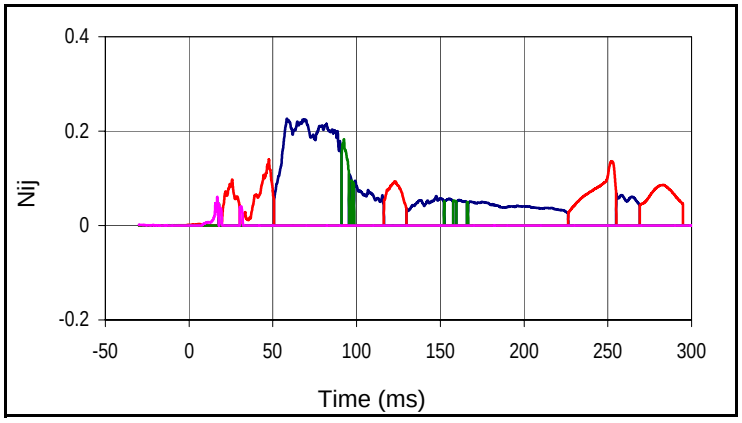

| Curve Description | | | |
|---|---|---|---|
| Driver Upper Neck Force X | | | |
| Plot No. | | SAE Class | Units |
| 010 | | 1000 | N |
| Max | Time | Min | Time |
| 1254.0 | 89.9 | -161.6 | 161.6 |




| Curve Description | | | |
|---|---|---|---|
| Driver Upper Neck Force Z | | | |
| Plot No. | | SAE Class | Units |
| 011 | | 1000 | N |
| Max | Time | Min | Time |
| 788.1 | 252.9 | -385.2 | 16.8 |

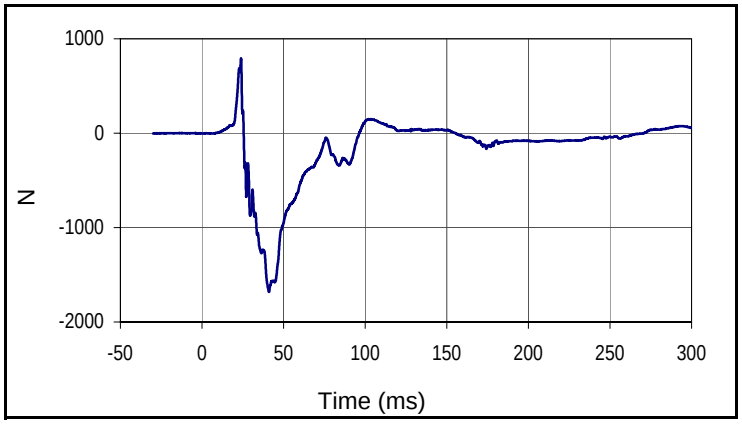



| Curve Description | | | |
|---|---|---|---|
| Driver Upper Neck Moment Y | | | |
| Plot No. | | SAE Class | Units |
| 012 | | 600 | Nm |
| Max | Time | Min | Time |
| 70.8 | 89.2 | -12.4 | 46.6 |

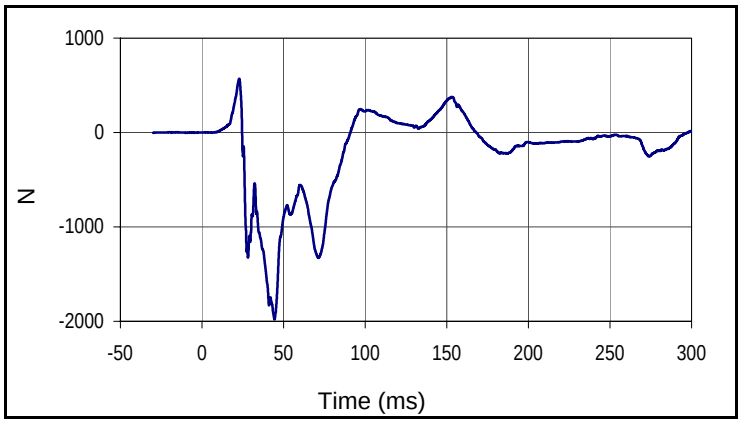



| Curve Description | | |
|---|---|---|
| Driver Nij | | |
| Units | Max | Time |
| Ntf | 0.23 | 58.5 |
| Units | Max | Time |
| Nte | 0.14 | 47.7 |
| Units | Max | Time |
| Ncf | 0.18 | 92.5 |
| Units | Max | Time |
| Nce | 0.06 | 16.8 |

| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |

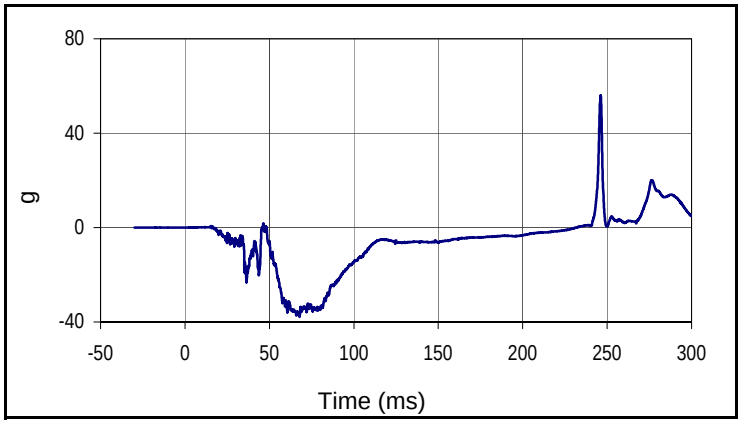



| Curve Description | | | |
|---|---|---|---|
| Driver Left Femur Force Z | | | |
| Plot No. | | SAE Class | Units |
| 014 | | 600 | N |
| Max | Time | Min | Time |
| 790.7 | 24.0 | -1680.5 | 41.0 |

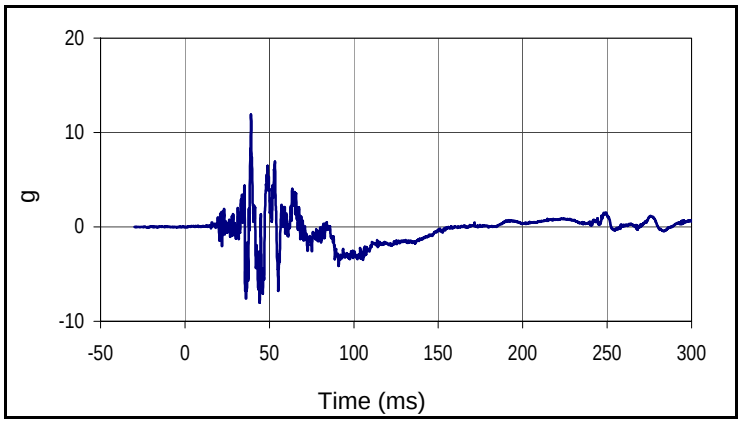



| Curve Description | | | |
|---|---|---|---|
| Driver Right Femur Force Z | | | |
| Plot No. | | SAE Class | Units |
| 015 | | 600 | N |
| Max | Time | Min | Time |
| 570.0 | 22.9 | -1978.6 | 44.5 |

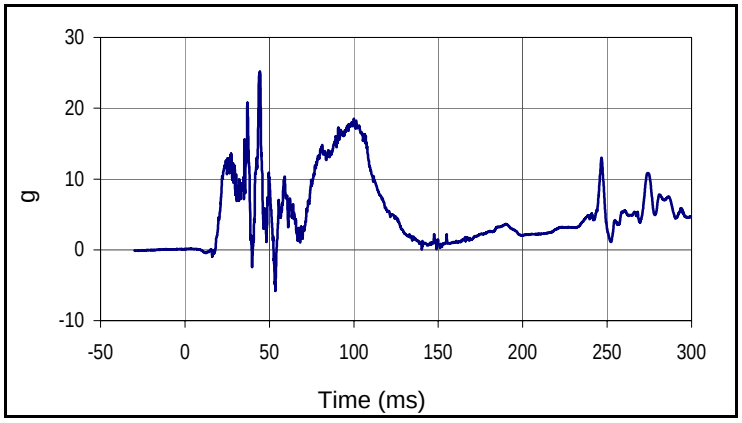
| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |



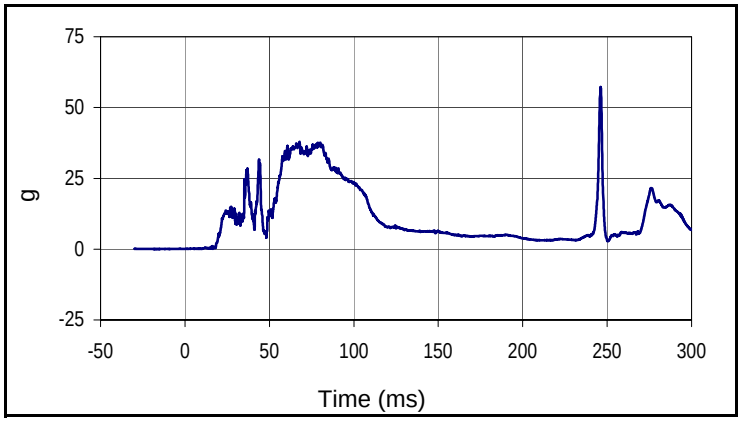

| Curve Description | | | |
|---|---|---|---|
| Passenger Head Acceleration X Primary | | | |
| Plot No. | | SAE Class | Units |
| 016 | | 1000 | g |
| Max | Time | Min | Time |
| 56.0 | 246.2 | -37.8 | 67.8 |




| Curve Description | | | |
|---|---|---|---|
| Passenger Head Acceleration Y Primary | | | |
| Plot No. | | SAE Class | Units |
| 017 | | 1000 | g |
| Max | Time | Min | Time |
| 11.9 | 39.1 | -8.0 | 44.2 |

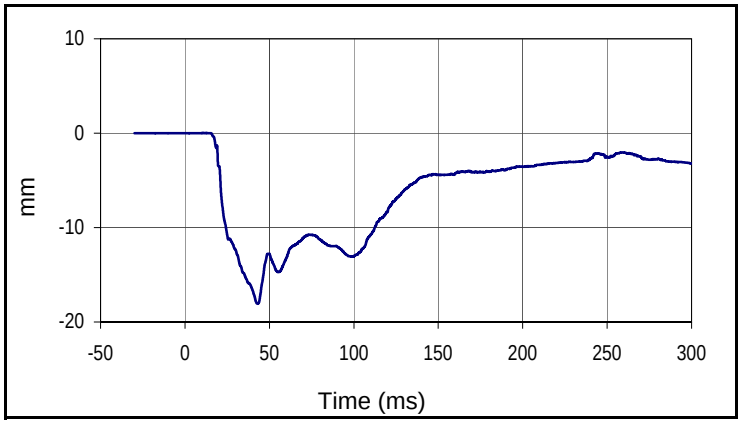



| Curve Description | | | |
|---|---|---|---|
| Passenger Head Acceleration Z Primary | | | |
| Plot No. | | SAE Class | Units |
| 018 | | 1000 | g |
| Max | Time | Min | Time |
| 25.1 | 44.4 | -5.8 | 53.5 |



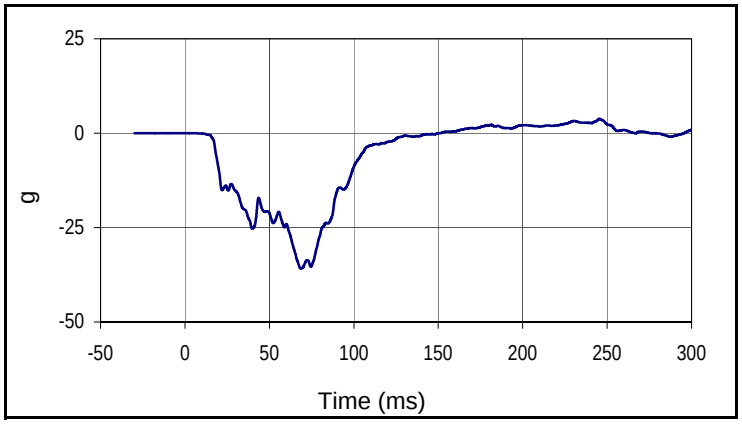

| Curve Description | | | |
|---|---|---|---|
| Passenger Head Resultant Acceleration Primary | | | |
| Plot No. | | SAE Class | Units |
| 019 | | 1000 | g |
| Max | Time | Min | Time |
| 57.2 | 246.2 | 0.0 | 0.5 |

| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |

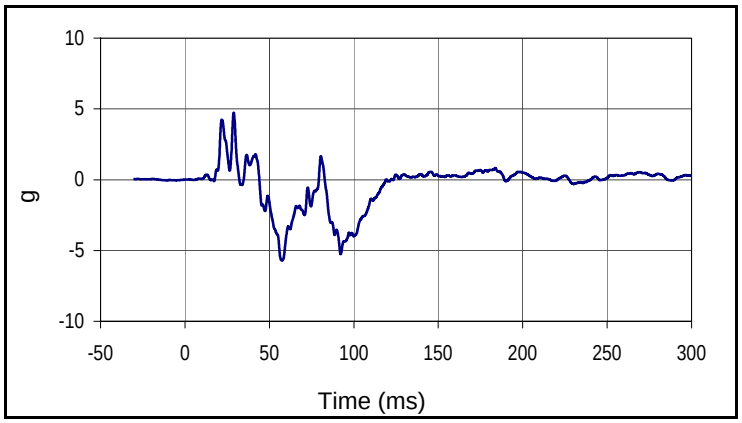



| Curve Description | | | |
|---|---|---|---|
| Passenger Chest Deflection | | | |
| Plot No. | | SAE Class | Units |
| 020 | | 600 | mm |
| Max | Time | Min | Time |
| 0.0 | 10.3 | -18.1 | 42.9 |

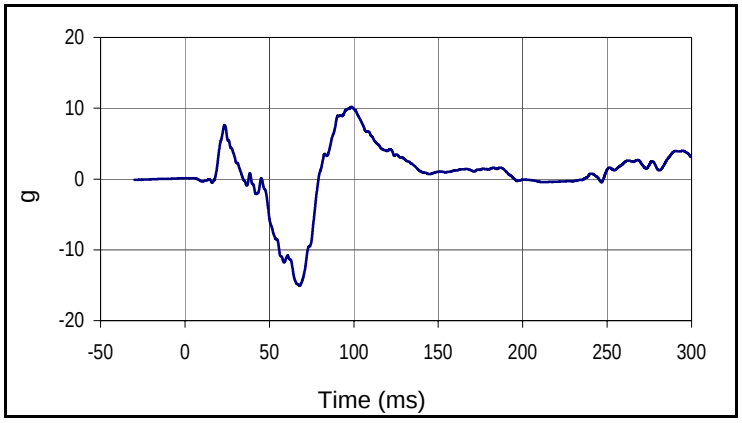
| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |



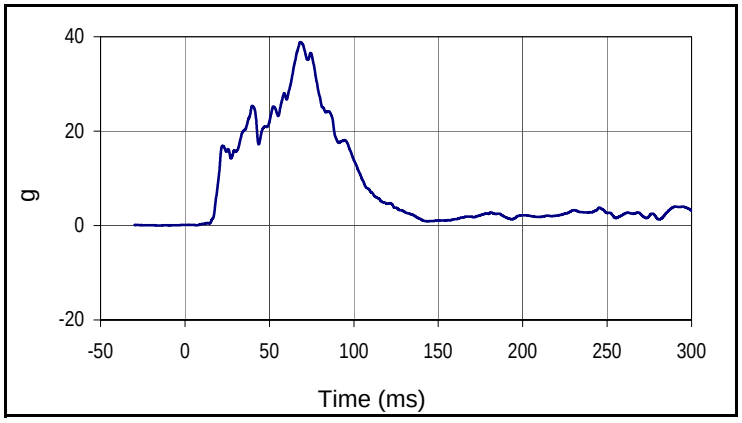

| Curve Description | | | |
|---|---|---|---|
| Passenger Chest Acceleration X Primary | | | |
| Plot No. | | SAE Class | Units |
| 021 | | 180 | g |
| Max | Time | Min | Time |
| 3.8 | 245.4 | -35.8 | 68.5 |




| Curve Description | | | |
|---|---|---|---|
| Passenger Chest Acceleration Y Primary | | | |
| Plot No. | | SAE Class | Units |
| 022 | | 180 | g |
| Max | Time | Min | Time |
| 4.7 | 28.9 | -5.7 | 57.6 |

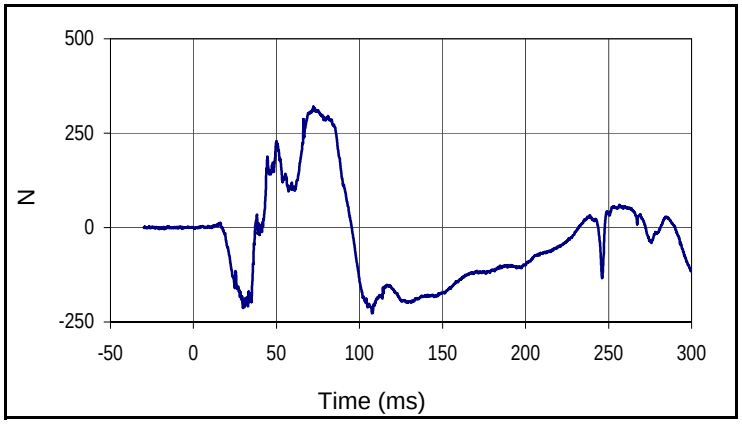



| Curve Description | | | |
|---|---|---|---|
| Passenger Chest Acceleration Z Primary | | | |
| Plot No. | | SAE Class | Units |
| 023 | | 180 | g |
| Max | Time | Min | Time |
| 10.2 | 98.6 | -15.1 | 67.9 |

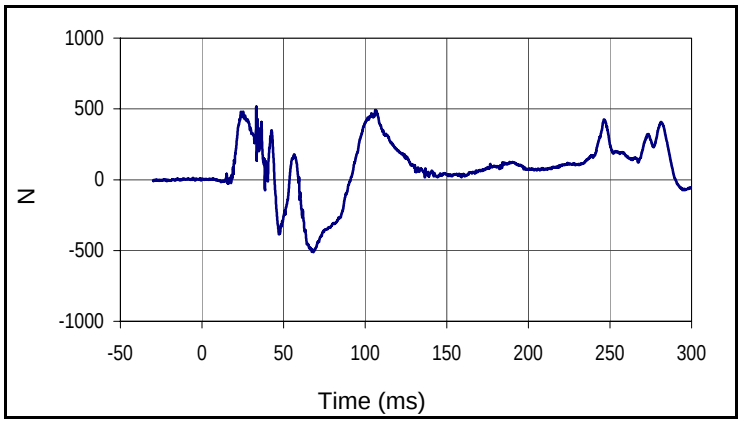



| Curve Description | | | |
|---|---|---|---|
| Passenger Chest Resultant Acceleration Primary | | | |
| Plot No. | | SAE Class | Units |
| 024 | | 180 | g |
| Max | Time | Min | Time |
| 38.9 | 68.3 | 0.0 | 7.1 |

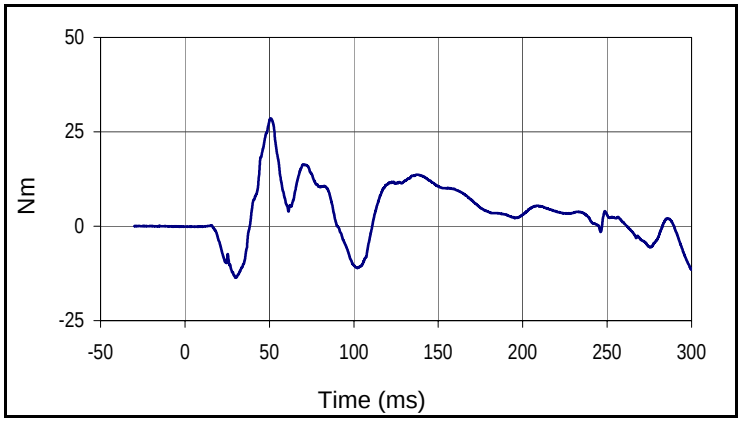
| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |



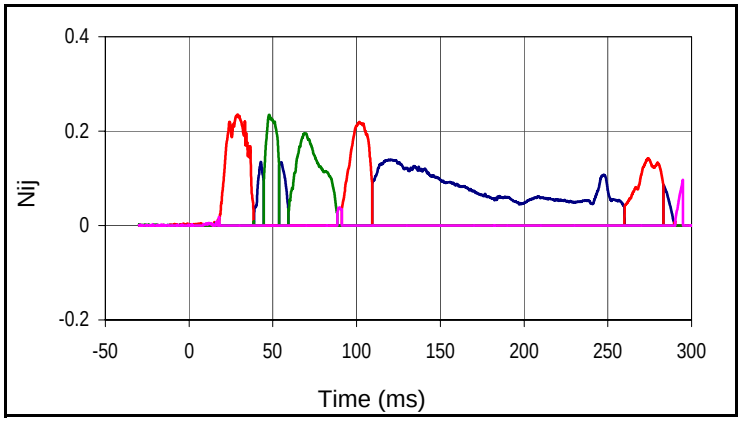

| Curve Description | | | |
|---|---|---|---|
| Passenger Upper Neck Force X | | | |
| Plot No. | | SAE Class | Units |
| 025 | | 1000 | N |
| Max | Time | Min | Time |
| 320.4 | 72.2 | -227.2 | 107.6 |




| Curve Description | | | |
|---|---|---|---|
| Passenger Upper Neck Force Z | | | |
| Plot No. | | SAE Class | Units |
| 026 | | 1000 | N |
| Max | Time | Min | Time |
| 514.4 | 33.3 | -512.5 | 68.3 |

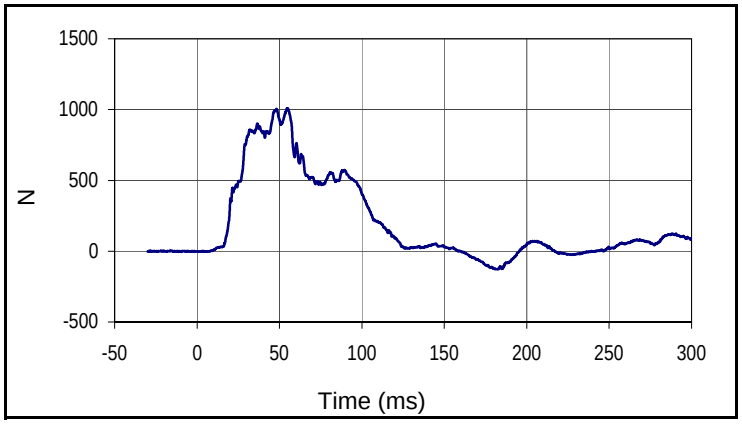



| Curve Description | | | |
|---|---|---|---|
| Passenger Upper Neck Moment Y | | | |
| Plot No. | | SAE Class | Units |
| 027 | | 600 | Nm |
| Max | Time | Min | Time |
| 28.6 | 50.8 | -13.6 | 29.8 |

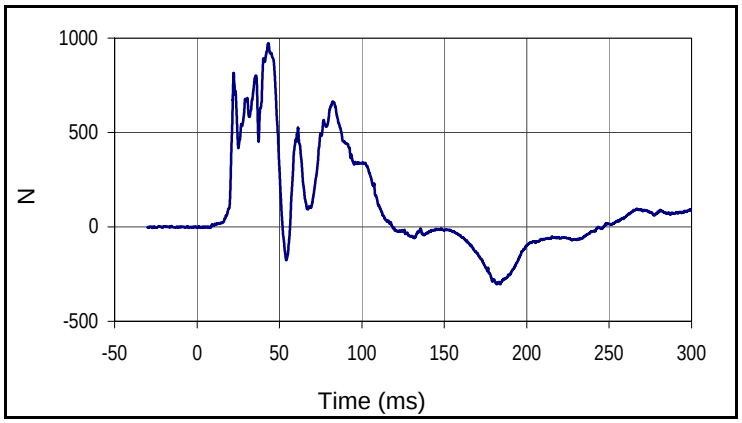



| Curve Description | | |
|---|---|---|
| Passenger Nij | | |
| Units | Max | Time |
| Ntf | 0.14 | 119.2 |
| Units | Max | Time |
| Nte | 0.24 | 28.9 |
| Units | Max | Time |
| Ncf | 0.23 | 47.9 |
| Units | Max | Time |
| Nce | 0.10 | 294.8 |

| | | | |
|---|---|---|---|
| Test Vehicle: | 2018 Mercedes-Benz GLC 300 4MATIC 5-Door MPV | NHTSA No.: | M20184300 |
| Test Program: | 56 km/h Frontal Impact NCAP Test | Test Date: | 12/12/17 |




| Curve Description | | | |
|---|---|---|---|
| Passenger Left Femur Force Z | | | |
| Plot No. | | SAE Class | Units |
| 029 | | 600 | N |
| Max | Time | Min | Time |
| 1010.6 | 55.0 | -127.7 | 181.9 |




| Curve Description | | | |
|---|---|---|---|
| Passenger Right Femur Force Z | | | |
| Plot No. | | SAE Class | Units |
| 030 | | 600 | N |
| Max | Time | Min | Time |
| 972.8 | 43.2 | -303.9 | 181.7 |

# APPENDIX C
# ATD CALIBRATION AND PERFORMANCE VERIFICATION DATA

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

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# Hybrid III 50th Percentile Male
# ATD Damage Checklist

ATD Serial No.: 360 Test Date: 2017-12-01

| Dummy Item | Inspect for | Comments | Damage | Okay |
|---|---|---|---|---|
| Entire ATD | Perform general cleaning | | | ✓ |
| Outer Skin | Gashes, rips, cracks | | | ✓ |
| Head | Ballast secure | | | ✓ |
| | General appearance | | | ✓ |
| Neck bracket | Upper neck firmly attached to lower bracket | | | ✓ |
| Neck | Broken or cracked rubber | | | ✓ |
| | Looseness at the condyle joint | | | ✓ |
| Nodding block | Cracked or out of position | | | ✓ |
| Lumbar Spine | Broken or cracked rubber | | | ✓ |
| Ribs | Broken or bent ribs | | | ✓ |
| | Broken or bent rib supports | | | ✓ |
| | Damping material separated or cracked | | | ✓ |
| | Rubber bumpers in place | | | ✓ |
| Chest Displ. | Bent shaft | | | ✓ |
| Assembly | Slider arm riding in track | | | ✓ |
| Sensors | Check cables for cuts, tears | | | ✓ |
| | Check for damaged insulation | | | ✓ |
| Accelerometer | Head mounting secure | | | ✓ |
| Mounting | Chest mounting secure | | | ✓ |
| Knees | Skin condition | | | ✓ |
| | Insert (do not remove) | | | ✓ |
| | Casting | | | ✓ |
| Limbs | Normal movement and adjustment | | | ✓ |
| Knee Sliders | Wires intact | | | ✓ |
| | Rubber returned to "resting" position | | | ✓ |
| Pelvis | Broken | | | ✓ |
| Other | Describe below as needed | | | ✓ |

Describe any repairs or replacement of parts or other findings:

Technician: _____ Approved By: _____

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# Hybrid III 50th Percentile Male
## External Measurements

ATD Serial No.: 360 Test Date: 2017-12-01

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.1 | Pass |
| Laboratory Relative Humidity | % | 10 | 70 | 29 | Pass |
| A - Total sitting height | mm | 879 | 889 | 883 | Pass |
| B - Shoulder pivot height | mm | 505 | 521 | 512 | Pass |
| C - 'H' point height | mm | 84 | 89 | 87 | Pass |
| D - 'H' point location from backline | mm | 135 | 140 | 140 | Pass |
| E - Shoulder pivot from backline | mm | 84 | 94 | 90 | Pass |
| F - Thigh clearance | mm | 140 | 155 | 152 | Pass |
| G - Back of elbow to wrist pivot | mm | 290 | 305 | 298 | Pass |
| H - Head back to backline | mm | 41 | 46 | 46 | Pass |
| I - Shoulder to elbow length | mm | 330 | 345 | 341 | Pass |
| J - Elbow rest height | mm | 190 | 211 | 202 | Pass |
| K - Buttock to knee length | mm | 579 | 604 | 589 | Pass |
| L - Popliteal length | mm | 429 | 455 | 435 | Pass |
| M - Knee pivot height | mm | 485 | 500 | 496 | Pass |
| N - Buttock popliteal length | mm | 452 | 477 | 472 | Pass |
| O - Chest depth without jacket | mm | 213 | 229 | 223 | Pass |
| P - Foot length | mm | 251 | 267 | 262 | Pass |
| V - Shoulder breadth | mm | 422 | 437 | 433 | Pass |
| W - Foot breadth | mm | 91 | 107 | 101 | Pass |
| Y - Chest circum. (w/chest jacket) | mm | 970 | 1001 | 981 | Pass |
| Z - Waist circum. | mm | 836 | 866 | 849 | Pass |
| AA - Location for chest circum. | mm | 429 | 434 | 432 | Pass |
| BB - Location for waist circum. | mm | 226 | 231 | 230 | Pass |
| | | | Overall Test Results | | Pass |

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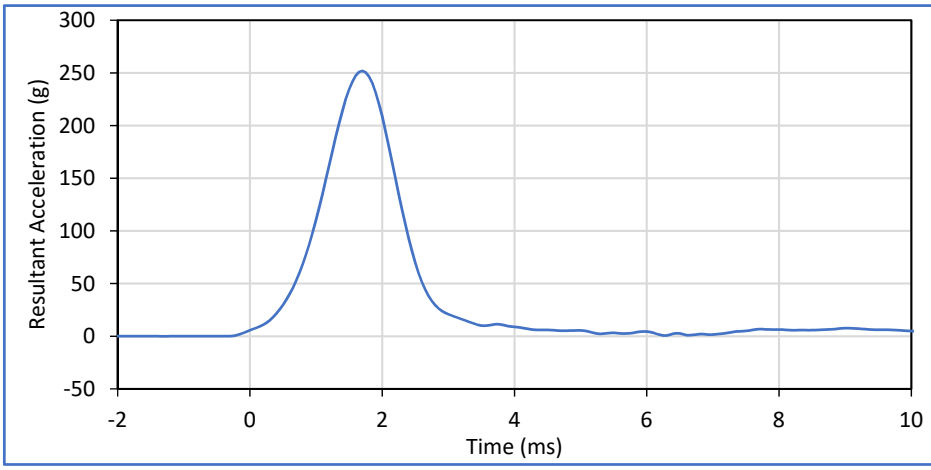
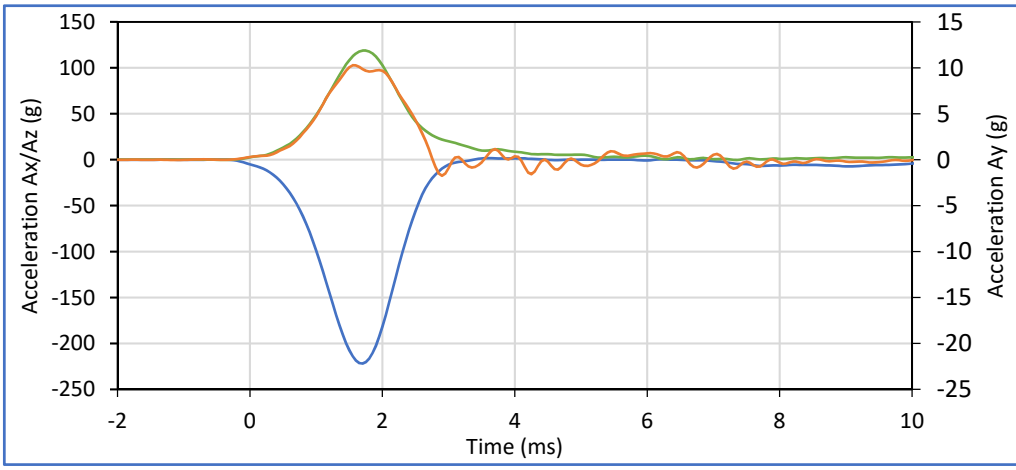
# Hybrid III 50th Percentile Male
## Head Drop

ATD Serial No.: 360 Test Date: 2017-11-29

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 18.9 | 25.6 | 20.7 | Pass |
| Laboratory Humidity | % | 10 | 70 | 26 | Pass |
| Peak Resultant Acceleration | g | 225.0 | 275.0 | 251.9 | Pass |
| Peak Lateral Acceleration | g | -15.0 | 15.0 | 10.3 | Pass |
| Oscillations After Main Pulse | % | 0.0 | 10.0 | 3.0 | Pass |
| Is Acceleration Unimodal? | Yes/No | Yes | | Yes | Pass |
| | | | Overall Test Results | | Pass |




**Head Acceleration Resultant**
Max:251.9@1.7 / Min:0.7@6.3
SAE Class 1000




**Head Ax**
Max:1.7@3.6 / Min:-221.9@1.7
SAE Class 1000

**Head Ay**
Max:10.3@1.6 / Min:-1.7@2.9
SAE Class 1000

**Head Az**
Max:118.9@1.8 / Min:-0.3@7.4
SAE Class 1000

Technician: Approved By:

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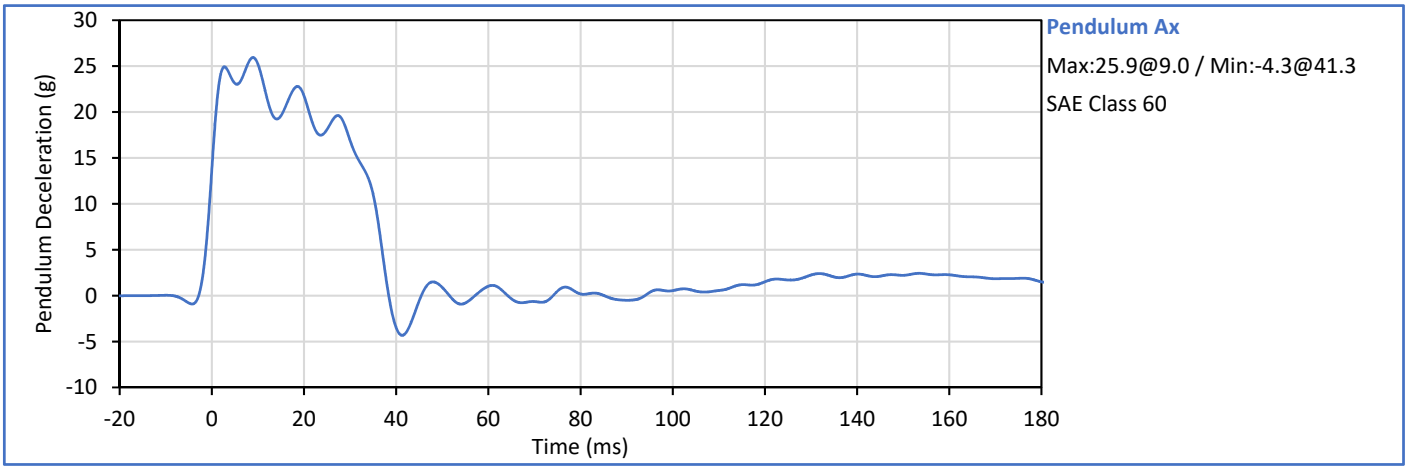
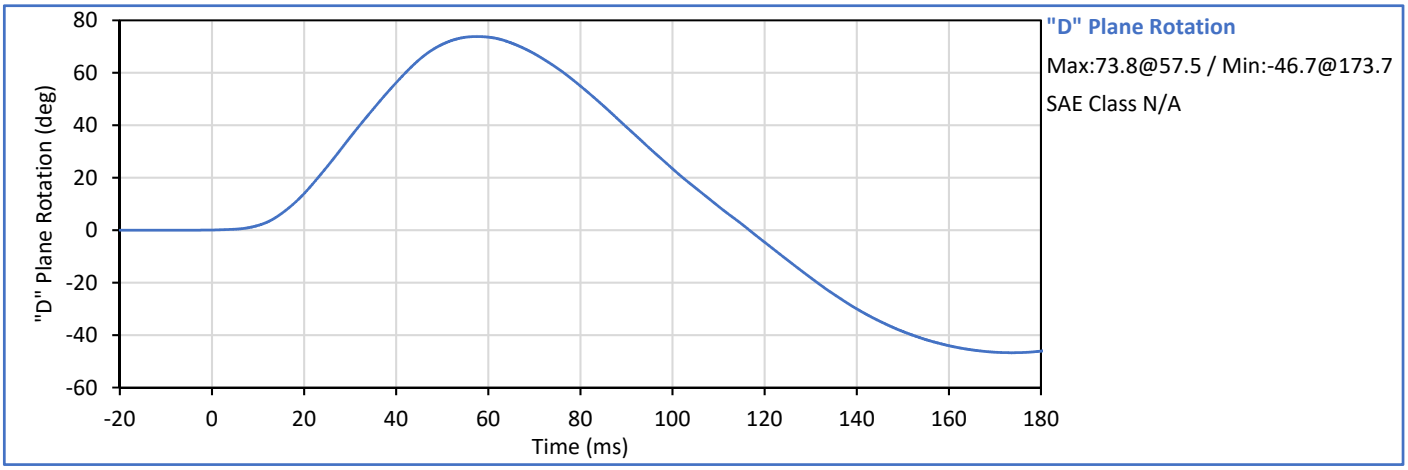
# Hybrid III 50th Percentile Male
## Neck Flexion Test

ATD Serial No.: 360 Test Date: 2017-11-29

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 20.7 | Pass |
| Laboratory Humidity | % | 10 | 70 | 22 | Pass |
| Pendulum Velocity | m/s | 6.89 | 7.13 | 7.02 | Pass |
| Pendulum Deceleration at 10 ms | g | 22.5 | 27.5 | 25.2 | Pass |
| Pendulum Deceleration at 20 ms | g | 17.6 | 22.6 | 21.8 | Pass |
| Pendulum Deceleration at 30 ms | g | 12.5 | 18.5 | 16.9 | Pass |
| Peak Pendulum Decel. after 30 ms | g | 0.0 | 29.0 | 16.9 | Pass |
| Deceleration Decay to Cross 5 g | ms | 34.0 | 42.0 | 37.0 | Pass |
| "D" Plane Rotation peak | deg | 64.0 | 78.0 | 73.8 | Pass |
| | ms | 57.0 | 64.0 | 57.5 | Pass |
| "D" Plane Rotation Decay To Zero | ms | 113.0 | 128.0 | 116.8 | Pass |
| Moment About Occipital Condyle | Nm | 88.1 | 108.5 | 93.1 | Pass |
| | ms | 47.0 | 58.0 | 50.0 | Pass |
| Moment Decay, Peak to Zero | deg | 97.0 | 107.0 | 98.6 | Pass |
| | | | Overall Test Results | | Pass |

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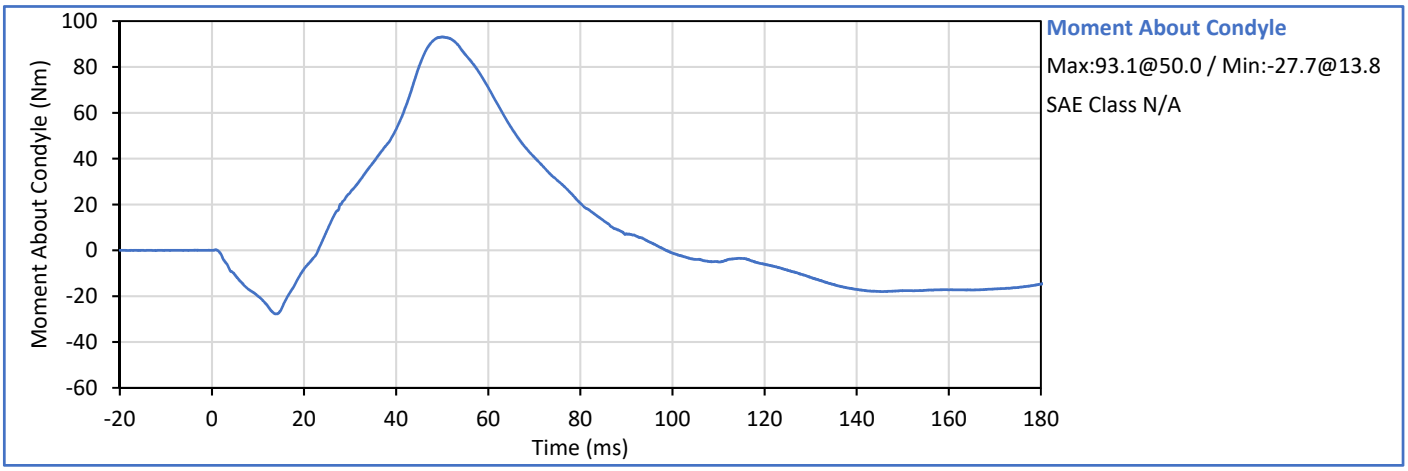
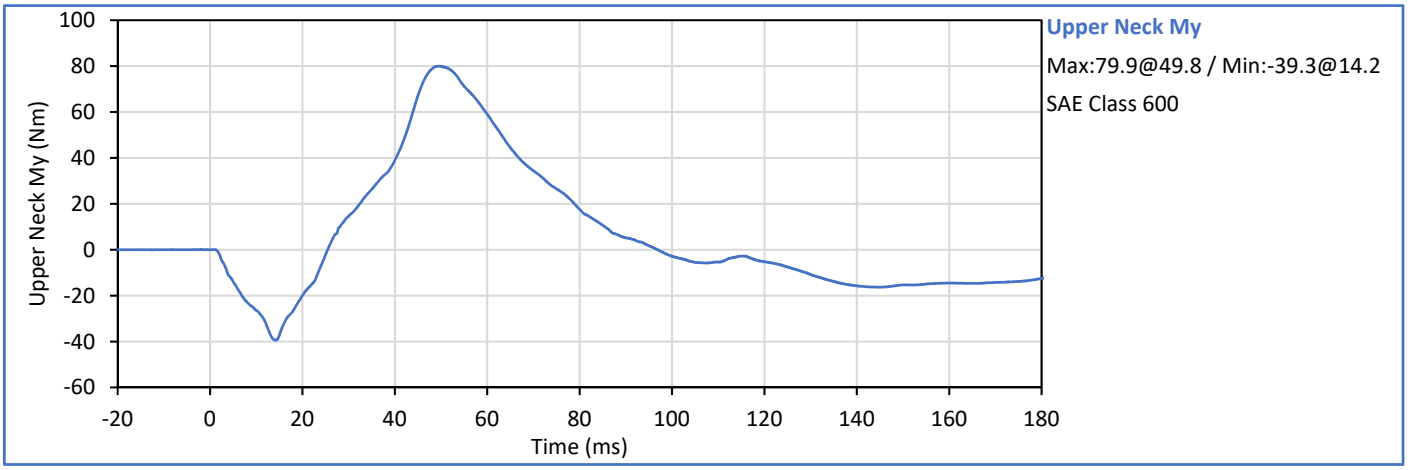
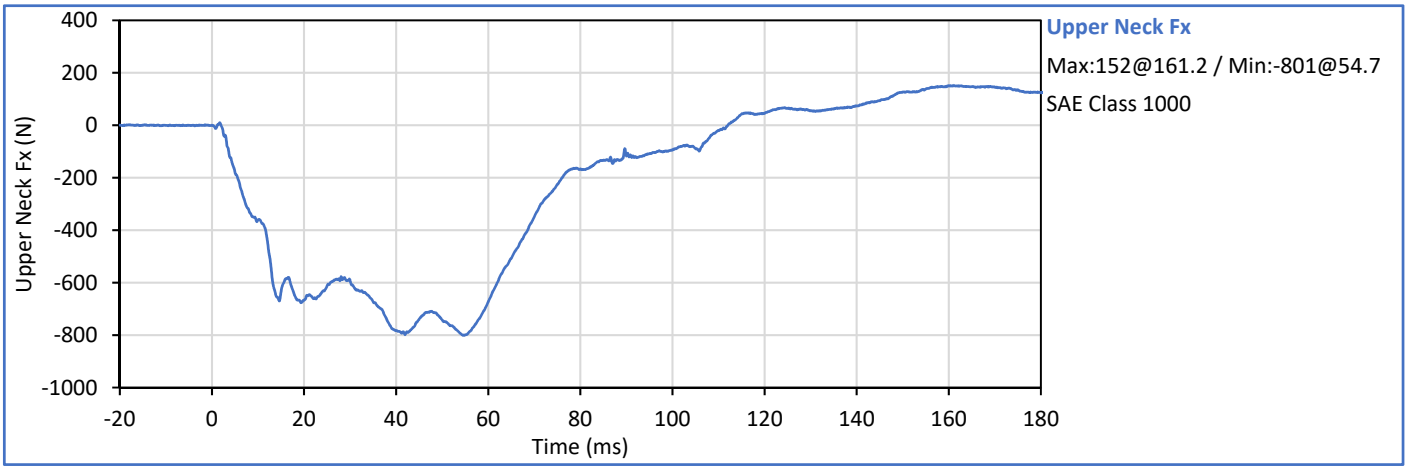
# Hybrid III 50th Percentile Male
# Neck Flexion Test

ATD Serial No.: 360 Test Date: 2017-11-29



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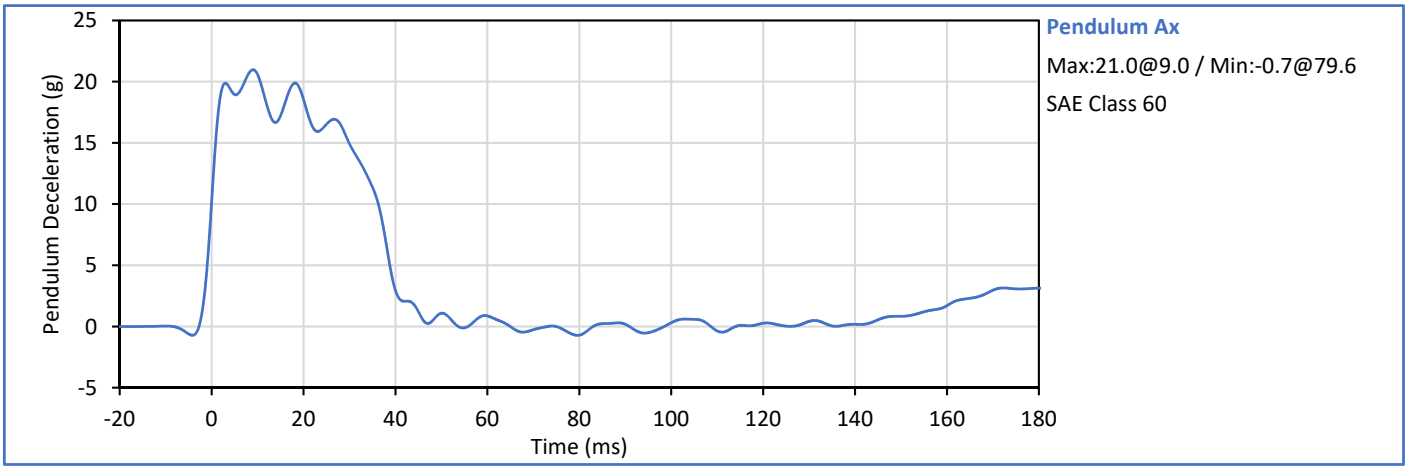
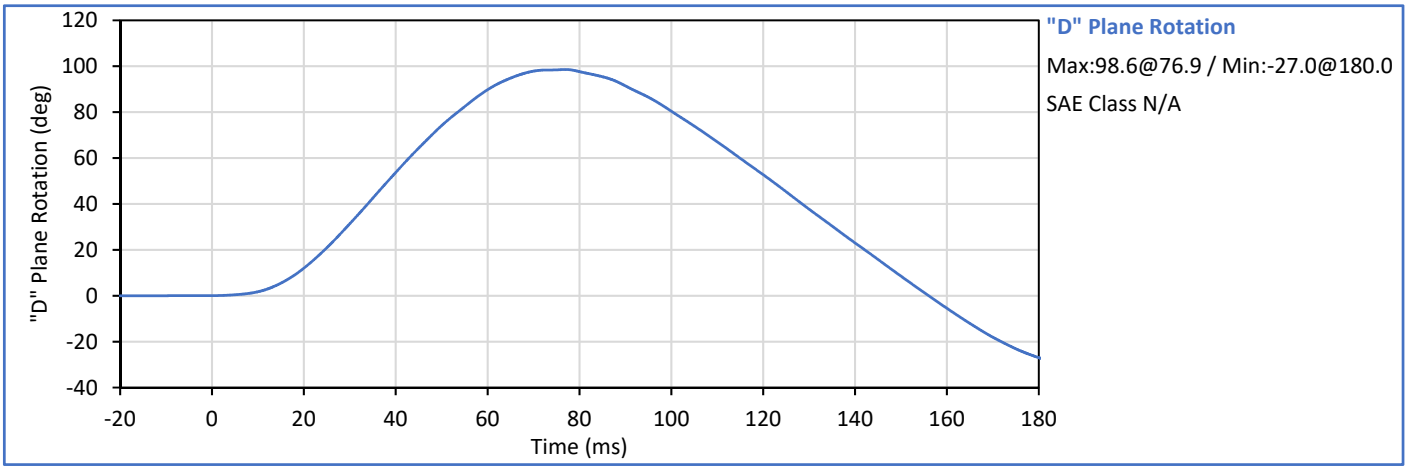
# Hybrid III 50th Percentile Male
# Neck Extension Test

ATD Serial No.: 360 Test Date: 2017-11-29

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 20.8 | Pass |
| Laboratory Humidity | % | 10 | 70 | 23 | Pass |
| Pendulum Velocity | m/s | 5.94 | 6.19 | 6.00 | Pass |
| Pendulum Deceleration at 10 ms | g | 17.2 | 21.2 | 20.6 | Pass |
| Pendulum Deceleration at 20 ms | g | 14.0 | 19.0 | 18.5 | Pass |
| Pendulum Deceleration at 30 ms | g | 11.0 | 16.0 | 14.9 | Pass |
| Peak Pendulum Decel. after 30 ms | g | 0.0 | 22.0 | 14.9 | Pass |
| Deceleration Decay to Cross 5 g | ms | 38.0 | 46.0 | 38.8 | Pass |
| "D" Plane Rotation peak | deg | 81.0 | 106.0 | 98.6 | Pass |
| | ms | 72.0 | 82.0 | 76.9 | Pass |
| "D" Plane Rotation Decay To Zero | ms | 147.0 | 174.0 | 156.1 | Pass |
| Moment About Occipital Condyle | Nm | -79.9 | -52.9 | -66.4 | Pass |
| | ms | 65.0 | 79.0 | 68.5 | Pass |
| Moment Decay, Peak to Zero | deg | 120.0 | 148.0 | 135.0 | Pass |
| | | | Overall Test Results | | Pass |

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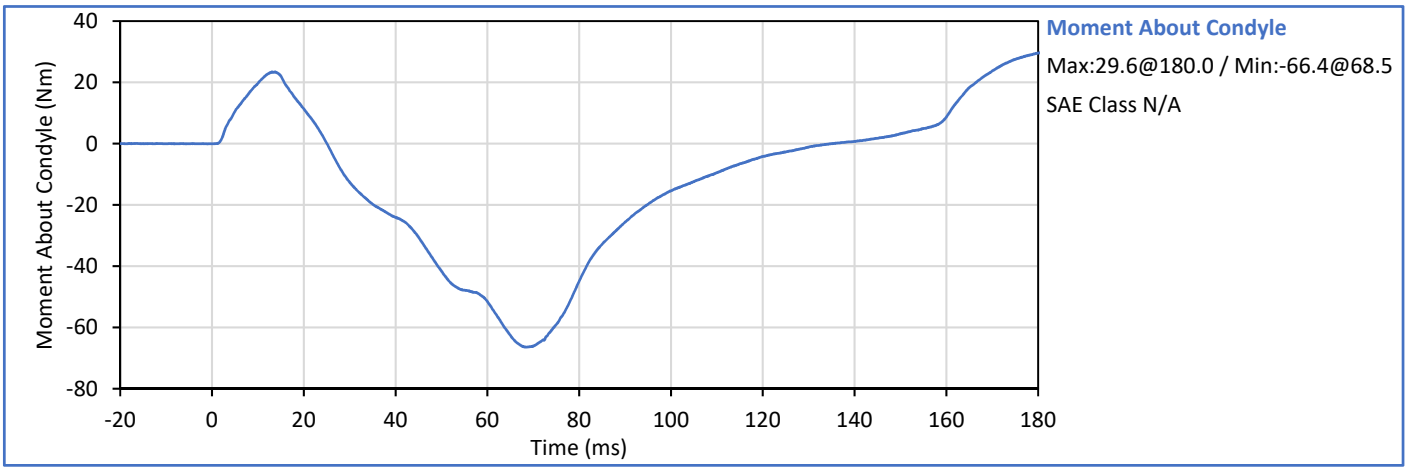
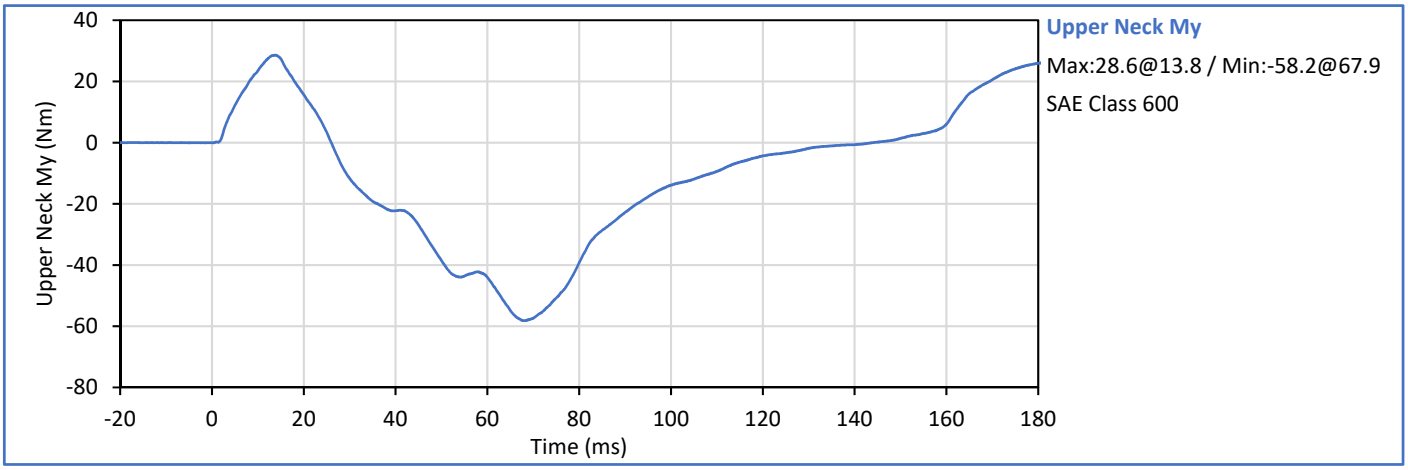
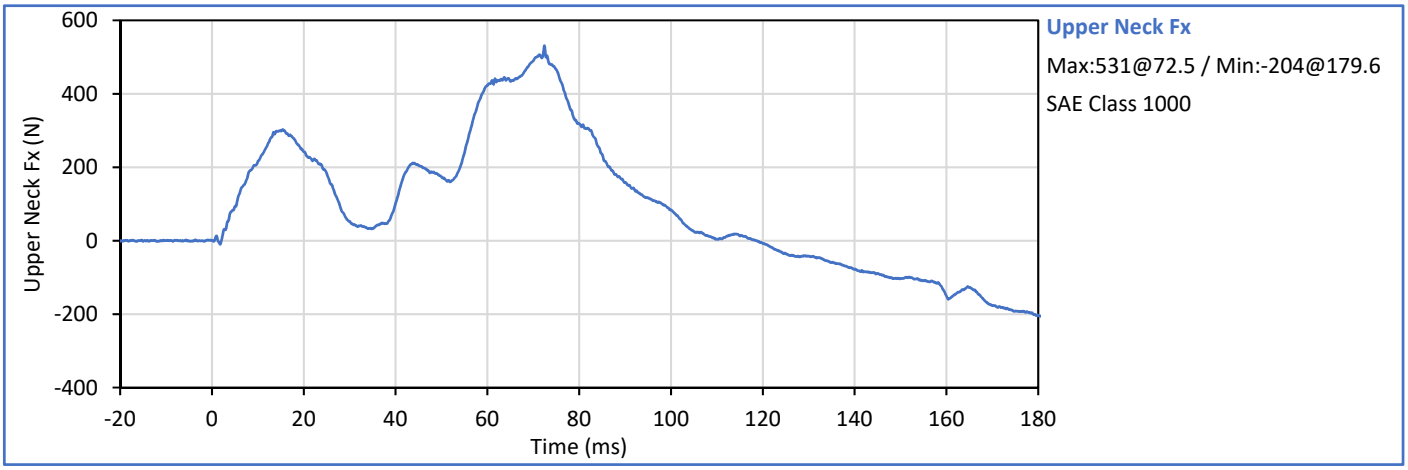
# Hybrid III 50th Percentile Male
# Neck Extension Test

ATD Serial No.: 360 Test Date: 2017-11-29



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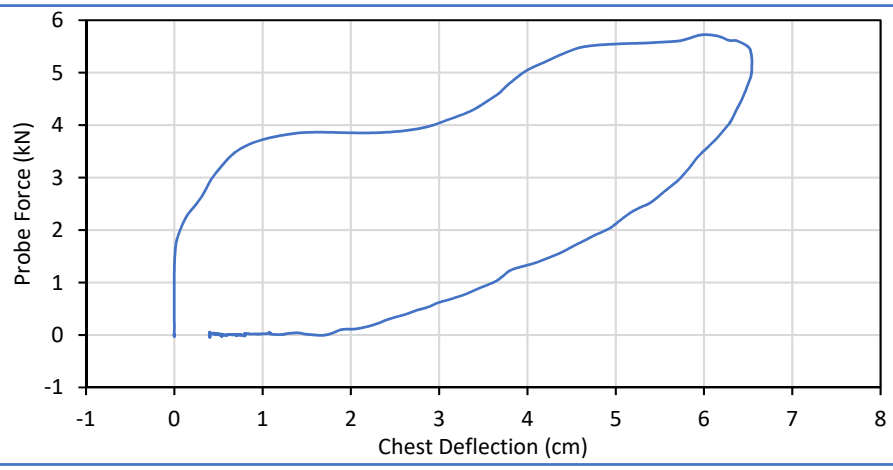
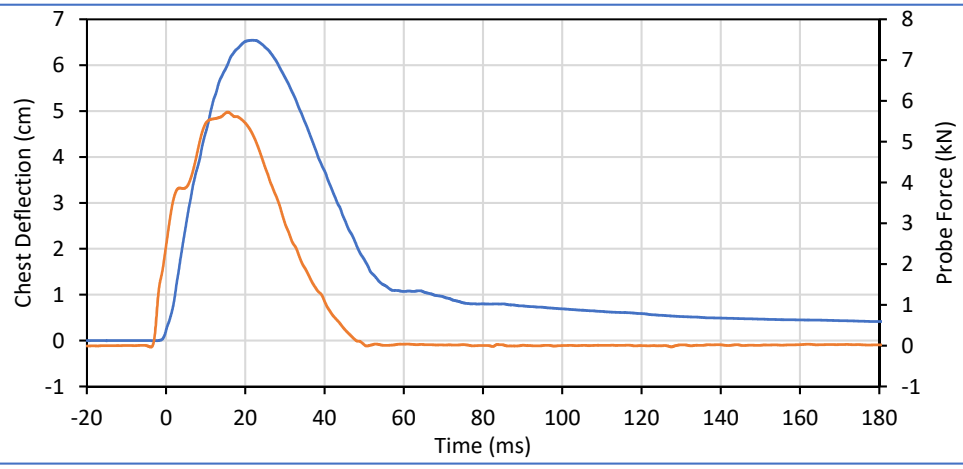
# Hybrid III 50th Percentile Male
# Thorax Impact

ATD Serial No.: 360 Test Date: 2017-12-01

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.9 | Pass |
| Laboratory Humidity | % | 10 | 70 | 22 | Pass |
| Probe Velocity | m/s | 6.58 | 6.82 | 6.66 | Pass |
| Peak Chest Deflection | cm | 6.35 | 7.26 | 6.54 | Pass |
| Peak Probe Force | kN | 5.159 | 5.893 | 5.726 | Pass |
| Internal Hysterisis | % | 69.0 | 85.0 | 72.8 | Pass |
| | | | Overall Test Results | | Pass |




**Probe Force**
Max:5.726@6.01 / Min:-0.03@0.53
SAE Class N/A




**Chest Deflection**
Max:6.54@21.7 / Min:0.23@0.0
SAE Class 600

**Probe Force**
Max:5.726@15.5 / Min:-0.029@127.6
SAE Class 180

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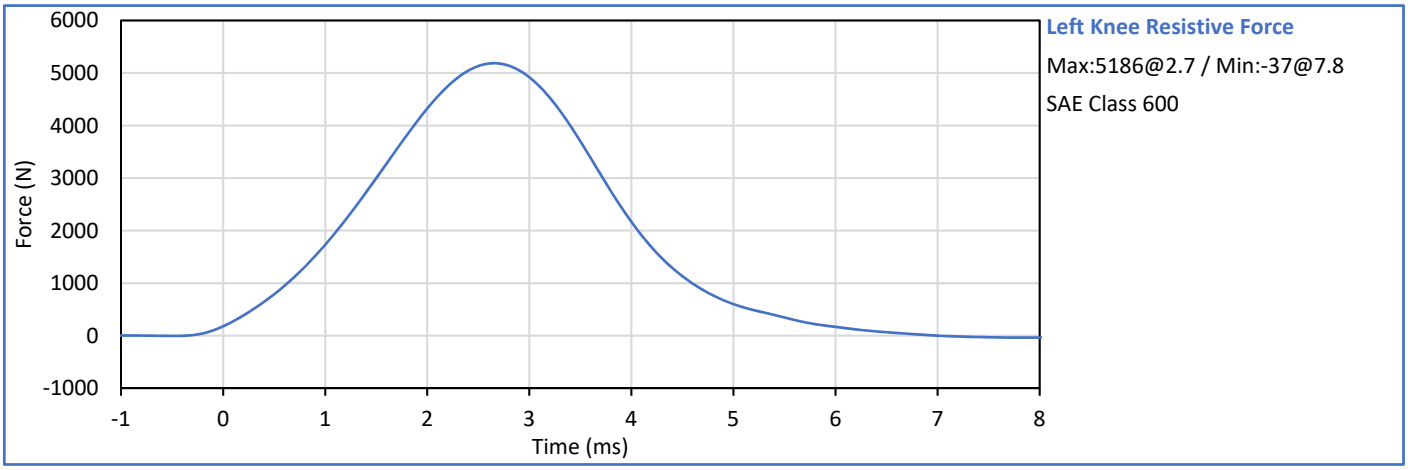
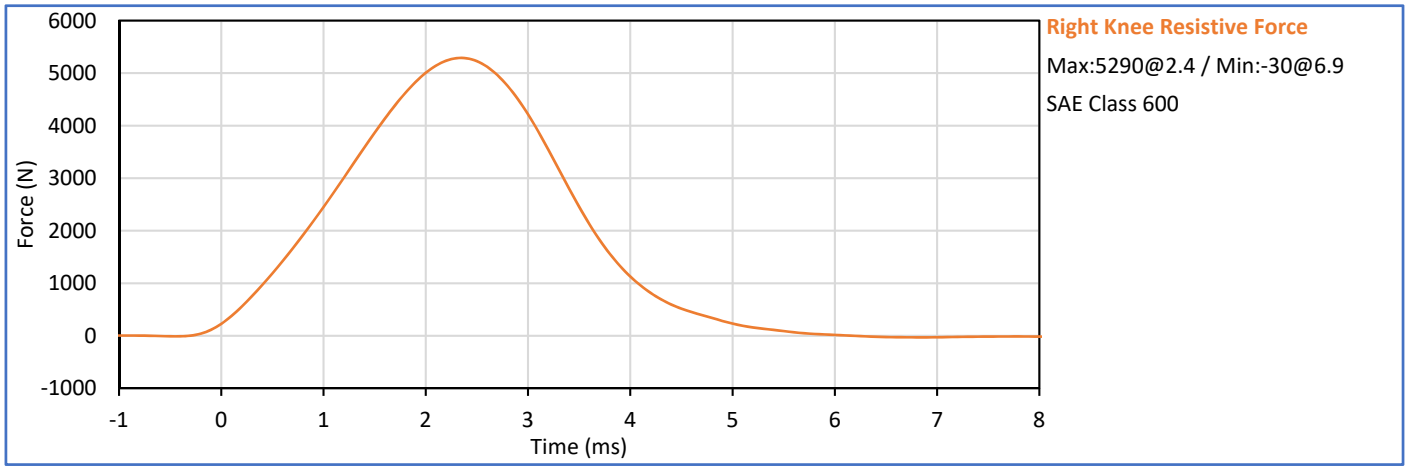
# Hybrid III 50th Percentile Male
# Knee Impact (Left/Right)

ATD Serial No.: 360 Test Date: 2017-11-28

| | Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|---|
| | Laboratory Temperature | °C | 18.9 | 25.6 | 21.1 | Pass |
| | Laboratory Humidity | % | 10 | 70 | 25 | Pass |
| Left Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.095 | Pass |
| | Peak Resistive Force | N | 4715 | 5782 | 5186 | Pass |
| Right Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.092 | Pass |
| | Peak Resistive Force | N | 4715 | 5782 | 5290 | Pass |
| | | | | Overall Test Results | | Pass |

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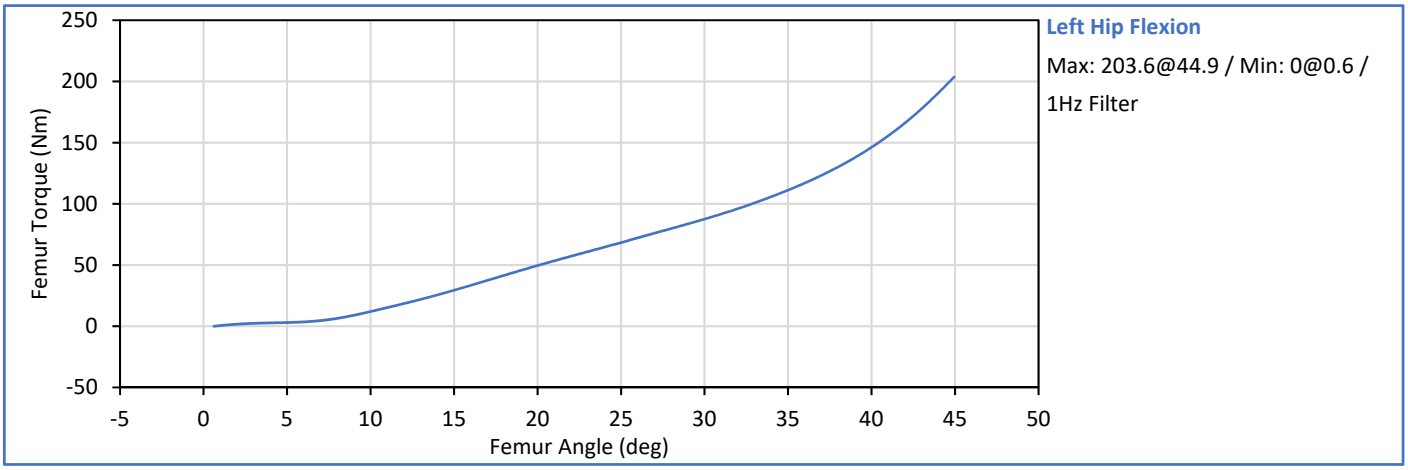
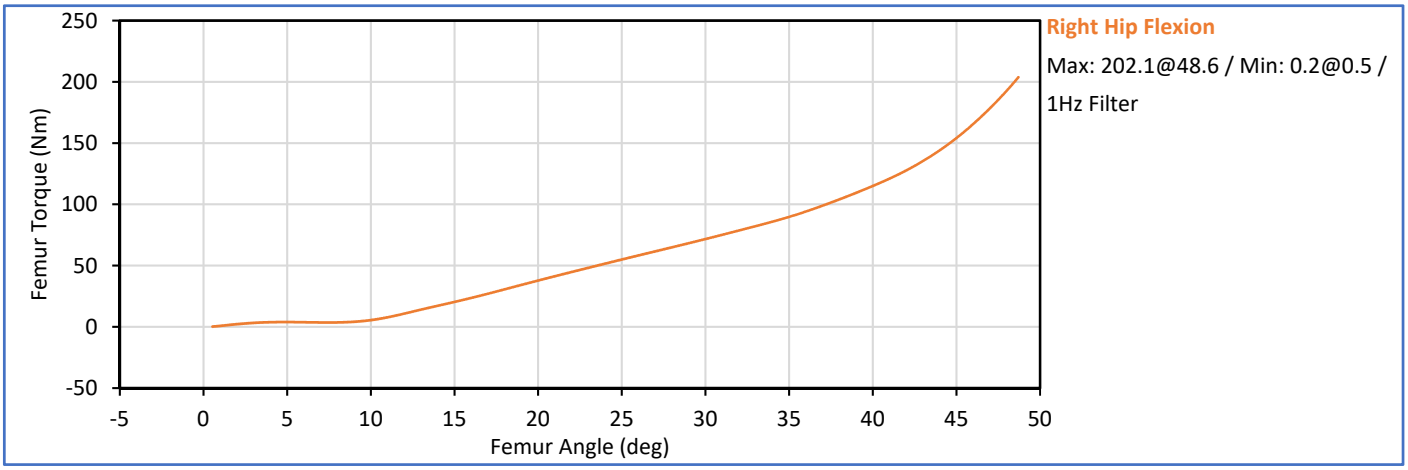
# Hybrid III 50th Percentile Male
## Hip Flexion (Left/Right)

ATD Serial No.: 360 Test Date: 2017-11-26

| | Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|---|
| | Laboratory Temperature | °C | 18.9 | 25.6 | 21.1 | Pass |
| | Laboratory Humidity | % | 10 | 70 | 27 | Pass |
| Left Hip | Left Hip Rotation Rate | deg/s | 5.0 | 10.0 | 8.0 | Pass |
| | Left Femur Torque at 30° | Nm | 0.0 | 95.0 | 87.6 | Pass |
| | Left Hip Rotation at 203 Nm | deg | 40.0 | 50.0 | 44.9 | Pass |
| Right Hip | Right Hip Rotation Rate | deg/s | 5.0 | 10.0 | 8.0 | Pass |
| | Right Femur Torque at 30° | Nm | 0.0 | 95.0 | 71.7 | Pass |
| | Right Hip Rotation at 203 Nm | deg | 40.0 | 50.0 | 48.6 | Pass |
| | | | | Overall Test Results | | Pass |

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# Hybrid III 5th Percentile Female
# ATD Damage Checklist

ATD Serial No.: 630 Test Date: 2017-11-21

| Dummy Item | Inspect for | Comments | Damage | Okay |
|---|---|---|---|---|
| Entire ATD | Perform general cleaning | | | ✓ |
| Outer Skin | Gashes, rips, cracks | | | ✓ |
| Head | Ballast secure | | | ✓ |
| | General appearance | | | ✓ |
| Neck bracket | Upper neck firmly attached to lower bracket | | | ✓ |
| Neck | Broken or cracked rubber | | | ✓ |
| | Looseness at the condyle joint | | | ✓ |
| Nodding block | Cracked or out of position | | | ✓ |
| Lumbar Spine | Broken or cracked rubber | | | ✓ |
| Ribs | Broken or bent ribs | | | ✓ |
| | Broken or bent rib supports | | | ✓ |
| | Damping material separated or cracked | | | ✓ |
| | Rubber bumpers in place | | | ✓ |
| Chest Displ. | Bent shaft | | | ✓ |
| Assembly | Slider arm riding in track | | | ✓ |
| Sensors | Check cables for cuts, tears | | | ✓ |
| | Check for damaged insulation | | | ✓ |
| Accelerometer | Head mounting secure | | | ✓ |
| Mounting | Chest mounting secure | | | ✓ |
| Knees | Skin condition | | | ✓ |
| | Insert (do not remove) | | | ✓ |
| | Casting | | | ✓ |
| Limbs | Normal movement and adjustment | | | ✓ |
| Knee Sliders | Wires intact | | | ✓ |
| | Rubber returned to "resting" position | | | ✓ |
| Pelvis | Broken | | | ✓ |
| Other | Describe below as needed | | | ✓ |

Describe any repairs or replacement of parts or other findings:

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# Hybrid III 5th Percentile Female
## External Measurements

ATD Serial No.: 630 Test Date: 2017-11-21

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.3 | Pass |
| Laboratory Relative Humidity | % | 10 | 70 | 33 | Pass |
| A - Total sitting height | mm | 775 | 800 | 788 | Pass |
| B - Shoulder pivot height | mm | 432 | 457 | 449 | Pass |
| C - 'H' point height | mm | 81 | 86 | 85 | Pass |
| D - 'H' point location from backline | mm | 145 | 150 | 147 | Pass |
| E - Shoulder pivot from backline | mm | 69 | 84 | 76 | Pass |
| F - Thigh clearance | mm | 119 | 135 | 124 | Pass |
| G - Back of elbow to wrist pivot | mm | 244 | 259 | 252 | Pass |
| H - Head back to backline | mm | 41 | 46 | 44 | Pass |
| I - Shoulder to elbow length | mm | 277 | 297 | 289 | Pass |
| J - Elbow rest height | mm | 183 | 203 | 194 | Pass |
| K - Buttock to knee length | mm | 521 | 546 | 529 | Pass |
| L - Popliteal length | mm | 356 | 376 | 371 | Pass |
| M - Knee pivot height | mm | 394 | 419 | 405 | Pass |
| N - Buttock popliteal length | mm | 414 | 439 | 428 | Pass |
| O - Chest depth without jacket | mm | 175 | 191 | 184 | Pass |
| P - Foot length | mm | 219 | 234 | 224 | Pass |
| R - Buttock to Knee Pivot Length | mm | 457 | 483 | 468 | Pass |
| S - Head Breadth | mm | 137 | 147 | 142 | Pass |
| T - Head Depth | mm | 178 | 188 | 181 | Pass |
| U - Hip Breadth | mm | 300 | 315 | 302 | Pass |
| V - Shoulder breadth | mm | 351 | 366 | 361 | Pass |
| W - Foot breadth | mm | 79 | 94 | 87 | Pass |
| X - Head circum. | mm | 528 | 549 | 545 | Pass |
| Y - Chest circum. (w/chest jacket) | mm | 851 | 881 | 861 | Pass |
| Z - Waist circum. | mm | 760 | 790 | 773 | Pass |
| AA - Location for chest circum. | mm | 300 | 310 | 303 | Pass |
| BB - Location for waist circum. | mm | 160 | 170 | 166 | Pass |
| | | | Overall Test Results | | Pass |

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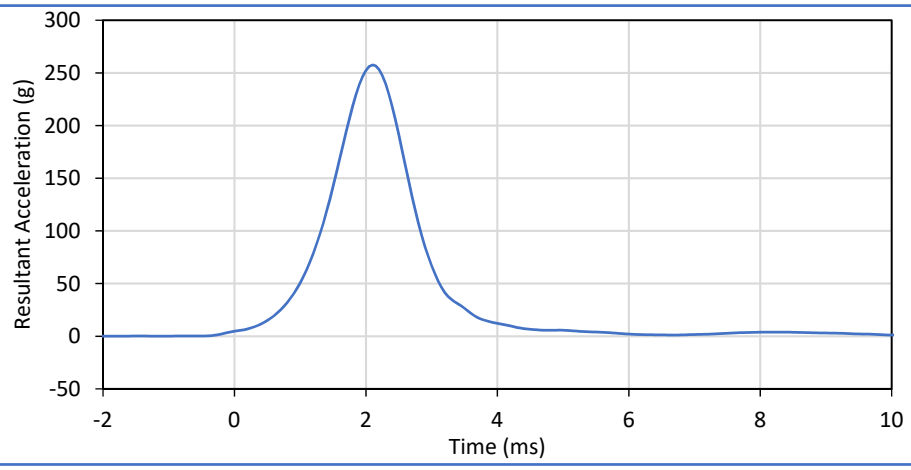
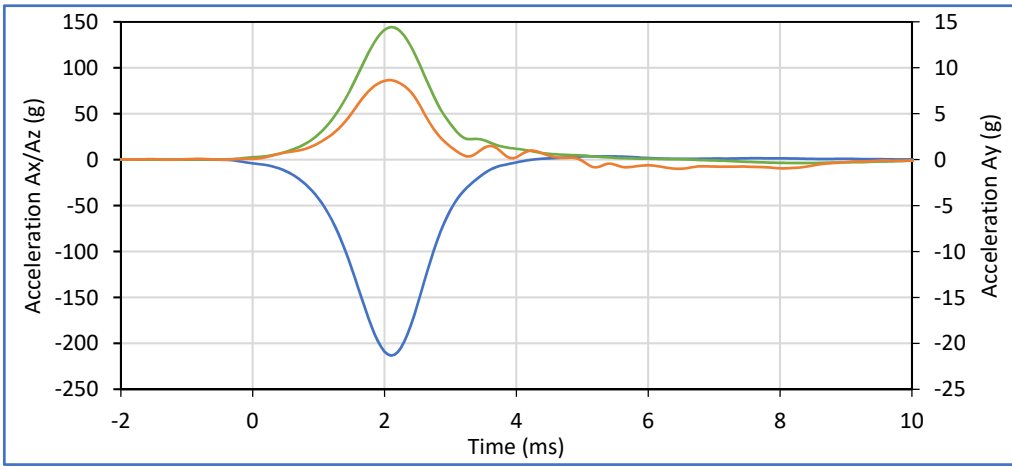
# Hybrid III 5th Percentile Female
## Head Drop

ATD Serial No.: 630 Test Date: 2017-11-21

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 18.9 | 25.6 | 20.6 | Pass |
| Laboratory Humidity | % | 10 | 70 | 17 | Pass |
| Peak Resultant Acceleration | g | 250.0 | 300.0 | 257.6 | Pass |
| Peak Lateral Acceleration | g | -15.0 | 15.0 | 8.7 | Pass |
| Oscillations After Main Pulse | % | 0.0 | 10.0 | 1.5 | Pass |
| Is Acceleration Unimodal? | Yes/No | Yes | | Yes | Pass |
| | | | Overall Test Results | | Pass |




**Head Acceleration Resultant**
Max:257.6@2.1 / Min:1.2@10.0
SAE Class 1000




**Head Ax**
Max:3.6@5.1 / Min:-213.1@2.1
SAE Class 1000

**Head Ay**
Max:8.7@2.1 / Min:-1.0@6.5
SAE Class 1000

**Head Az**
Max:144.3@2.1 / Min:-3.7@8.4
SAE Class 1000

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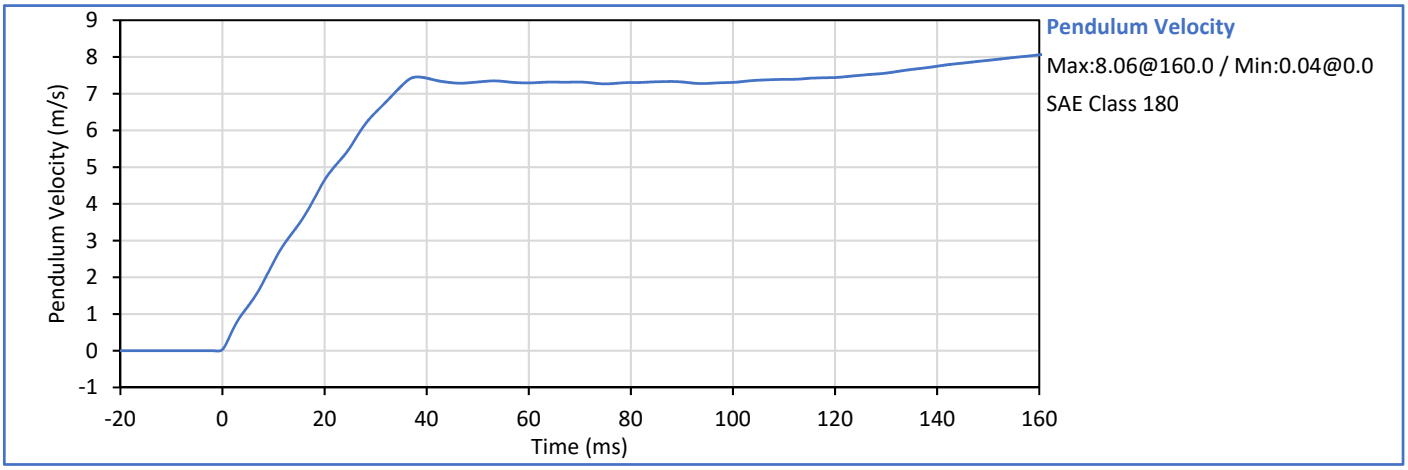
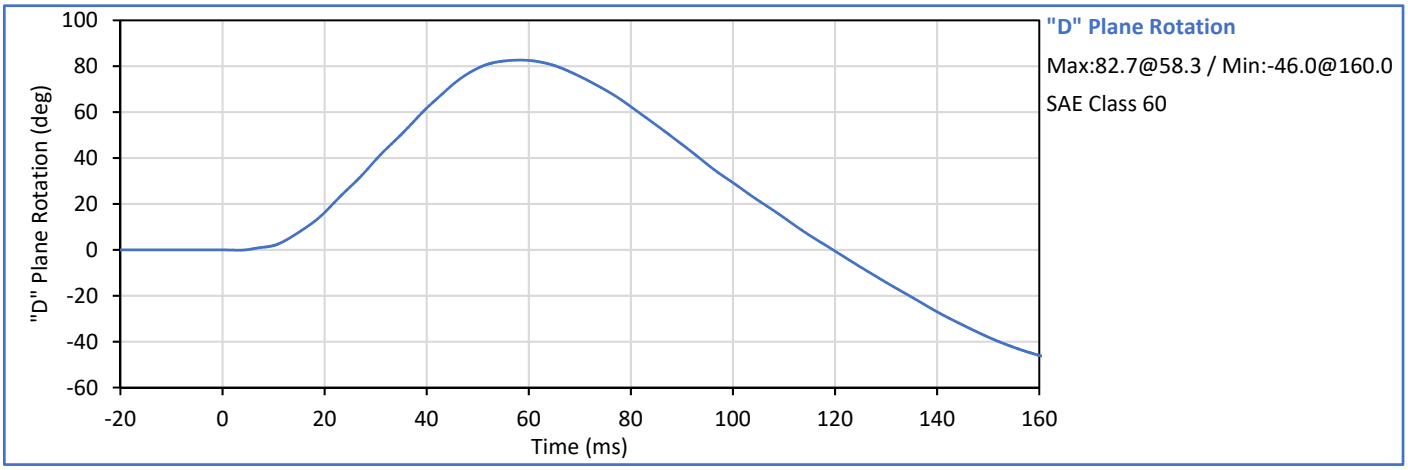
# Hybrid III 5th Percentile Female
# Neck Flexion Test

ATD Serial No.: 630 Test Date: 2017-11-22

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.2 | Pass |
| Laboratory Humidity | % | 10 | 70 | 20 | Pass |
| Pendulum Velocity | m/s | 6.89 | 7.13 | 7.12 | Pass |
| Pendulum Velocity at 10 ms | m/s | 2.10 | 2.50 | 2.41 | Pass |
| Pendulum Velocity at 20 ms | m/s | 4.00 | 5.00 | 4.65 | Pass |
| Pendulum Velocity at 30 ms | m/s | 5.80 | 7.00 | 6.49 | Pass |
| Peak "D" Plane Rotation | deg | 77.0 | 91.0 | 82.7 | Pass |
| Peak Moment in Rotation | Nm | 69.0 | 83.0 | 79.0 | Pass |
| Positive Moment Decay to 10 Nm | ms | 80.0 | 100.0 | 85.0 | Pass |
| | | | Overall Test Results | | Pass |

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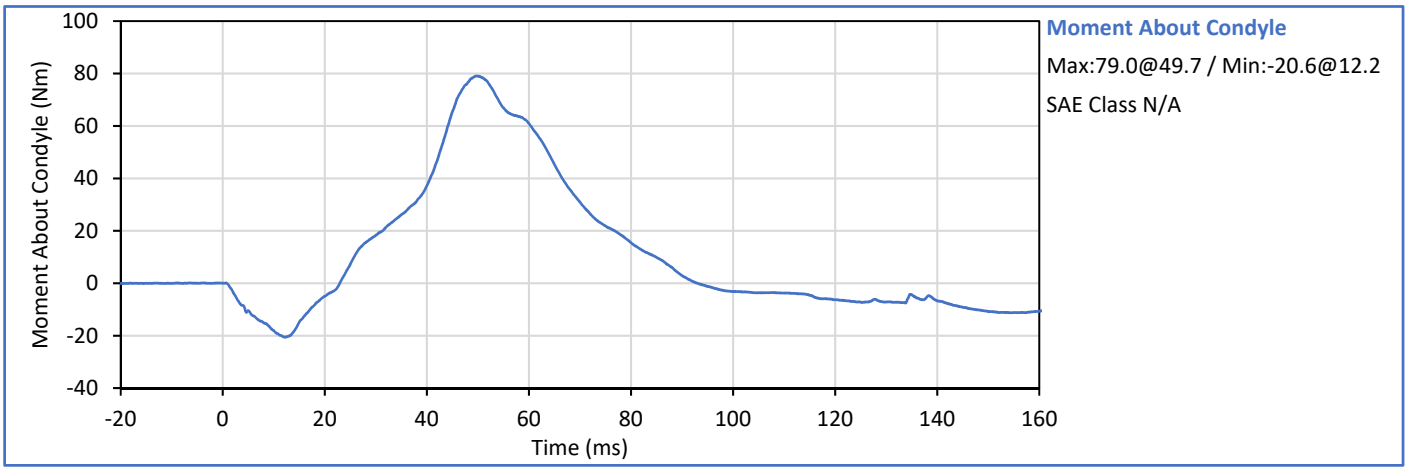
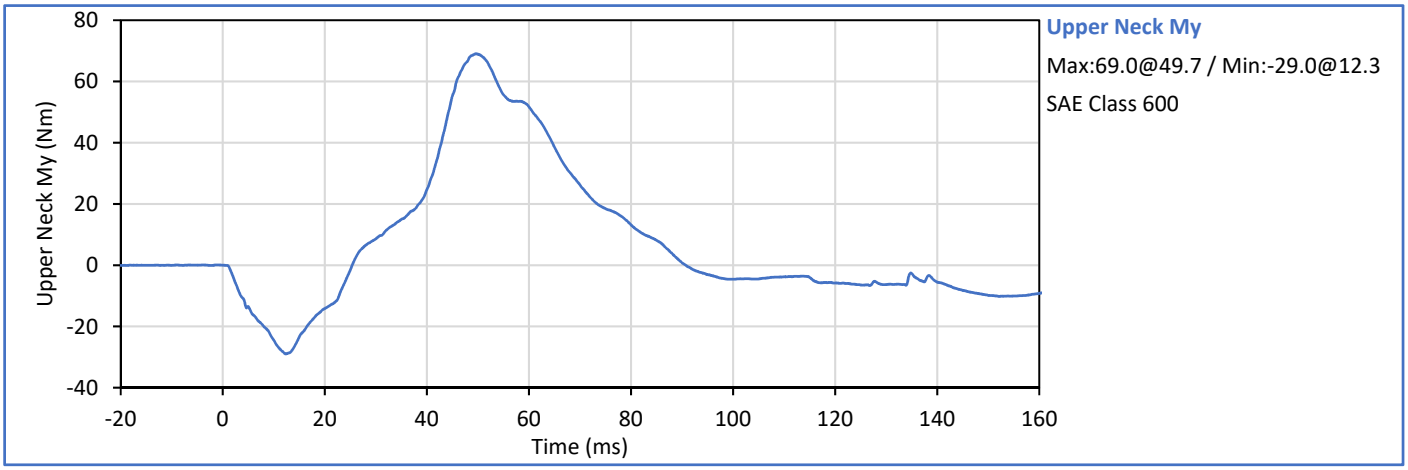
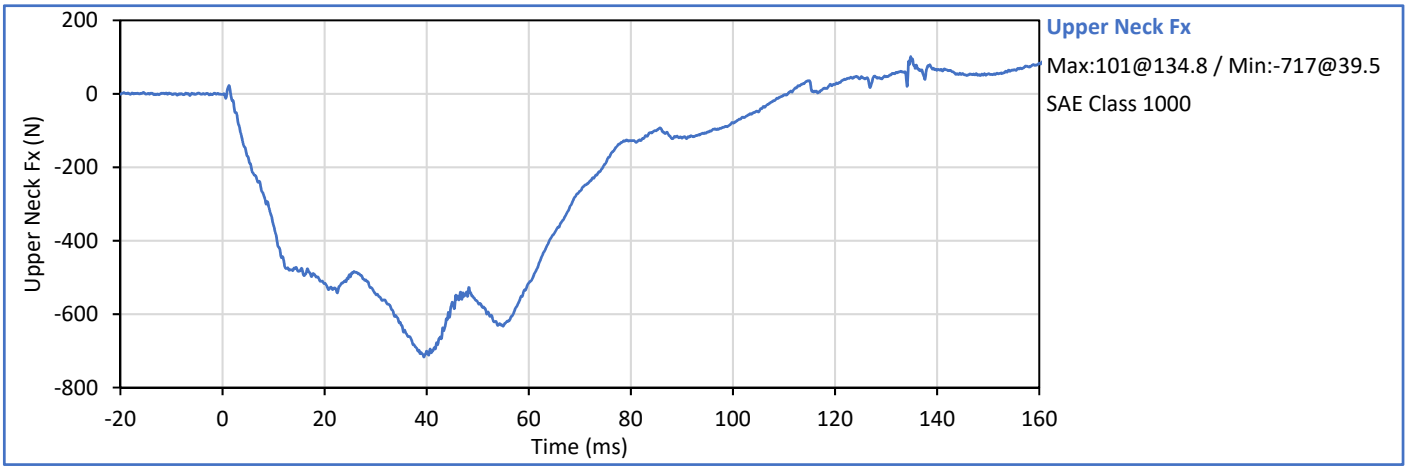
# Hybrid III 5th Percentile Female
# Neck Flexion Test

ATD Serial No.: 630 Test Date: 2017-11-22



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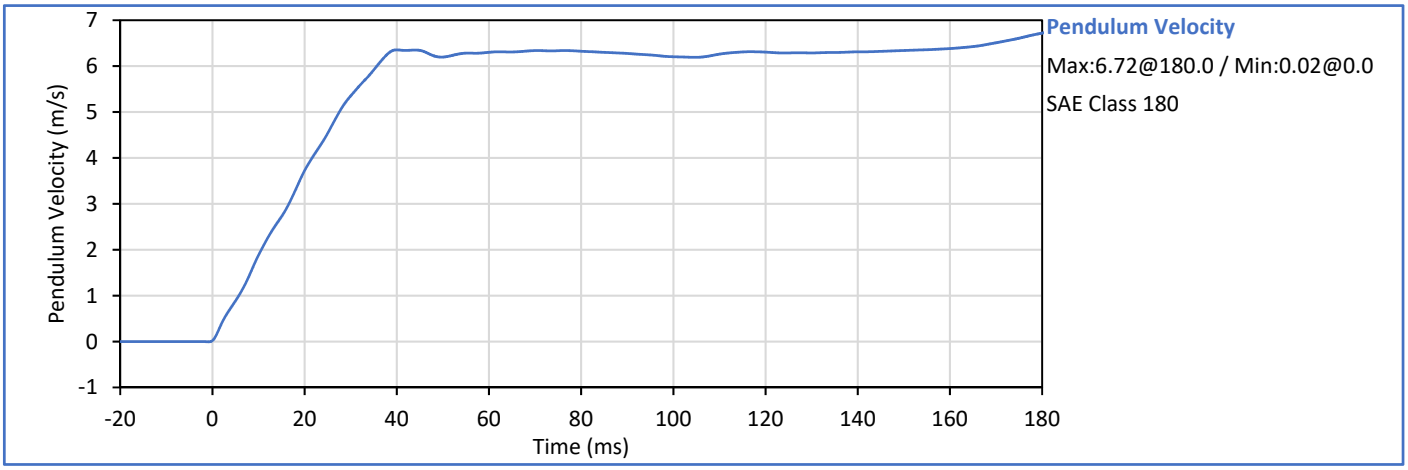
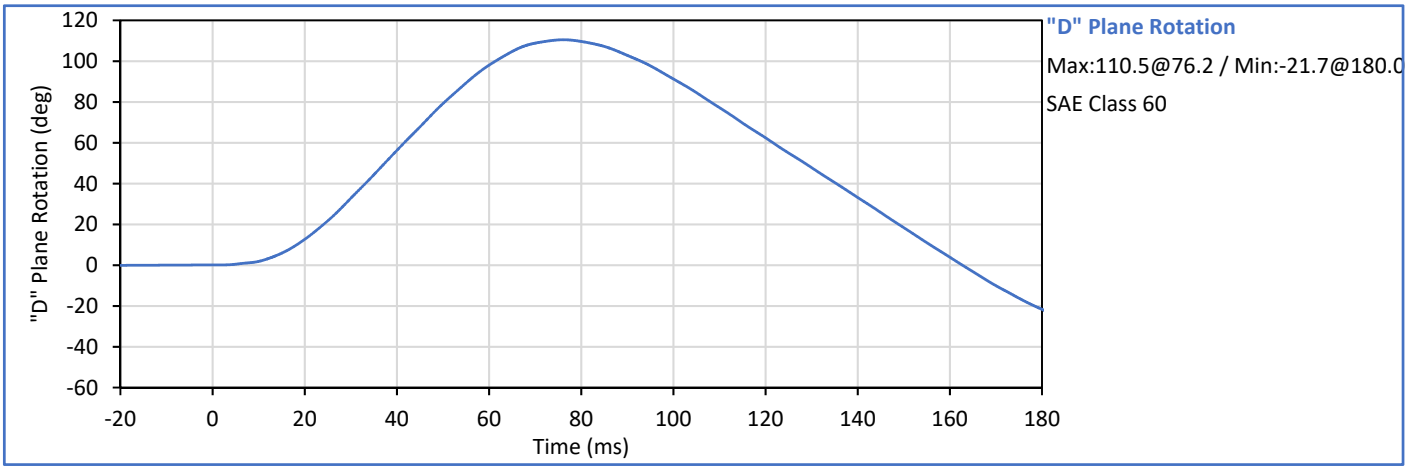
# Hybrid III 5th Percentile Female
# Neck Extension Test

ATD Serial No.: 630 Test Date: 2017-11-22

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.3 | Pass |
| Laboratory Humidity | % | 10 | 70 | 21 | Pass |
| Pendulum Velocity | m/s | 5.95 | 6.19 | 6.05 | Pass |
| Pendulum Velocity at 10 ms | m/s | 1.50 | 1.90 | 1.88 | Pass |
| Pendulum Velocity at 20 ms | m/s | 3.10 | 3.90 | 3.72 | Pass |
| Pendulum Velocity at 30 ms | m/s | 4.60 | 5.60 | 5.35 | Pass |
| Peak "D" Plane Rotation | deg | 99.0 | 114.0 | 110.5 | Pass |
| Peak Moment in Rotation | Nm | -65.0 | -53.0 | -56.4 | Pass |
| Negative Moment Decay to -10 Nm | ms | 94.0 | 114.0 | 100.5 | Pass |
| | | | Overall Test Results | | Pass |

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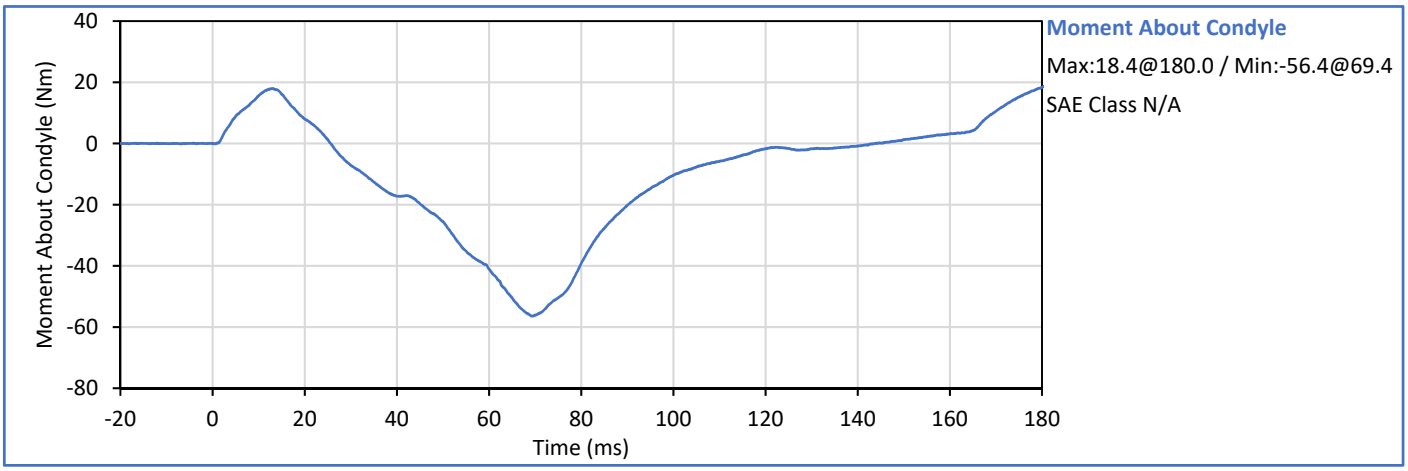
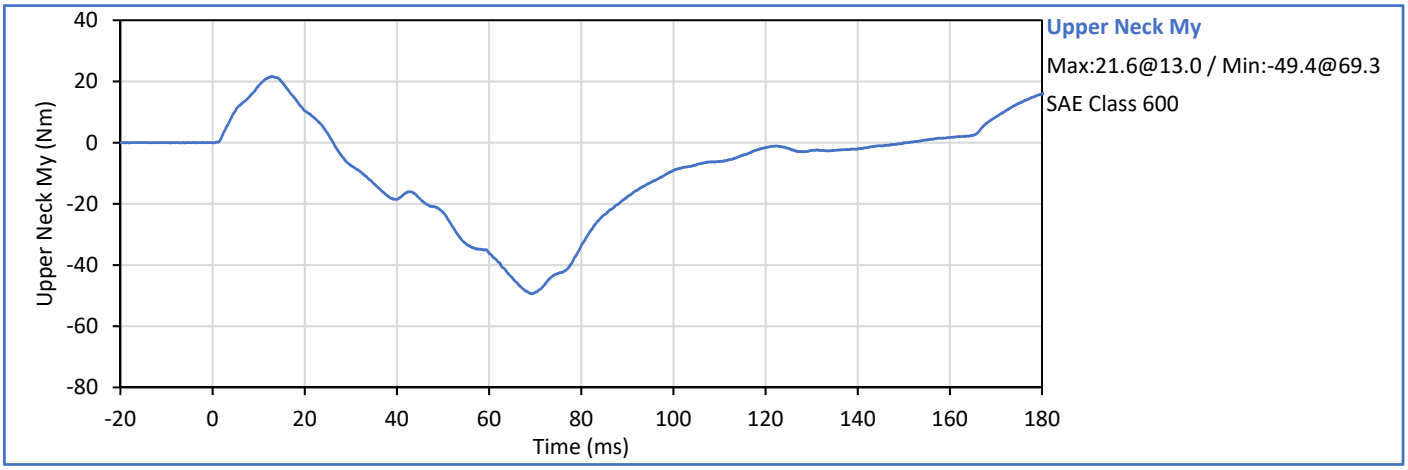
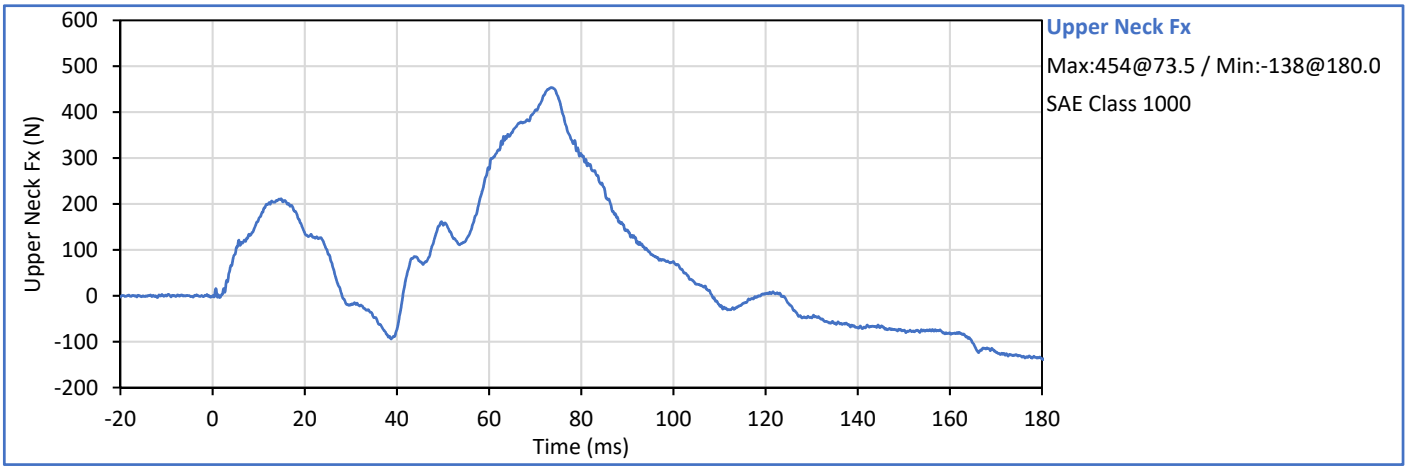
# Hybrid III 5th Percentile Female
# Neck Extension Test

ATD Serial No.: 630 Test Date: 2017-11-22



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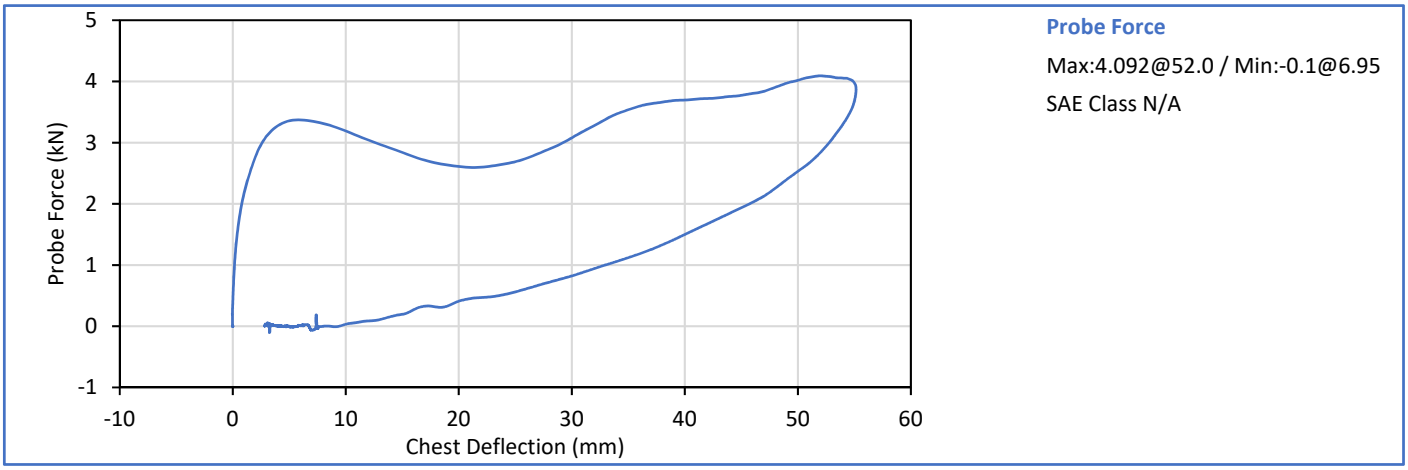
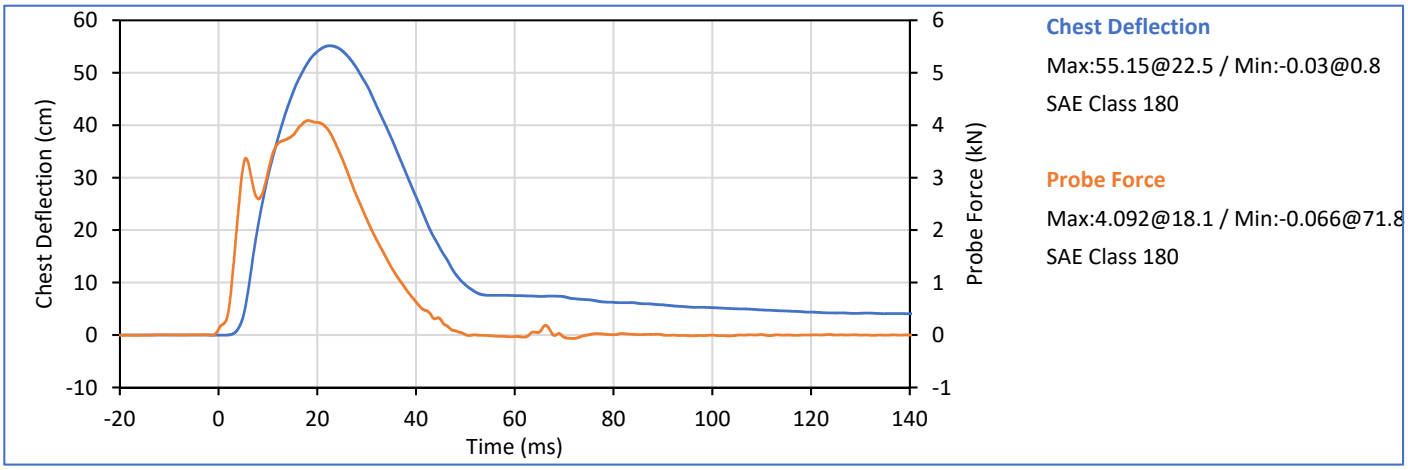
# Hybrid III 5th Percentile Female
# Thorax Impact

ATD Serial No.: 630 Test Date: 2017-11-27

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.3 | Pass |
| Laboratory Humidity | % | 10 | 70 | 26 | Pass |
| Probe Velocity | m/s | 6.59 | 6.83 | 6.64 | Pass |
| Peak Chest Deflection | mm | 50.0 | 58.0 | 55.2 | Pass |
| Peak Probe Force, 50 and 58 mm | kN | 3.900 | 4.400 | 4.092 | Pass |
| Peak Probe Force, 18 and 50 mm | kN | 0.000 | 4.600 | 4.018 | Pass |
| Internal Hysterisis | % | 69.0 | 85.0 | 69.7 | Pass |
| | | | Overall Test Results | | Pass |




**Probe Force**
Max:4.092@52.0 / Min:-0.1@6.95
SAE Class N/A




**Chest Deflection**
Max:55.15@22.5 / Min:-0.03@0.8
SAE Class 180

**Probe Force**
Max:4.092@18.1 / Min:-0.066@71.8
SAE Class 180

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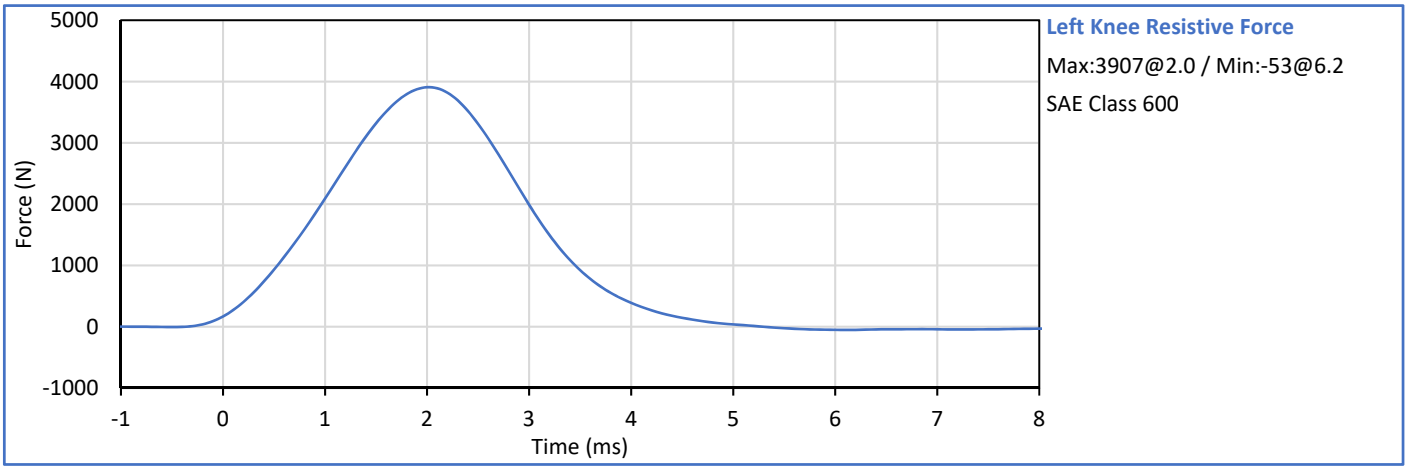
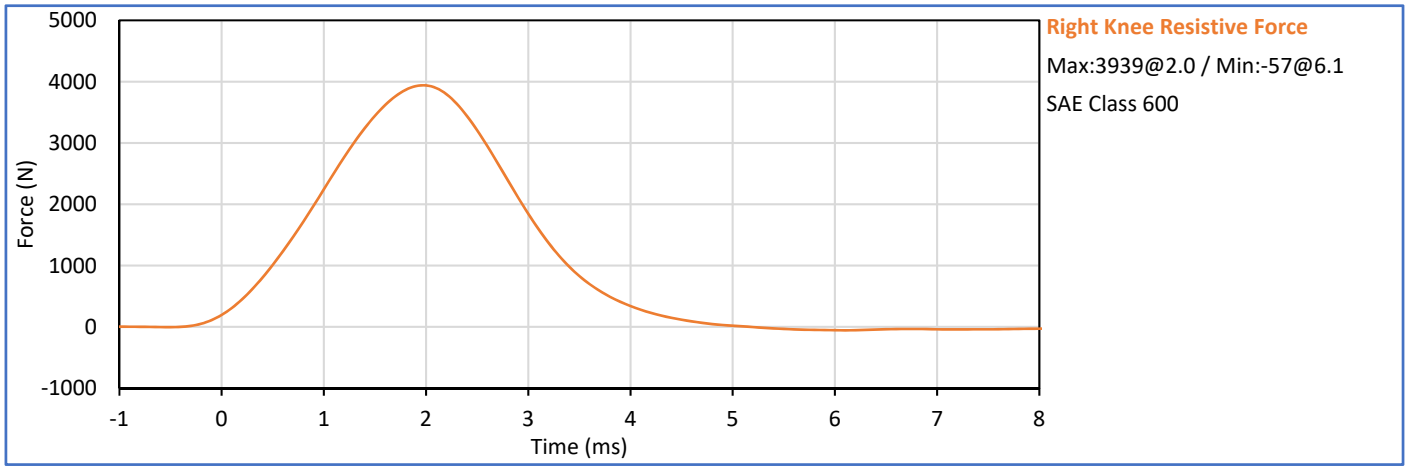
# Hybrid III 5th Percentile Female
# Knee Impact (Left/Right)

ATD Serial No.: 630 Test Date: 2017-11-25

| | Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|---|
| | Laboratory Temperature | °C | 18.9 | 25.6 | 21.3 | Pass |
| | Laboratory Humidity | % | 10 | 70 | 24 | Pass |
| Left Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.111 | Pass |
| | Peak Resistive Force | N | 3450 | 4060 | 3907 | Pass |
| Right Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.120 | Pass |
| | Peak Resistive Force | N | 3450 | 4060 | 3939 | Pass |
| | | | | Overall Test Results | | Pass |

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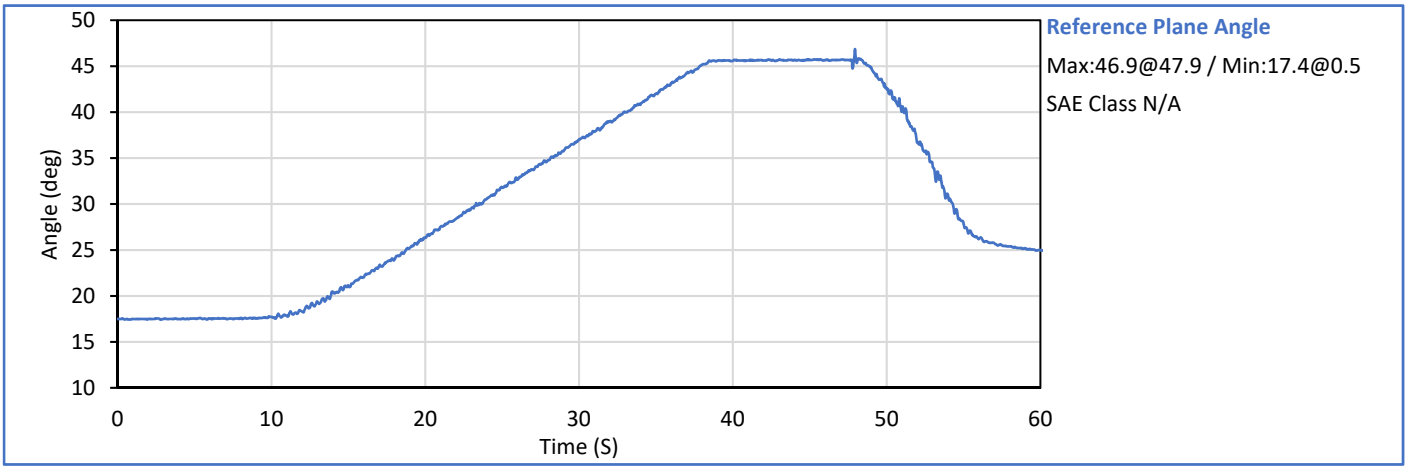
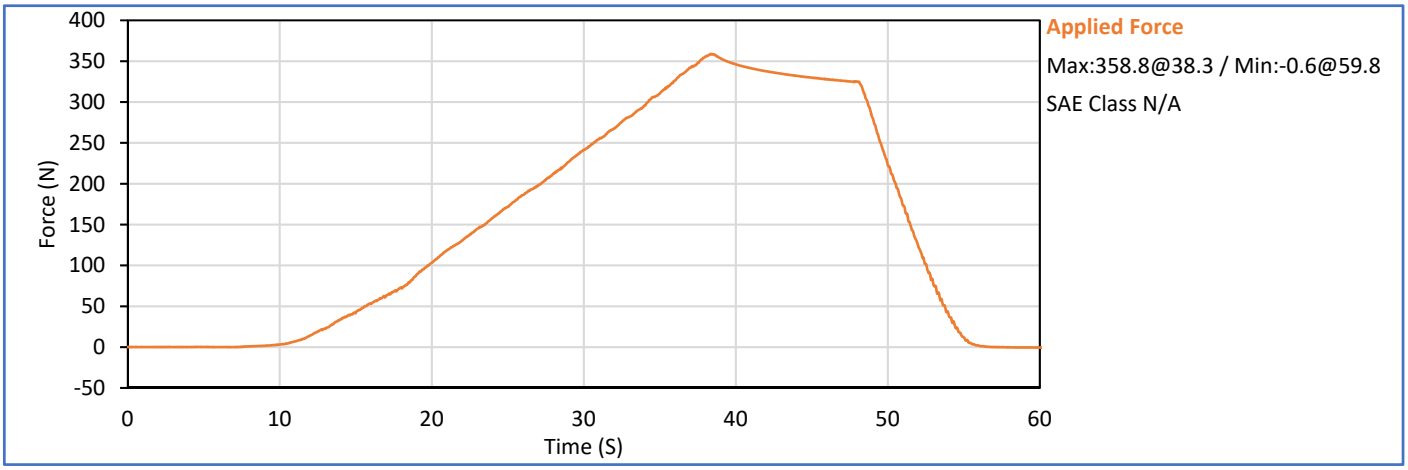
# Hybrid III 5th Percentile Female
# Torso Flexion Test

ATD Serial No.: 630 Test Date: 2017-11-27

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.2 | Pass |
| Laboratory Humidity | % | 10 | 70 | 25 | Pass |
| Orientation Angle | deg | 0.0 | 20.0 | 14.3 | Pass |
| Test Initial Angle | deg | 11.0 | 19.0 | 17.5 | Pass |
| Peak Force at 45° (+/-0.5°) | N | 320.0 | 390.0 | 353.9 | Pass |
| Torso Flexion Rate | deg/s | 0.50 | 1.50 | 1.04 | Pass |
| Final Reference Plane Angle | deg | -8.0 | 8.0 | 4.4 | Pass |
| | | | Overall Test Results | | Pass |




Technician: Approved By:

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

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# Hybrid III 50th Percentile Male
# ATD Damage Checklist

ATD Serial No.: 360 Test Date: 2017-12-16

| Dummy Item | Inspect for | Comments | Damage | Okay |
|---|---|---|---|---|
| Entire ATD | Perform general cleaning | | | ✓ |
| Outer Skin | Gashes, rips, cracks | | | ✓ |
| Head | Ballast secure | | | ✓ |
| | General appearance | | | ✓ |
| Neck bracket | Upper neck firmly attached to lower bracket | | | ✓ |
| Neck | Broken or cracked rubber | | | ✓ |
| | Looseness at the condyle joint | | | ✓ |
| Nodding block | Cracked or out of position | | | ✓ |
| Lumbar Spine | Broken or cracked rubber | | | ✓ |
| Ribs | Broken or bent ribs | | | ✓ |
| | Broken or bent rib supports | | | ✓ |
| | Damping material separated or cracked | | | ✓ |
| | Rubber bumpers in place | | | ✓ |
| Chest Displ. | Bent shaft | | | ✓ |
| Assembly | Slider arm riding in track | | | ✓ |
| Sensors | Check cables for cuts, tears | | | ✓ |
| | Check for damaged insulation | | | ✓ |
| Accelerometer | Head mounting secure | | | ✓ |
| Mounting | Chest mounting secure | | | ✓ |
| Knees | Skin condition | | | ✓ |
| | Insert (do not remove) | | | ✓ |
| | Casting | | | ✓ |
| Limbs | Normal movement and adjustment | | | ✓ |
| Knee Sliders | Wires intact | | | ✓ |
| | Rubber returned to "resting" position | | | ✓ |
| Pelvis | Broken | | | ✓ |
| Other | Describe below as needed | Pelvis Ax data anomaly | ✗ | |

Describe any repairs or replacement of parts or other findings:

The Pelvis Ax responded correctly until late in the event. Post-test troubleshooting could not isolate the issue to a wire or connection. The accelerometer is replaced and the suspect accelerometer is quarantined

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# Hybrid III 50th Percentile Male
## External Measurements

ATD Serial No.: 360 Test Date: 2017-12-18

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.1 | Pass |
| Laboratory Relative Humidity | % | 10 | 70 | 29 | Pass |
| A - Total sitting height | mm | 879 | 889 | 886 | Pass |
| B - Shoulder pivot height | mm | 505 | 521 | 509 | Pass |
| C - 'H' point height | mm | 84 | 89 | 88 | Pass |
| D - 'H' point location from backline | mm | 135 | 140 | 138 | Pass |
| E - Shoulder pivot from backline | mm | 84 | 94 | 92 | Pass |
| F - Thigh clearance | mm | 140 | 155 | 152 | Pass |
| G - Back of elbow to wrist pivot | mm | 290 | 305 | 302 | Pass |
| H - Head back to backline | mm | 41 | 46 | 44 | Pass |
| I - Shoulder to elbow length | mm | 330 | 345 | 336 | Pass |
| J - Elbow rest height | mm | 190 | 211 | 204 | Pass |
| K - Buttock to knee length | mm | 579 | 604 | 596 | Pass |
| L - Popliteal length | mm | 429 | 455 | 434 | Pass |
| M - Knee pivot height | mm | 485 | 500 | 495 | Pass |
| N - Buttock popliteal length | mm | 452 | 477 | 473 | Pass |
| O - Chest depth without jacket | mm | 213 | 229 | 218 | Pass |
| P - Foot length | mm | 251 | 267 | 260 | Pass |
| V - Shoulder breadth | mm | 422 | 437 | 432 | Pass |
| W - Foot breadth | mm | 91 | 107 | 101 | Pass |
| Y - Chest circum. (w/chest jacket) | mm | 970 | 1001 | 978 | Pass |
| Z - Waist circum. | mm | 836 | 866 | 844 | Pass |
| AA - Location for chest circum. | mm | 429 | 434 | 431 | Pass |
| BB - Location for waist circum. | mm | 226 | 231 | 231 | Pass |
| | | | Overall Test Results | | Pass |

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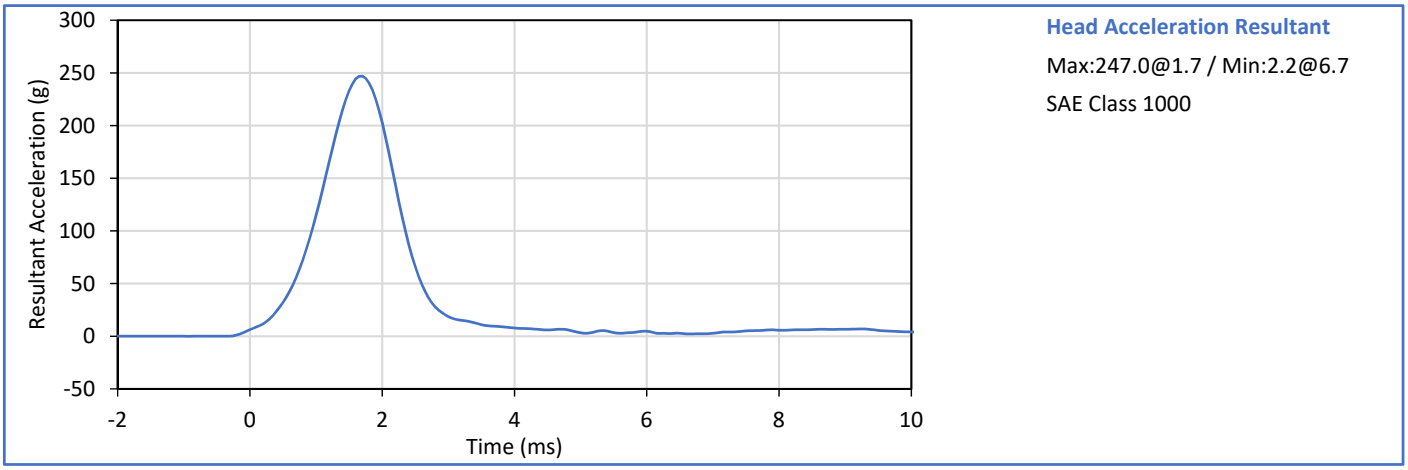
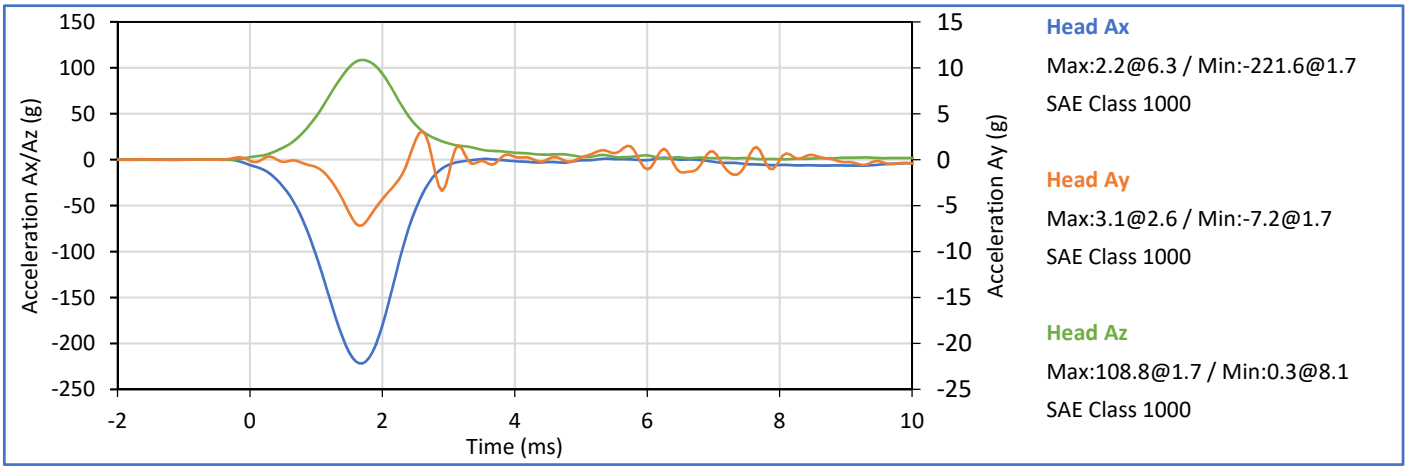
# Hybrid III 50th Percentile Male
## Head Drop

ATD Serial No.: 360 Test Date: 2017-12-17

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 18.9 | 25.6 | 20.7 | Pass |
| Laboratory Humidity | % | 10 | 70 | 26 | Pass |
| Peak Resultant Acceleration | g | 225.0 | 275.0 | 247.0 | Pass |
| Peak Lateral Acceleration | g | -15.0 | 15.0 | -7.2 | Pass |
| Oscillations After Main Pulse | % | 0.0 | 10.0 | 2.8 | Pass |
| Is Acceleration Unimodal? | Yes/No | Yes | | Yes | Pass |
| | | | Overall Test Results | | Pass |




**Head Acceleration Resultant**
Max:247.0@1.7 / Min:2.2@6.7
SAE Class 1000




**Head Ax**
Max:2.2@6.3 / Min:-221.6@1.7
SAE Class 1000

**Head Ay**
Max:3.1@2.6 / Min:-7.2@1.7
SAE Class 1000

**Head Az**
Max:108.8@1.7 / Min:0.3@8.1
SAE Class 1000

Technician: Tyler Jarman Approved By:

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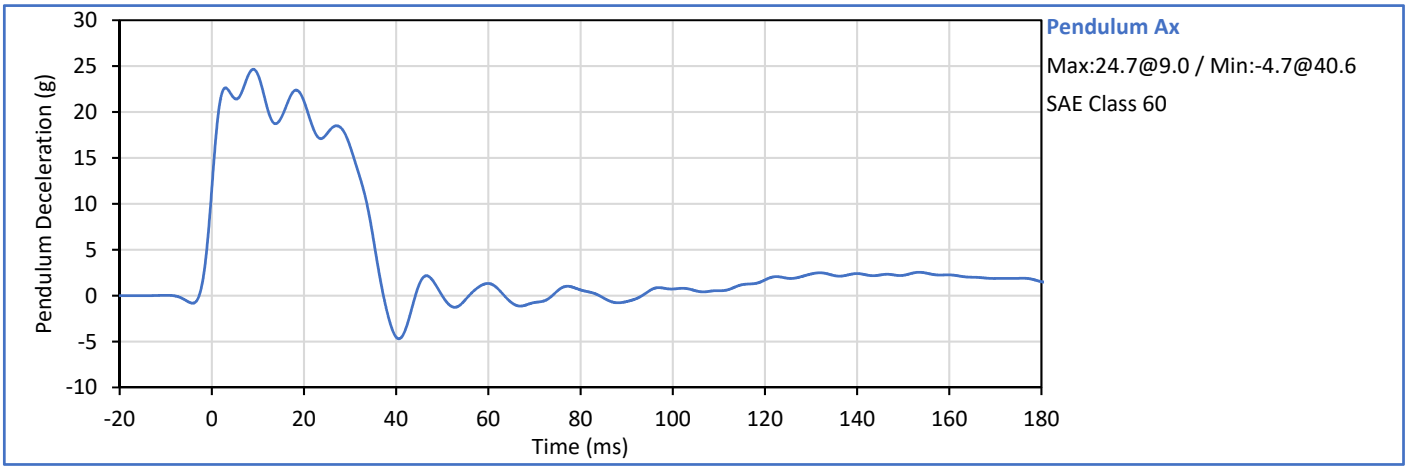
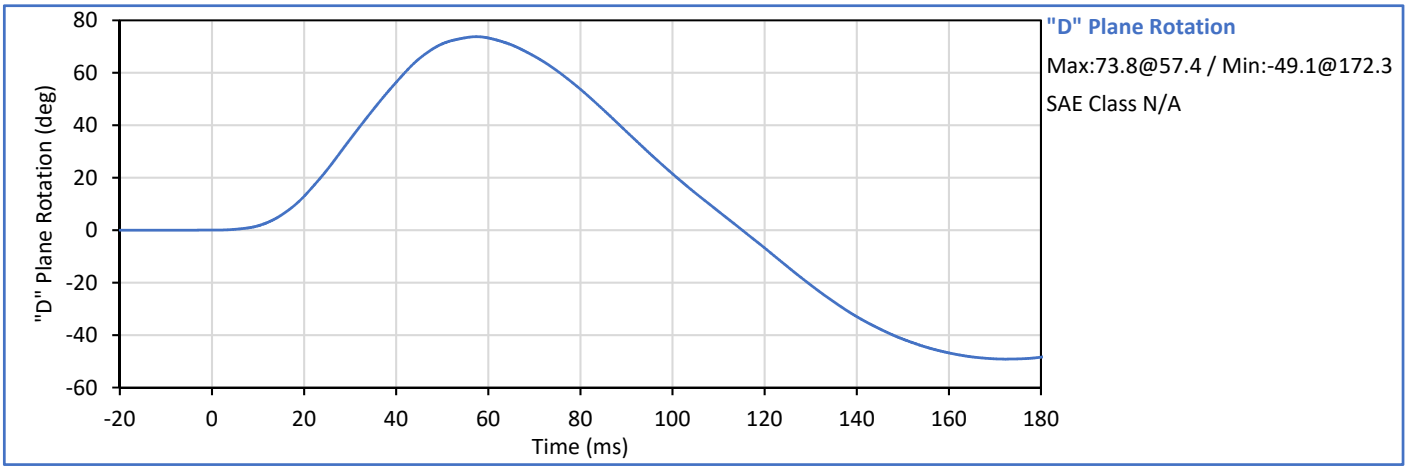
# Hybrid III 50th Percentile Male
## Neck Flexion Test

ATD Serial No.: 360 Test Date: 2017-12-17

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.2 | Pass |
| Laboratory Humidity | % | 10 | 70 | 21 | Pass |
| Pendulum Velocity | m/s | 6.89 | 7.13 | 7.02 | Pass |
| Pendulum Deceleration at 10 ms | g | 22.5 | 27.5 | 24.1 | Pass |
| Pendulum Deceleration at 20 ms | g | 17.6 | 22.6 | 21.2 | Pass |
| Pendulum Deceleration at 30 ms | g | 12.5 | 18.5 | 16.2 | Pass |
| Peak Pendulum Decel. after 30 ms | g | 0.0 | 29.0 | 16.2 | Pass |
| Deceleration Decay to Cross 5 g | ms | 34.0 | 42.0 | 35.5 | Pass |
| "D" Plane Rotation peak | deg | 64.0 | 78.0 | 73.8 | Pass |
| | ms | 57.0 | 64.0 | 57.4 | Pass |
| "D" Plane Rotation Decay To Zero | ms | 113.0 | 128.0 | 115.2 | Pass |
| Moment About Occipital Condyle | Nm | 88.1 | 108.5 | 93.7 | Pass |
| | ms | 47.0 | 58.0 | 47.7 | Pass |
| Moment Decay, Peak to Zero | deg | 97.0 | 107.0 | 99.9 | Pass |
| | | | Overall Test Results | | Pass |

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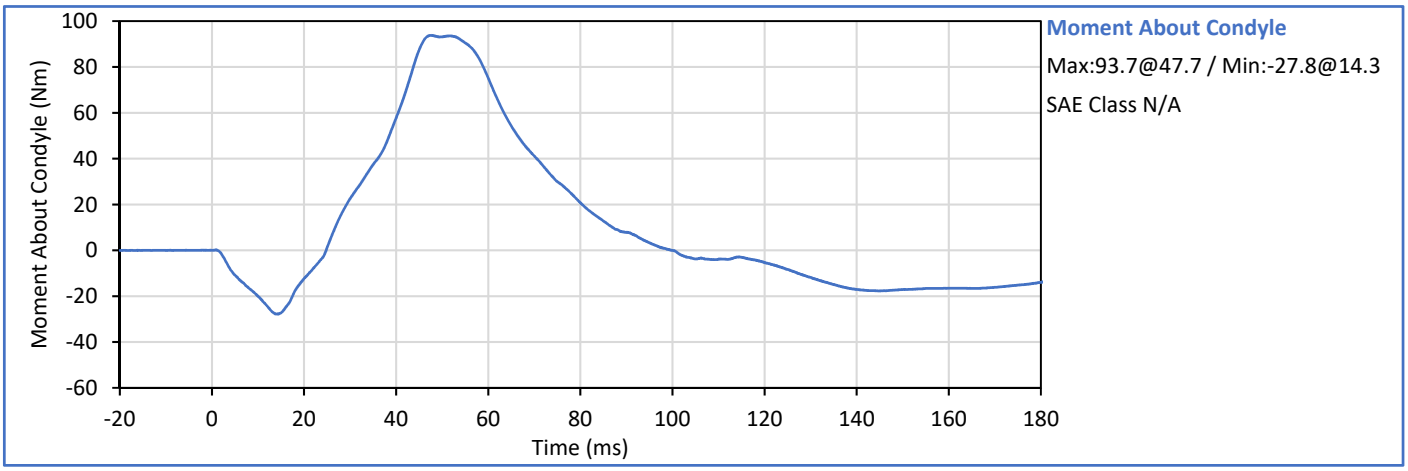
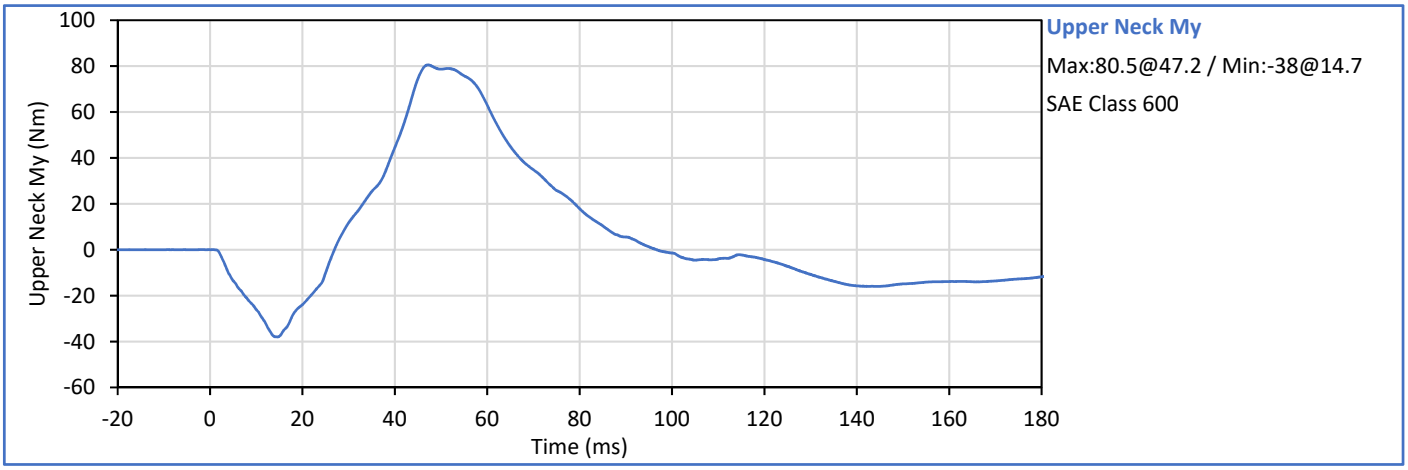
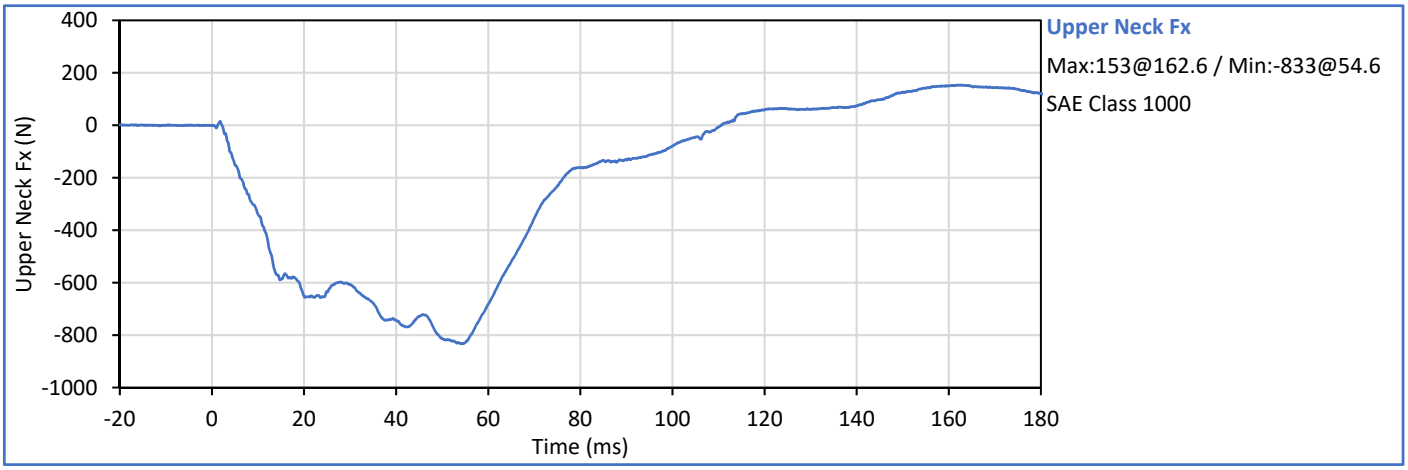
# Hybrid III 50th Percentile Male
# Neck Flexion Test

ATD Serial No.: 360 Test Date: 2017-12-17



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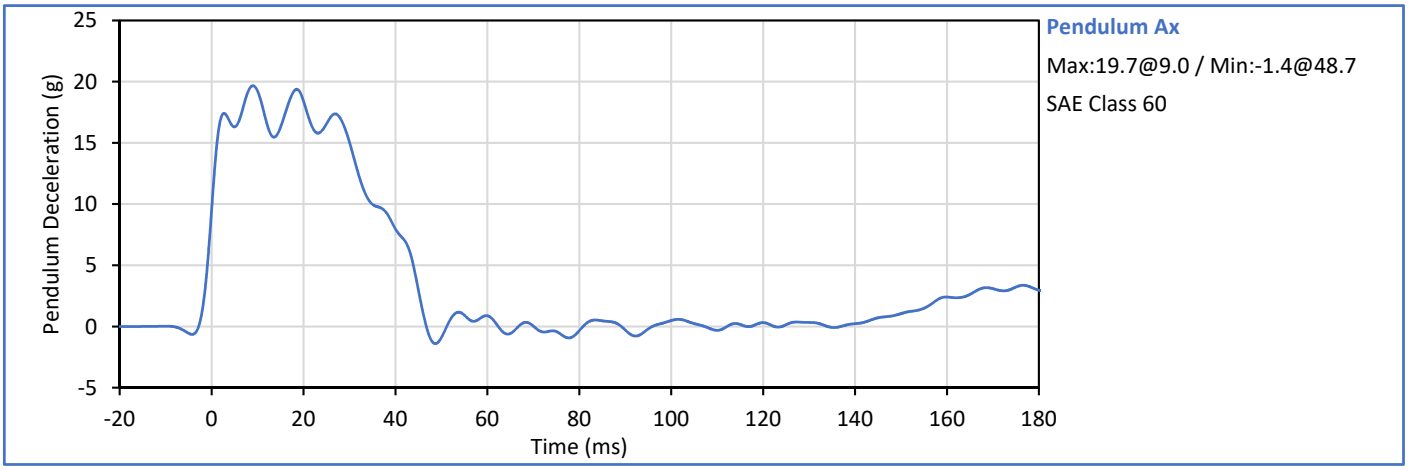
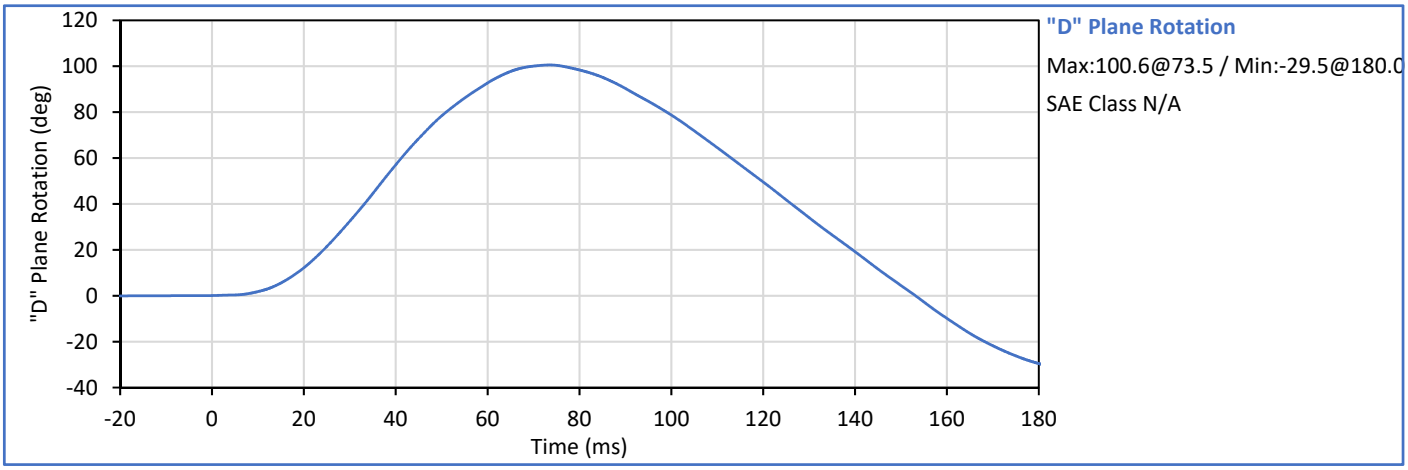
# Hybrid III 50th Percentile Male
# Neck Extension Test

ATD Serial No.: 360 Test Date: 2017-12-17

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.4 | Pass |
| Laboratory Humidity | % | 10 | 70 | 24 | Pass |
| Pendulum Velocity | m/s | 5.94 | 6.19 | 6.02 | Pass |
| Pendulum Deceleration at 10 ms | g | 17.2 | 21.2 | 19.2 | Pass |
| Pendulum Deceleration at 20 ms | g | 14.0 | 19.0 | 18.4 | Pass |
| Pendulum Deceleration at 30 ms | g | 11.0 | 16.0 | 15.0 | Pass |
| Peak Pendulum Decel. after 30 ms | g | 0.0 | 22.0 | 15.0 | Pass |
| Deceleration Decay to Cross 5 g | ms | 38.0 | 46.0 | 44.0 | Pass |
| "D" Plane Rotation peak | deg | 81.0 | 106.0 | 100.6 | Pass |
| | ms | 72.0 | 82.0 | 73.5 | Pass |
| "D" Plane Rotation Decay To Zero | ms | 147.0 | 174.0 | 153.3 | Pass |
| Moment About Occipital Condyle | Nm | -79.9 | -52.9 | -72.7 | Pass |
| | ms | 65.0 | 79.0 | 67.0 | Pass |
| Moment Decay, Peak to Zero | deg | 120.0 | 148.0 | 132.2 | Pass |
| | | | Overall Test Results | | Pass |

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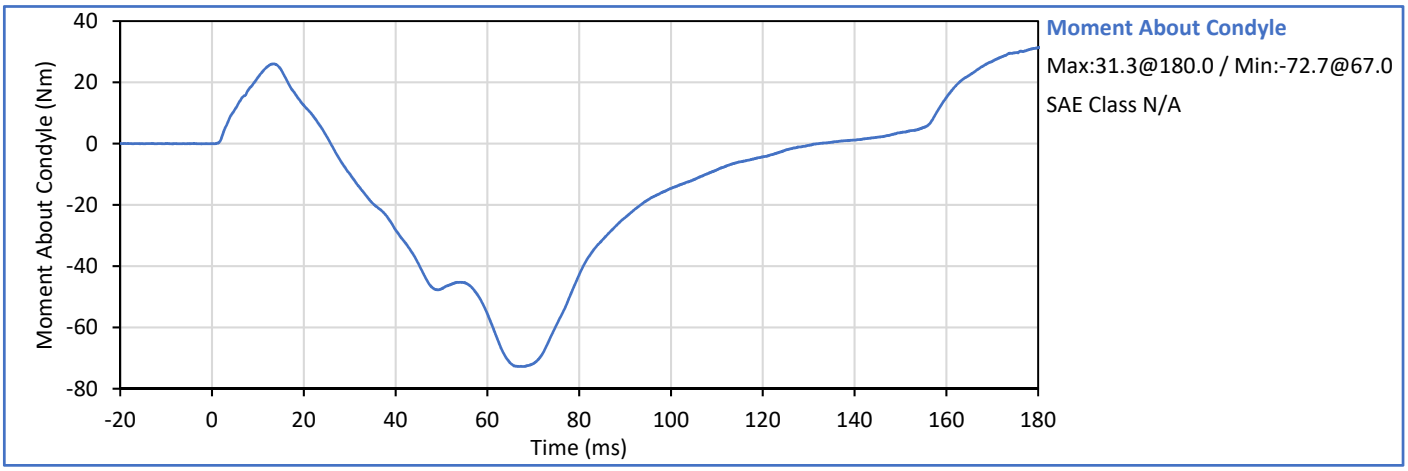
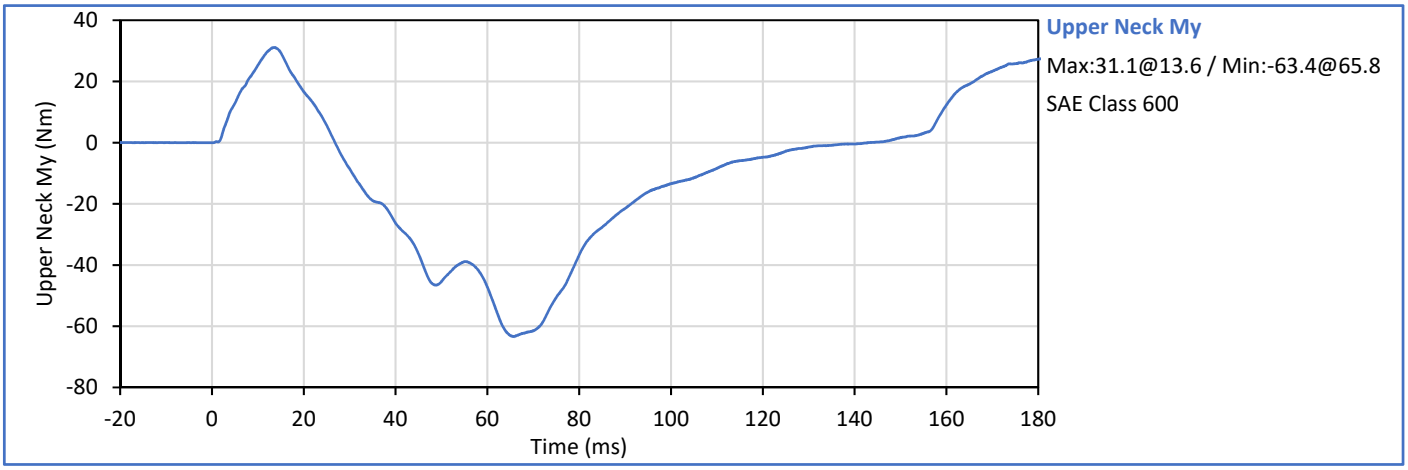
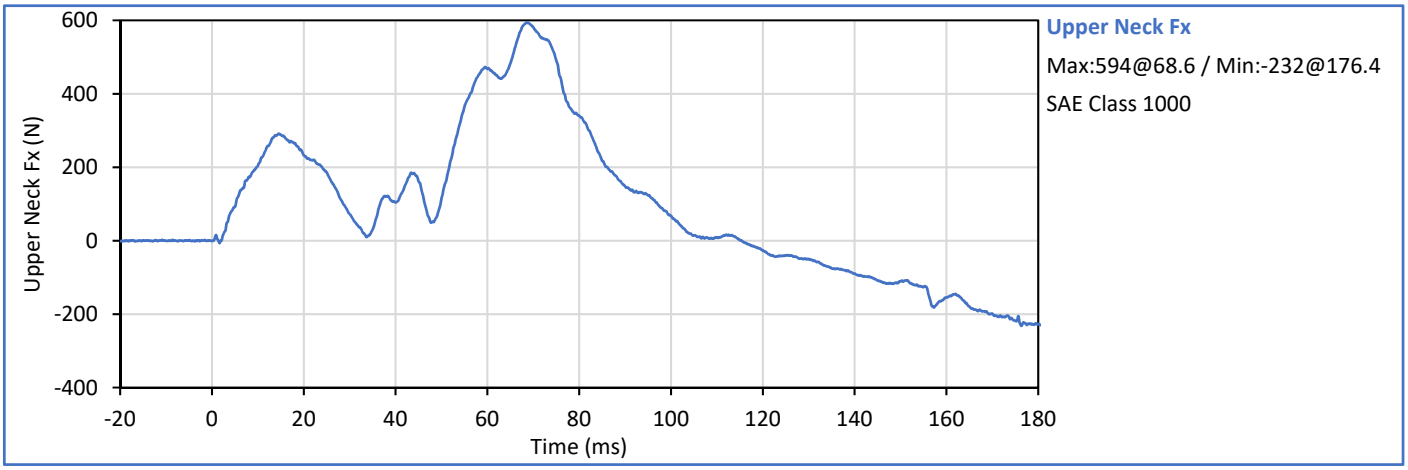
**Hybrid III 50th Percentile Male**
**Neck Extension Test**

ATD Serial No.: 360 Test Date: 2017-12-17



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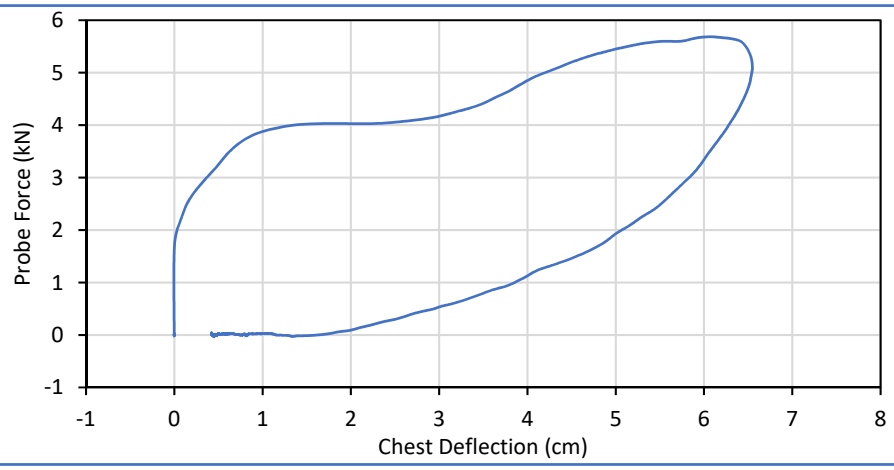
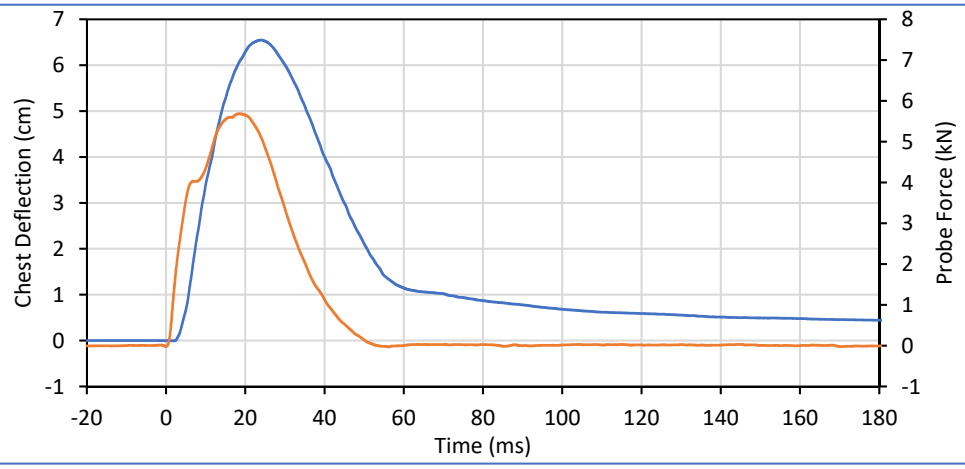
# Hybrid III 50th Percentile Male
## Thorax Impact

ATD Serial No.: 360 Test Date: 2017-12-16

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.4 | Pass |
| Laboratory Humidity | % | 10 | 70 | 20 | Pass |
| Probe Velocity | m/s | 6.58 | 6.82 | 6.74 | Pass |
| Peak Chest Deflection | cm | 6.35 | 7.26 | 6.55 | Pass |
| Peak Probe Force | kN | 5.159 | 5.893 | 5.686 | Pass |
| Internal Hysterisis | % | 69.0 | 85.0 | 75.1 | Pass |
| | | | Overall Test Results | | Pass |




**Probe Force**
Max:5.686@6.07 / Min:-0.03@1.34
SAE Class N/A




**Chest Dx**
Max:6.55@24.1 / Min:-0.01@1.8
SAE Class 600

**Probe Force**
Max:5.686@18.5 / Min:-0.028@56.1
SAE Class 180

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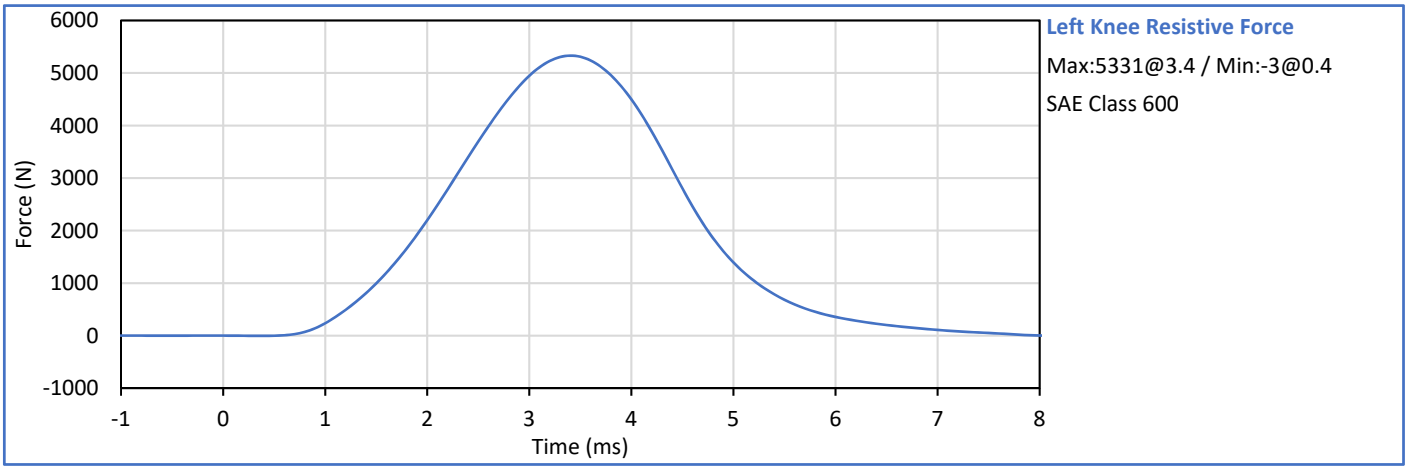
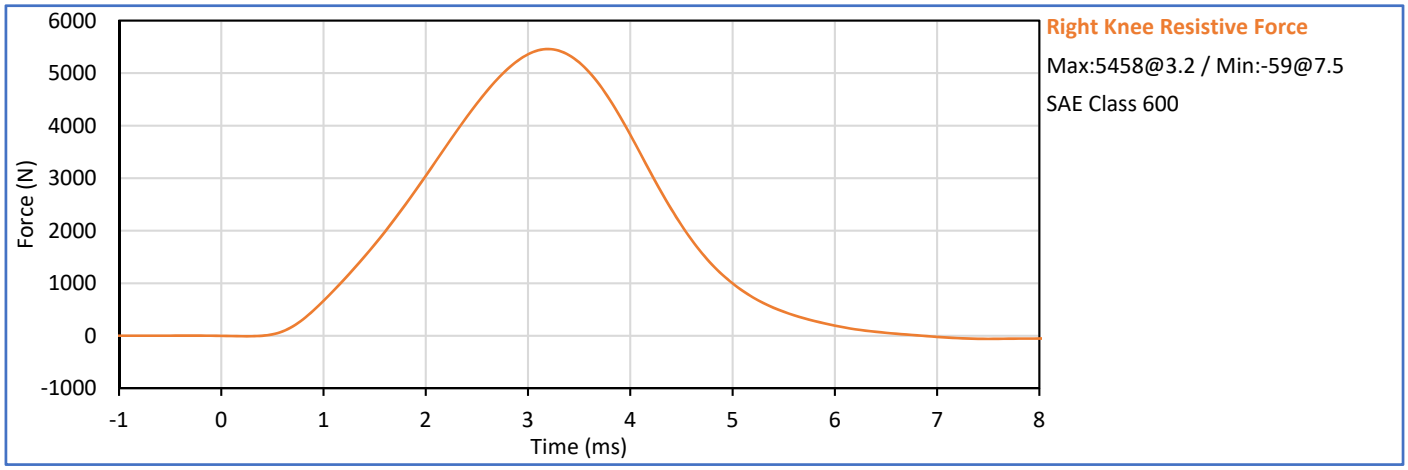
# Hybrid III 50th Percentile Male
# Knee Impact (Left/Right)

ATD Serial No.: 360 Test Date: 2017-12-17

| | Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|---|
| | Laboratory Temperature | °C | 18.9 | 25.6 | 21.1 | Pass |
| | Laboratory Humidity | % | 10 | 70 | 21 | Pass |
| Left Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.071 | Pass |
| | Peak Resistive Force | N | 4715 | 5782 | 5331 | Pass |
| Right Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.074 | Pass |
| | Peak Resistive Force | N | 4715 | 5782 | 5458 | Pass |
| | | | | Overall Test Results | | Pass |

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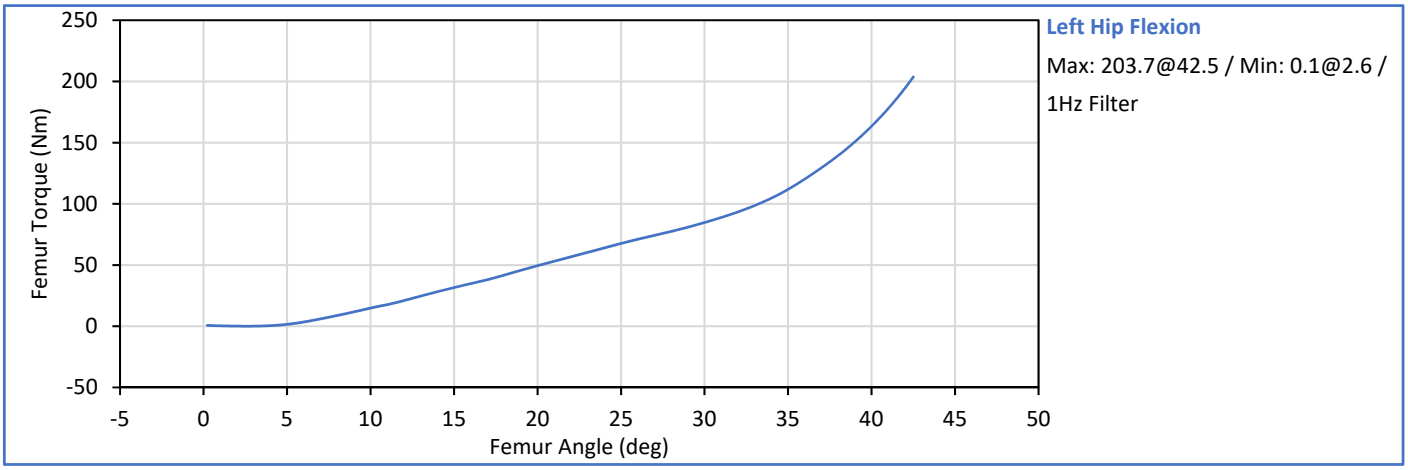
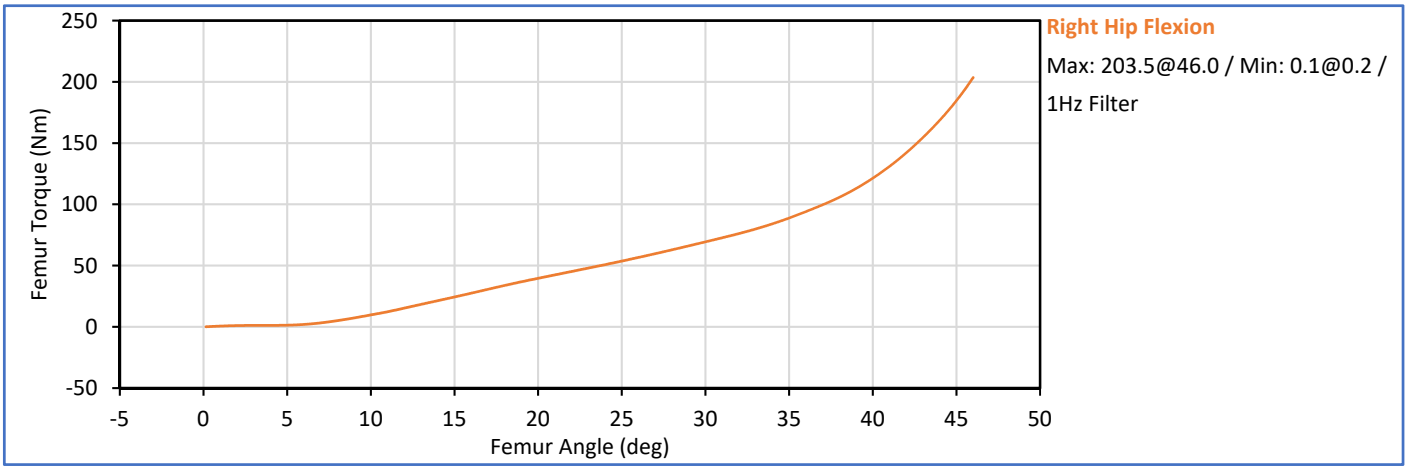
# Hybrid III 50th Percentile Male
## Hip Flexion (Left/Right)

ATD Serial No.: 360 Test Date: 2017-12-17

| | Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|---|
| | Laboratory Temperature | °C | 18.9 | 25.6 | 21.1 | Pass |
| | Laboratory Humidity | % | 10 | 70 | 21 | Pass |
| Left Hip | Left Hip Rotation Rate | deg/s | 5.0 | 10.0 | 6.1 | Pass |
| | Left Femur Torque at 30° | Nm | 0.0 | 95.0 | 84.8 | Pass |
| | Left Hip Rotation at 203 Nm | deg | 40.0 | 50.0 | 42.5 | Pass |
| Right Hip | Right Hip Rotation Rate | deg/s | 5.0 | 10.0 | 6.1 | Pass |
| | Right Femur Torque at 30° | Nm | 0.0 | 95.0 | 69.4 | Pass |
| | Right Hip Rotation at 203 Nm | deg | 40.0 | 50.0 | 46.0 | Pass |
| | | | | Overall Test Results | | Pass |

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# Hybrid III 5th Percentile Female
# ATD Damage Checklist

ATD Serial No.: 630 Test Date: 2017-12-18

| Dummy Item | Inspect for | Comments | Damage | Okay |
|---|---|---|---|---|
| Entire ATD | Perform general cleaning | | | ✓ |
| Outer Skin | Gashes, rips, cracks | | | ✓ |
| Head | Ballast secure | | | ✓ |
| | General appearance | | | ✓ |
| Neck bracket | Upper neck firmly attached to lower bracket | | | ✓ |
| Neck | Broken or cracked rubber | | | ✓ |
| | Looseness at the condyle joint | | | ✓ |
| Nodding block | Cracked or out of position | | | ✓ |
| Lumbar Spine | Broken or cracked rubber | | | ✓ |
| Ribs | Broken or bent ribs | | | ✓ |
| | Broken or bent rib supports | | | ✓ |
| | Damping material separated or cracked | | | ✓ |
| | Rubber bumpers in place | | | ✓ |
| Chest Displ. | Bent shaft | | | ✓ |
| Assembly | Slider arm riding in track | | | ✓ |
| Sensors | Check cables for cuts, tears | | | ✓ |
| | Check for damaged insulation | | | ✓ |
| Accelerometer | Head mounting secure | | | ✓ |
| Mounting | Chest mounting secure | | | ✓ |
| Knees | Skin condition | | | ✓ |
| | Insert (do not remove) | | | ✓ |
| | Casting | | | ✓ |
| Limbs | Normal movement and adjustment | | | ✓ |
| Knee Sliders | Wires intact | | | ✓ |
| | Rubber returned to "resting" position | | | ✓ |
| Pelvis | Broken | | | ✓ |
| Other | Describe below as needed | | | ✓ |

Describe any repairs or replacement of parts or other findings:

Technician: _____ Approved By: _____

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# Hybrid III 5th Percentile Female
## External Measurements

ATD Serial No.: 630 Test Date: 2017-12-19

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.3 | Pass |
| Laboratory Relative Humidity | % | 10 | 70 | 33 | Pass |
| A - Total sitting height | mm | 775 | 800 | 788 | Pass |
| B - Shoulder pivot height | mm | 432 | 457 | 445 | Pass |
| C - 'H' point height | mm | 81 | 86 | 84 | Pass |
| D - 'H' point location from backline | mm | 145 | 150 | 146 | Pass |
| E - Shoulder pivot from backline | mm | 69 | 84 | 78 | Pass |
| F - Thigh clearance | mm | 119 | 135 | 123 | Pass |
| G - Back of elbow to wrist pivot | mm | 244 | 259 | 256 | Pass |
| H - Head back to backline | mm | 41 | 46 | 44 | Pass |
| I - Shoulder to elbow length | mm | 277 | 297 | 286 | Pass |
| J - Elbow rest height | mm | 183 | 203 | 195 | Pass |
| K - Buttock to knee length | mm | 521 | 546 | 535 | Pass |
| L - Popliteal length | mm | 356 | 376 | 368 | Pass |
| M - Knee pivot height | mm | 394 | 419 | 410 | Pass |
| N - Buttock popliteal length | mm | 414 | 439 | 432 | Pass |
| O - Chest depth without jacket | mm | 175 | 191 | 182 | Pass |
| P - Foot length | mm | 219 | 234 | 227 | Pass |
| R - Buttock to Knee Pivot Length | mm | 457 | 483 | 473 | Pass |
| S - Head Breadth | mm | 137 | 147 | 142 | Pass |
| T - Head Depth | mm | 178 | 188 | 182 | Pass |
| U - Hip Breadth | mm | 300 | 315 | 307 | Pass |
| V - Shoulder breadth | mm | 351 | 366 | 357 | Pass |
| W - Foot breadth | mm | 79 | 94 | 86 | Pass |
| X - Head circum. | mm | 528 | 549 | 538 | Pass |
| Y - Chest circum. (w/chest jacket) | mm | 851 | 881 | 870 | Pass |
| Z - Waist circum. | mm | 760 | 790 | 771 | Pass |
| AA - Location for chest circum. | mm | 300 | 310 | 302 | Pass |
| BB - Location for waist circum. | mm | 160 | 170 | 164 | Pass |
| | | | Overall Test Results | | Pass |

Technician: Approved By:

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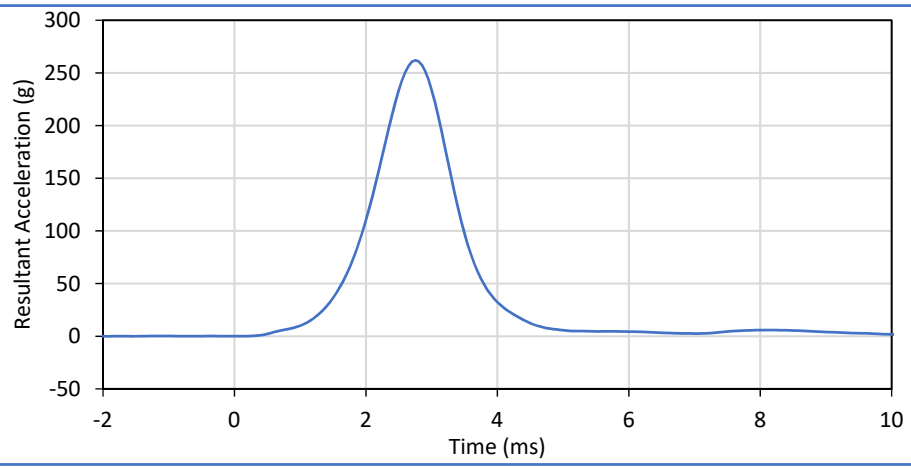
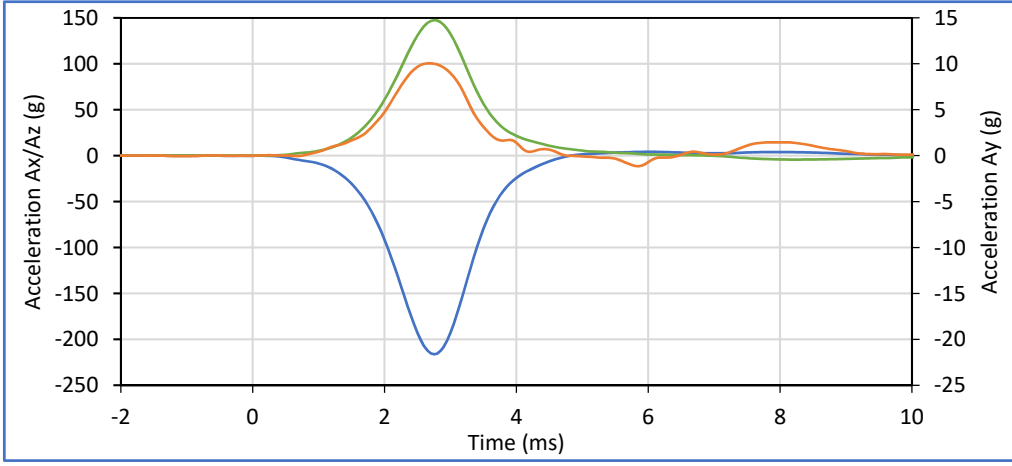
# Hybrid III 5th Percentile Female
## Head Drop

ATD Serial No.: 630 Test Date: 2017-12-18

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 18.9 | 25.6 | 21.1 | Pass |
| Laboratory Humidity | % | 10 | 70 | 23 | Pass |
| Peak Resultant Acceleration | g | 250.0 | 300.0 | 262.0 | Pass |
| Peak Lateral Acceleration | g | -15.0 | 15.0 | 10.1 | Pass |
| Oscillations After Main Pulse | % | 0.0 | 10.0 | 2.3 | Pass |
| Is Acceleration Unimodal? | Yes/No | Yes | | Yes | Pass |
| | | | Overall Test Results | | Pass |




**Head Acceleration Resultant**
Max:262.0@2.8 / Min:0.1@0.1
SAE Class 1000




**Head Acceleration X**
Max:4.1@6.1 / Min:-216.2@2.8
SAE Class 1000

**Head Acceleration Y**
Max:10.1@2.7 / Min:-1.1@5.9
SAE Class 1000

**Head Acceleration Z**
Max:147.6@2.8 / Min:-4.3@8.2
SAE Class 1000

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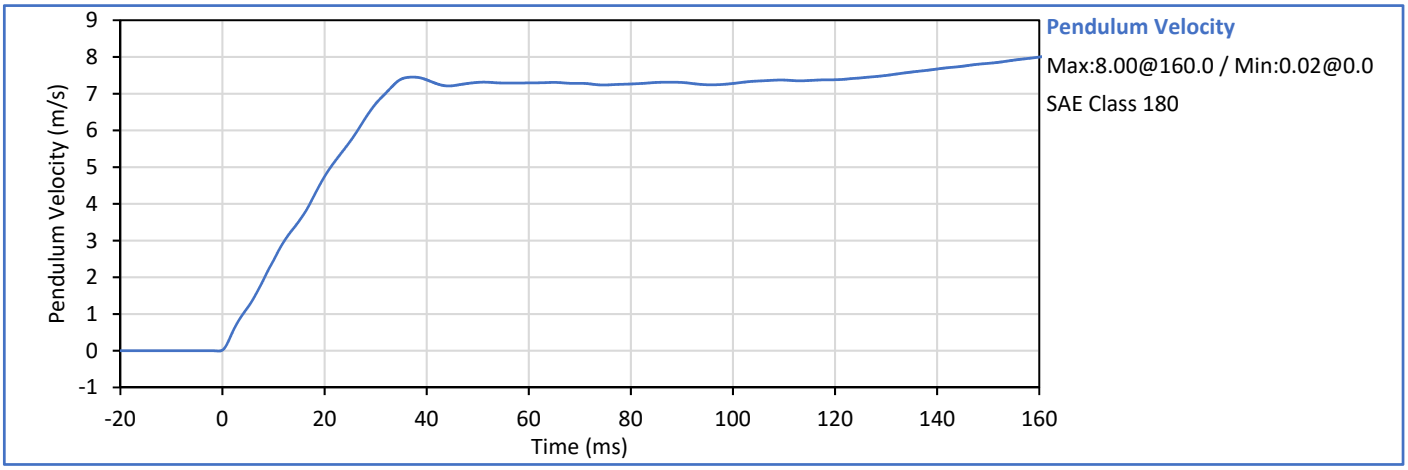
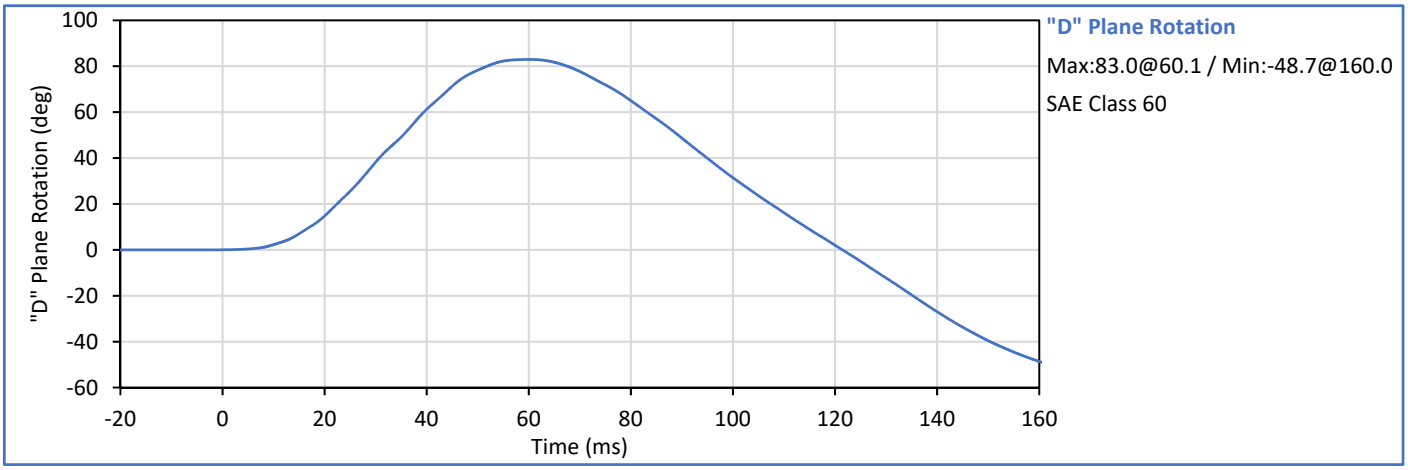
# Hybrid III 5th Percentile Female
# Neck Flexion Test

ATD Serial No.: 630 Test Date: 2017-12-19

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.2 | Pass |
| Laboratory Humidity | % | 10 | 70 | 20 | Pass |
| Pendulum Velocity | m/s | 6.89 | 7.13 | 7.12 | Pass |
| Pendulum Velocity at 10 ms | m/s | 2.10 | 2.50 | 2.46 | Pass |
| Pendulum Velocity at 20 ms | m/s | 4.00 | 5.00 | 4.74 | Pass |
| Pendulum Velocity at 30 ms | m/s | 5.80 | 7.00 | 6.72 | Pass |
| Peak "D" Plane Rotation | deg | 77.0 | 91.0 | 83.0 | Pass |
| Peak Moment in Rotation | Nm | 69.0 | 83.0 | 75.5 | Pass |
| Positive Moment Decay to 10 Nm | ms | 80.0 | 100.0 | 86.1 | Pass |
| | | | Overall Test Results | | Pass |

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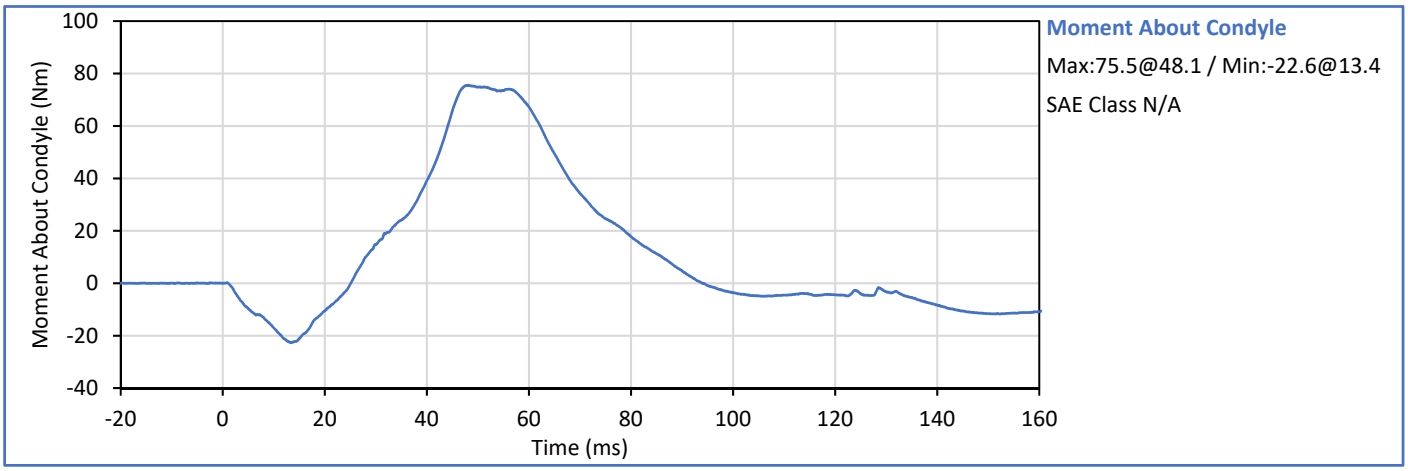
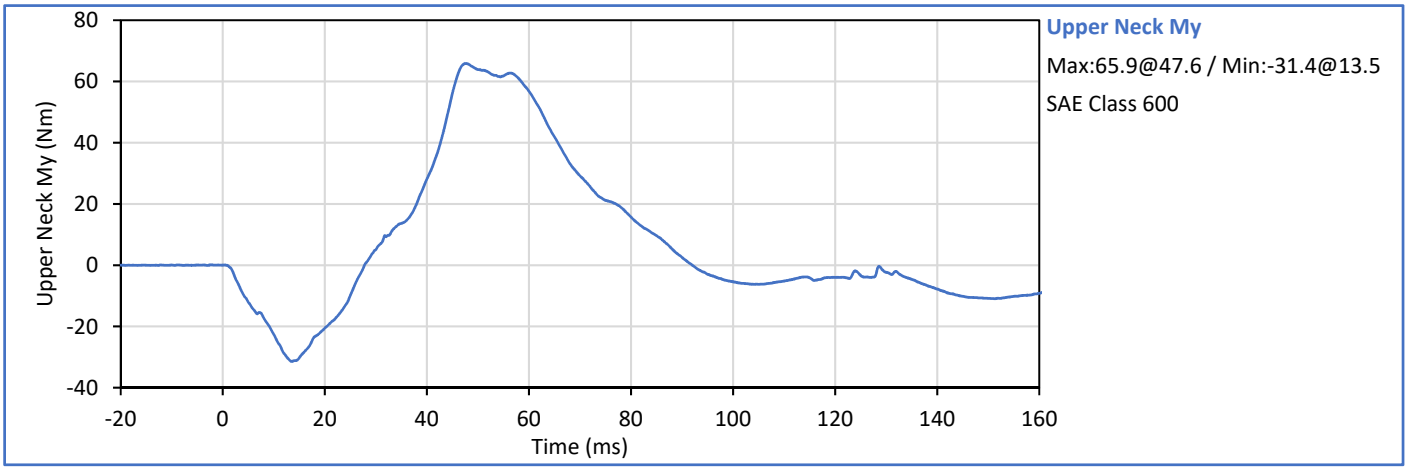
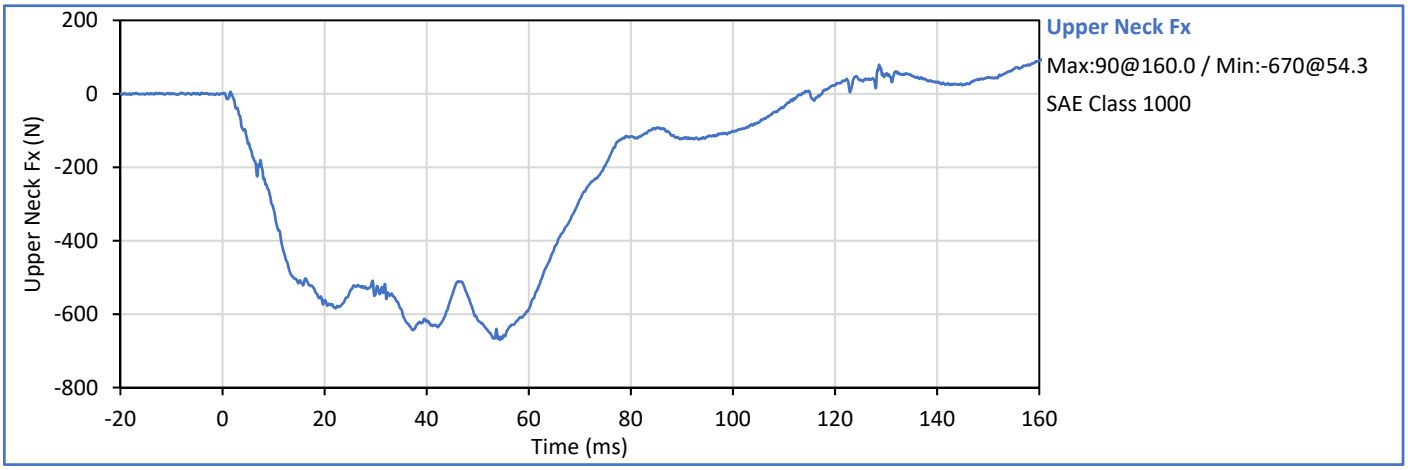
# Hybrid III 5th Percentile Female
# Neck Flexion Test

ATD Serial No.: 630 Test Date: 2017-12-19



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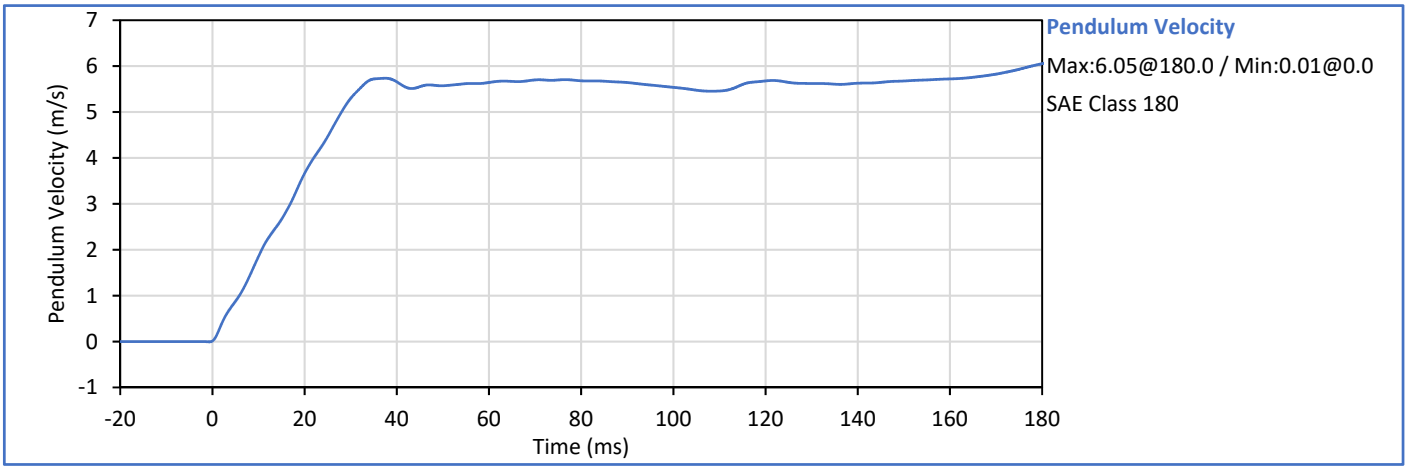
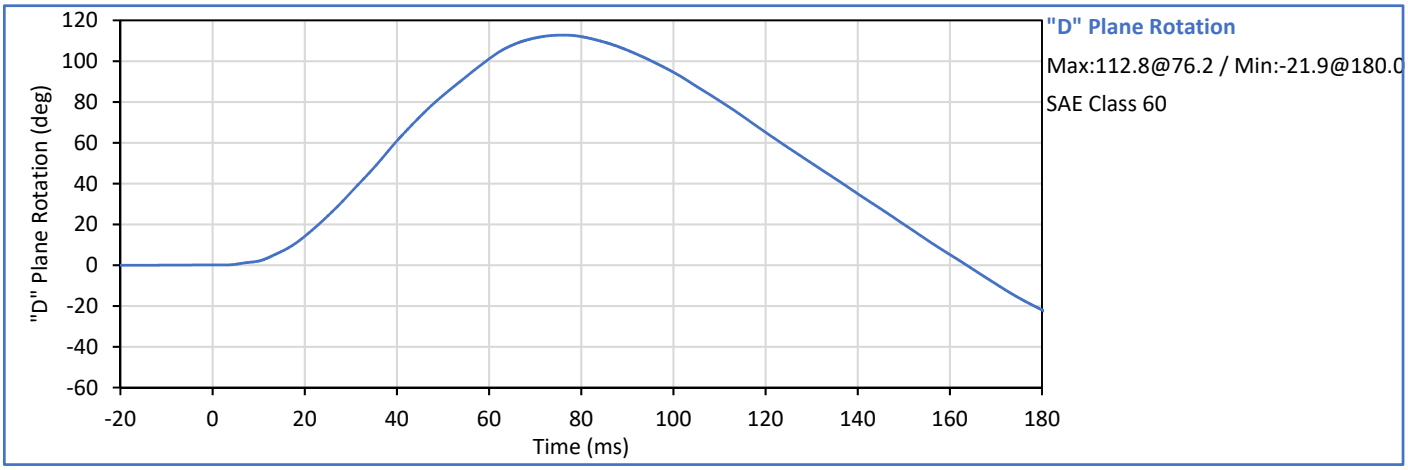
# Hybrid III 5th Percentile Female
# Neck Extension Test

ATD Serial No.: 630 Test Date: 2017-12-19

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.2 | Pass |
| Laboratory Humidity | % | 10 | 70 | 20 | Pass |
| Pendulum Velocity | m/s | 5.95 | 6.19 | 6.08 | Pass |
| Pendulum Velocity at 10 ms | m/s | 1.50 | 1.90 | 1.85 | Pass |
| Pendulum Velocity at 20 ms | m/s | 3.10 | 3.90 | 3.66 | Pass |
| Pendulum Velocity at 30 ms | m/s | 4.60 | 5.60 | 5.30 | Pass |
| Peak "D" Plane Rotation | deg | 99.0 | 114.0 | 112.8 | Pass |
| Peak Moment in Rotation | Nm | -65.0 | -53.0 | -58.9 | Pass |
| Negative Moment Decay to -10 Nm | ms | 94.0 | 114.0 | 100.7 | Pass |
| | | | Overall Test Results | | Pass |

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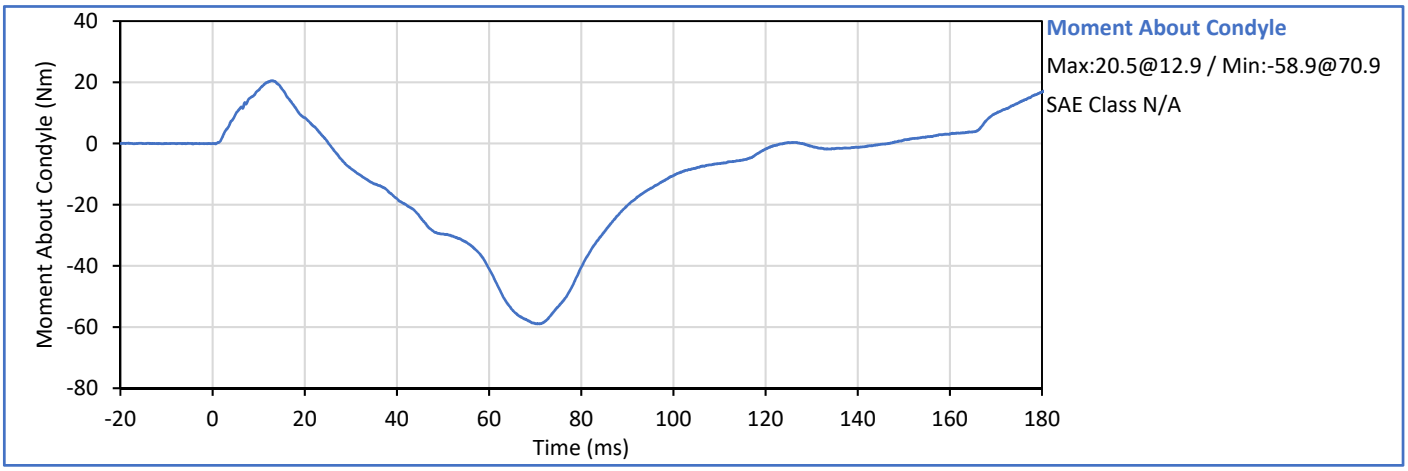
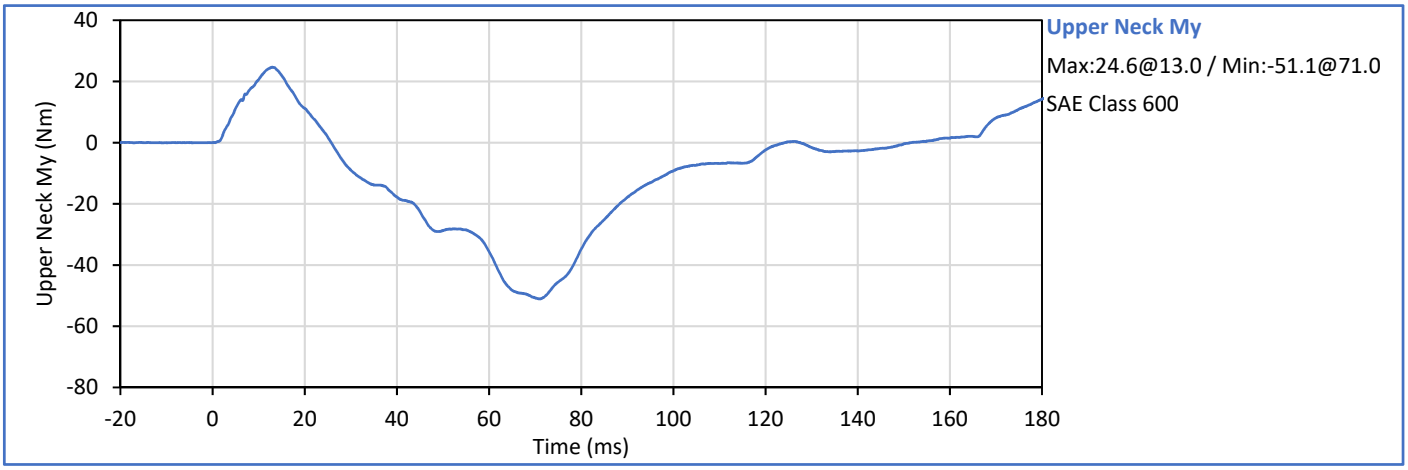
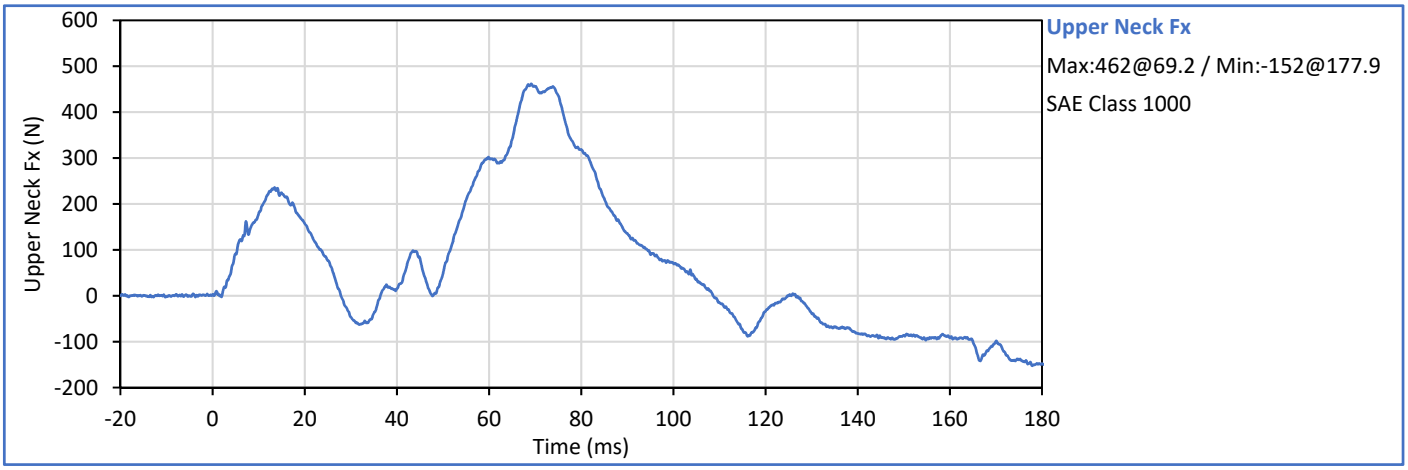
**Hybrid III 5th Percentile Female**
**Neck Extension Test**

ATD Serial No.: 630 Test Date: 2017-12-19



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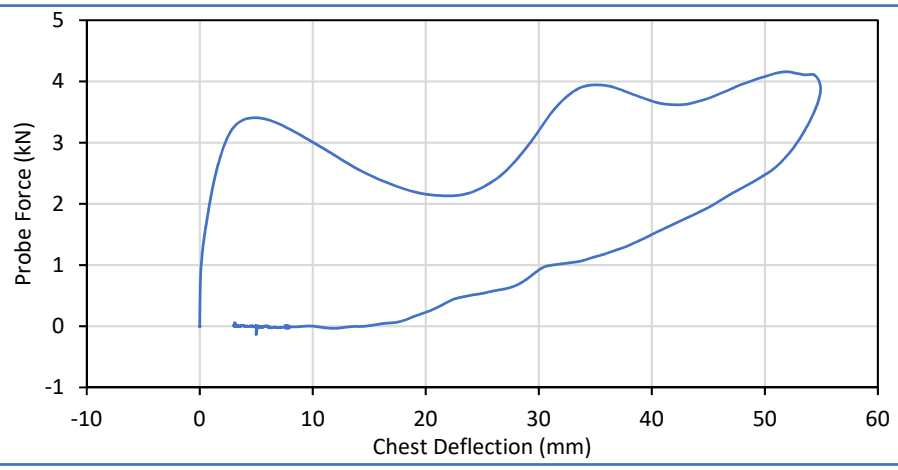
# Hybrid III 5th Percentile Female
# Thorax Impact

ATD Serial No.: 630 Test Date: 2017-12-19

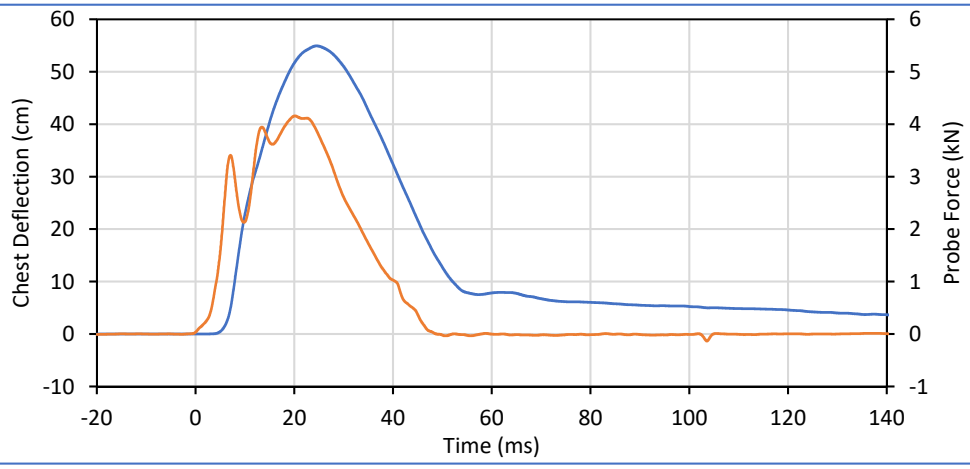
| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.3 | Pass |
| Laboratory Humidity | % | 10 | 70 | 24 | Pass |
| Probe Velocity | m/s | 6.59 | 6.83 | 6.65 | Pass |
| Peak Chest Deflection | mm | 50.0 | 58.0 | 54.9 | Pass |
| Peak Probe Force, 50 and 58 mm | kN | 3.900 | 4.400 | 4.159 | Pass |
| Peak Probe Force, 18 and 50 mm | kN | 0.000 | 4.600 | 4.081 | Pass |
| Internal Hysterisis | % | 69.0 | 85.0 | 70.4 | Pass |
| | | | Overall Test Results | | Pass |




**Probe Force**

Max:4.159@51.9 / Min:-0.1@5.00

SAE Class N/A




**Chest Deflection**

Max:54.93@24.5 / Min:0.00@0.0

SAE Class 180

**Probe Force**

Max:4.159@20.2 / Min:-0.135@103.6

SAE Class 180

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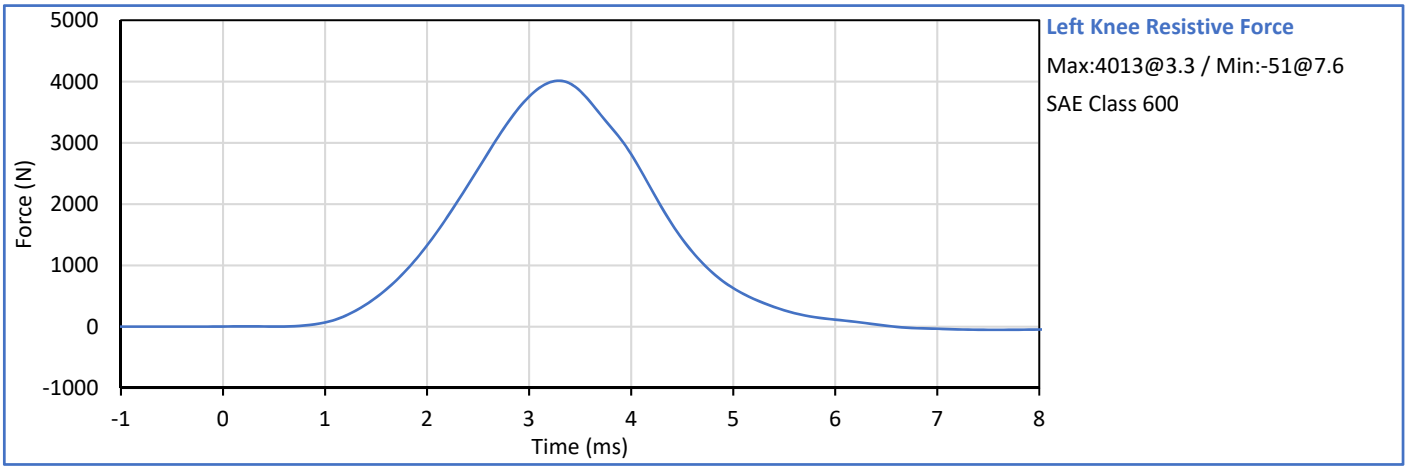
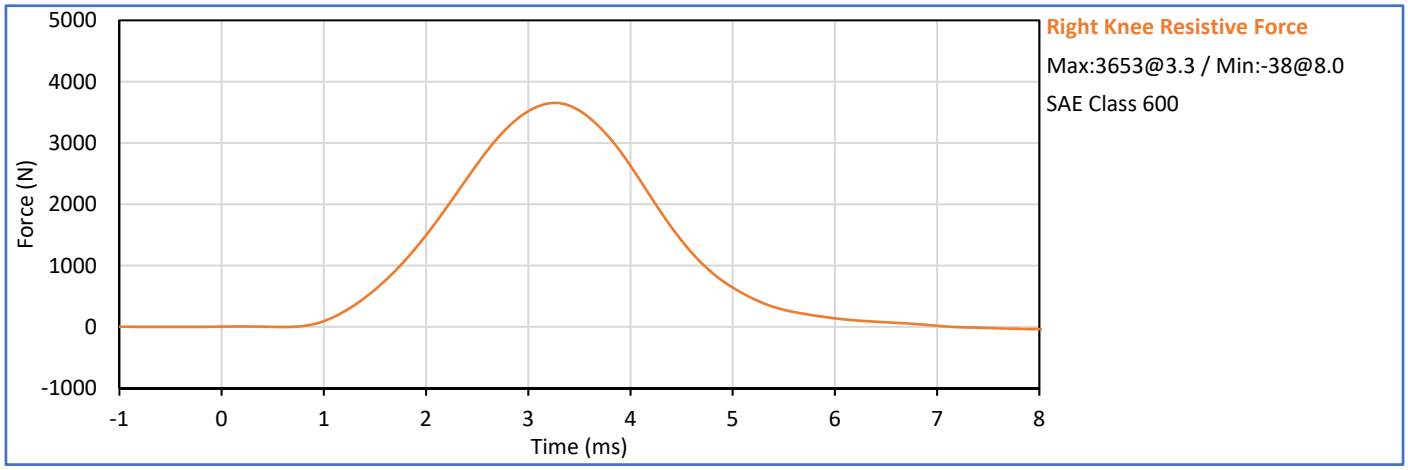
# Hybrid III 5th Percentile Female
# Knee Impact (Left/Right)

ATD Serial No.: 630 Test Date: 2017-12-18

| | Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|---|
| | Laboratory Temperature | °C | 18.9 | 25.6 | 21.1 | Pass |
| | Laboratory Humidity | % | 10 | 70 | 16 | Pass |
| Left Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.121 | Pass |
| | Peak Resistive Force | N | 3450 | 4060 | 4013 | Pass |
| Right Knee | Probe Velocity | m/s | 2.070 | 2.130 | 2.127 | Pass |
| | Peak Resistive Force | N | 3450 | 4060 | 3653 | Pass |
| | | | | Overall Test Results | | Pass |

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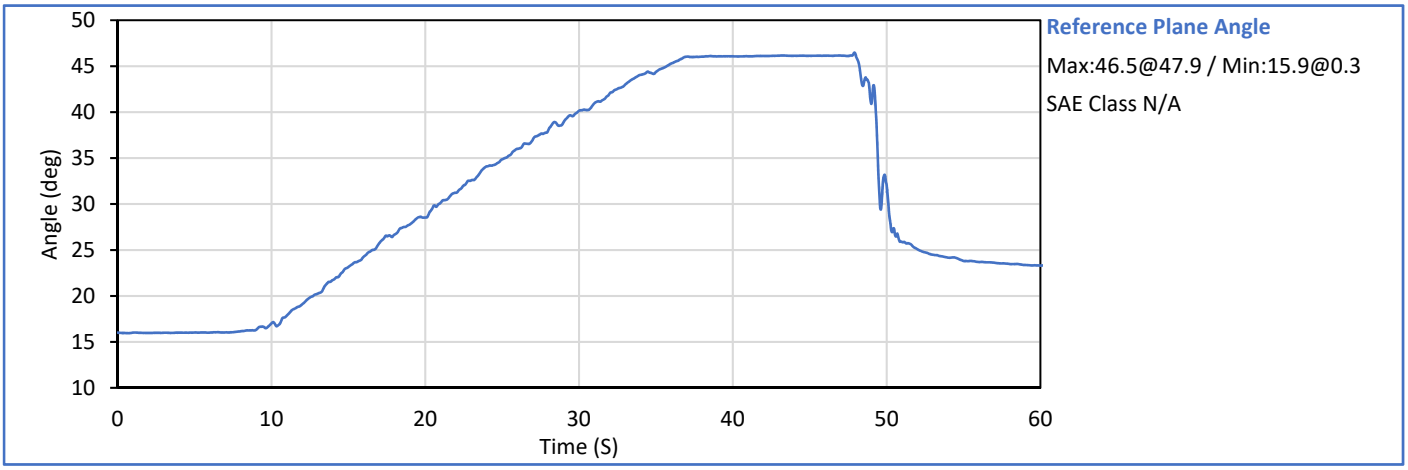
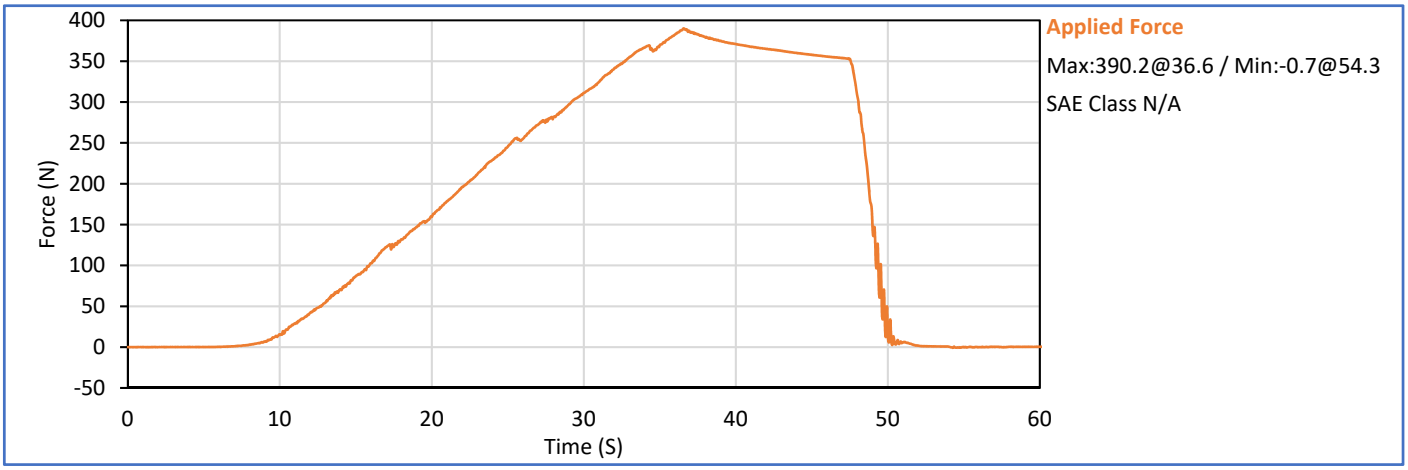
# Hybrid III 5th Percentile Female
# Torso Flexion Test

ATD Serial No.: 630 Test Date: 2017-12-19

| Tested Parameter | Units | Spec. Low | Spec. High | Result | Pass/Fail |
|---|---|---|---|---|---|
| Laboratory Temperature | °C | 20.6 | 22.2 | 21.4 | Pass |
| Laboratory Humidity | % | 10 | 70 | 22 | Pass |
| Orientation Angle | deg | 0.0 | 20.0 | 14.4 | Pass |
| Test Initial Angle | deg | 11.0 | 19.0 | 16.0 | Pass |
| Peak Force at 45° (+/-0.5°) | N | 320.0 | 390.0 | 378.5 | Pass |
| Torso Flexion Rate | deg/s | 0.50 | 1.50 | 1.13 | Pass |
| Final Reference Plane Angle | deg | -8.0 | 8.0 | 6.2 | Pass |
| | | | Overall Test Results | | Pass |

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