**Final Report Number: NCAP-TRC-19-005**

# New Car Assessment Program (NCAP)

# Frontal Barrier Impact Test

**NISSAN MOTOR CO., LTD.**

**2019 Infiniti QX50 SUV**

**NHTSA Number: M20195213**

**PREPARED BY:**
**Transportation Research Center Inc.**
**10820 State Route 347**
**P. O. Box B-67**
**East Liberty, OH 43319**

**Report Date: June 13, 2019**

**FINAL REPORT**

**Prepared For:**
**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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Prepared By: ILO Project Operations Group

Approved By: John Shultz

Approval Date: June 13, 2019

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date _____

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

Date _____

Technical Report Documentation Page

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| | 6. Performing Organization Code<br>TRC Inc. |
| 7. Author(s)<br>John Shultz, Project Manager | 8. Performing Organization Report No.<br>190319 |
| 9. Performing Organization Name and Address<br>Transportation Research Center Inc.<br>10820 State Route 347<br>East Liberty, OH 43319-0367 | 10. Work Unit No. (TRAIS)<br>11. Contract or Grant No.<br>DTNH22-12-D-00257 |
| 12. Sponsoring Agency Name and Address<br>U. S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Crashworthiness Standards<br>1200 New Jersey Ave SE<br>Room W43-410, Washington, DC 20590 | 13. Type of Report and Period Covered<br>Final Report<br>March 19, 2019 –<br>June 13, 2019<br>14. Sponsoring Agency Code<br>NRM-110 |

15. Supplemental Notes

16. Abstract

A 56.0 km/h NCAP Frontal Impact Test was conducted on a 2019 Infiniti QX50 SUV, in accordance with the specifications the Office of Crashworthiness Standards Laboratory Procedure for NCAP Full Frontal Rigid Barrier Impact Testing. This test was conducted to obtain data related to FMVSS Nos. 208, 212, 219 (partial), and 301 performance. The test was conducted at the Transportation Research Center Inc. in East Liberty, Ohio on March 19, 2019.

The impact velocity was 56.48 km/h, and the ambient temperature at the barrier face at the time of impact was 22.1° C. The target vehicle post-test maximum crush was 510 millimeters at crush zone 3 left side and crush zone 4 at right side. The test vehicle's performance is as follows:

| | Driver ATD | | | Passenger ATD | | |
|---|---|---|---|---|---|---|
| Measurement Description | Units | Threshold | Result | Units | Threshold | Result |
| Head Injury Criteria ($HIC_{15}$) | NA | 700 | 177 | NA | 700 | 321 |
| Maximum Chest Compression | mm | 63 | -23.1 | mm | 52 | -15.6 |
| 3ms Chest Clip | Gs | 60 | 37.1 | Gs | 60 | 39.5 |
| Nij | NA | 1 | 0.18 | NA | 1 | 0.30 |
| Neck Tension | Newtons | 4170 | 1069.0 | Newtons | 2620 | 529.3 |
| Neck Compression | Newtons | 4000 | -163.0 | Newtons | 2520 | -309.6 |
| Left Femur Force | Newtons | 10000 | -824.2 | Newtons | 6800 | -1659.3 |
| Right Femur Force | Newtons | 10000 | -1235.6 | Newtons | 6800 | -2709.8 |


| 17. Key Words | 18. Distribution Statement |
|---|---|
| 56.3 km/h (35 mph) Full Frontal Rigid 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 |

| 19. Security Classif. (of this report) | 20. Security Classif. (of this page) | 21. Number of Pages | 22. Price |
|---|---|---|---|
| Unclassified | Unclassified | 177 | |

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# 1: PURPOSE AND SUMMARY OF THE TEST

## PURPOSE

This 56 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 No. DTNH22-12-D-00257. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

This 56 km/h frontal barrier impact test was conducted in accordance with the Office of Crashworthiness Standards Laboratory Test Procedure or NCAP Full Frontal Rigid Barrier Impact Testing dated May 2018.

## SUMMARY

A load cell barrier consisting of 288 load cells was impacted by a 2019 Infiniti QX50 SUV at a velocity of 56.48 km/h. The test was performed at Transportation Research Center, Inc. on March 19, 2019. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

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

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

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

The driver (position 1) ATD (Serial No. 037), and the right-front passenger (position 2) ATD (Serial No. 070) were qualified prior to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

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

There was 100.0 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard solvent leakage (or electrolyte spillage) after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 510 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: front airbag, headrest and knee airbag. The passenger's visible contact points were as follows: front airbag, headrest and knee airbag.

The occupant data is summarized below:

| ATD Position | $HIC_{15}$ | Nij | Neck Tension (N) | Neck Compression (N) | 3 ms Chest Clip (Gs) | Chest Disp. (mm) | Left Femur (N) | Right Femur (N) |
|---|---|---|---|---|---|---|---|---|
| Driver ($50^{th}$ Male) | 177 | 0.18 | 1069.0 | -163.0 | 37.1 | -23.1 | -824.2 | -1235.6 |
| Passenger ($5^{th}$ Female) | 321 | 0.30 | 529.3 | -309.6 | 39.5 | -15.6 | -1659.3 | -2709.8 |

**TEST COMMENTS:**

Passenger Head X Accel Redundant data channel failed at 100 ms
Engine Top X data channel questionable at 36.0 MS

## 2.2 REPORT AREA 2: DATA SHEETS

## DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### TEST VEHICLE INFORMATION

| | |
|---|---|
| NHTSA No. | M20195213 |
| Model Year | 2019 |
| Make | Infiniti |
| Model | QX50 |
| Body Style | MPV |
| VIN | 3PCAJ5M33KF105784 |
| Body Color | Graphite Shadow |
| Odometer Reading (km/mi) | 80 mi |
| Engine Displacement (L) | 2.0 |
| Type/No. Cylinders | Gas/4 |
| Engine Placement | Front/Transverse |
| Transmission Type | Automatic |
| Transmission Speeds | CVT |
| Overdrive | Yes |
| Final Drive | AWD |
| Roof Rack | No |
| Sunroof/T-Top | No |
| Running Boards | No |
| Tilt Steering Wheel | Yes |
| Power Seats | Yes |
| Anti-Lock Brakes (ABS) | Yes |
| Automatic Door Locks (ADLs) | Yes |

### TEST VEHICLE OPTIONS

| | |
|---|---|
| Traction Control System (TCS) | 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 | Yes |
| Driver Pretensioner | Yes |
| Driver Load Limiter | Yes |
| Front Pass. Pretensioner | Yes |
| Front Pass. Load Limiter | Yes |
| Other: | No |

Does owner's manual provide instructions to turn off automatic door locks? Yes

### DATA FROM CERTIFICATION LABEL

| | |
|---|---|
| Manufactured by | NISSAN MOTOR CO., LTD. |
| Date of Manufacture | 03/18 |

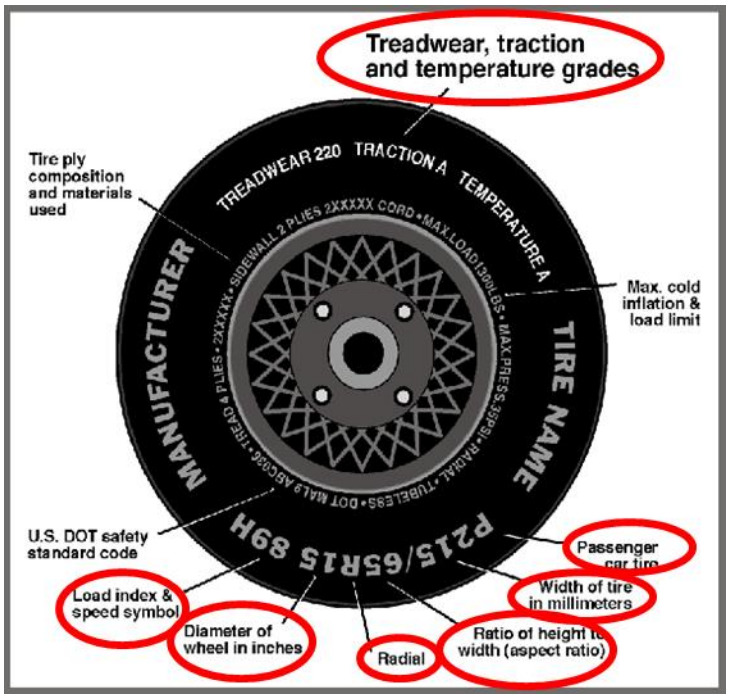
| | |
|---|---|
| GVWR (lb) | 5062 |
| GAWR Front (lb) | 2822 |
| GAWR Rear (lb) | 2513 |

### VEHICLE SEATING AND WEIGHT CAPACITY

| Measured Parameter | Front | Rear | Third | Total |
|---|---|---|---|---|
| Type of Seats | Bucket | Split Bench | N/A | |
| Number of Occupants | 2 | 3 | N/A | 5 |
| Capacity Wt. (VCW) (kg) | | | | 390.0 |
| Cargo Wt. (RCLW) (kg) | | | | 50.0 |

**DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA (CONT'D)**

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019




**DATA FROM TIRE PLACARD**

| Measured Parameter | Front | Rear |
|---|---|---|
| Maximum Tire Pressure (kPa) | 350 | 350 |
| Cold / Test Pressure (kPa) | 230 | 230 |
| Recommended Tire Size | P235/55RF19 | P235/55RF19 |
| Tire Size on Vehicle | P235/55RF19 | P235/55RF19 |
| Tire Manufacturer | Bridgestone | Bridgestone |
| Tire Model | Ecopia H/L 422 Plus | Ecopia H/L 422 Plus |
| Treadwear | 600 | 600 |
| Traction Grade | A | A |
| Temperature Grade | A | A |
| Tire Plies Sidewall | 2 | 2 |
| Tire Plies Body | 4 | 4 |
| Load Index/Speed Symbol | 101V | 101V |
| Tire Material | Rayon/Steel/Nylon | Rayon/Steel/Nylon |
| DOT Safety Code Right | EJ FO CMH4717 | EJ FO CMH4617 |
| DOT Safety Code Left | EJ FO CMH4617 | EJ FO CMH4617 |

## DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA (CONT'D)

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### TEST VEHICLE WEIGHTS

| | Units | As Delivered (UVW) (Axle) | | | As Tested (ATW) (Axle) | | |
|---|---|---|---|---|---|---|---|
| | | Front | Rear | Total | Front | Rear | Total |
| Left | kg | 530.2 | 378.8 | | 556.2 | 446.0 | |
| Right | kg | 523.4 | 367.2 | | 537.0 | 443.8 | |
| Ratio | % | 58.5 | 41.5 | | 55.1 | 44.9 | |
| Totals | kg | 1053.6 | 746.0 | 1799.6 | 1093.2 | 889.8 | 1983.0 |

### TARGET TEST WEIGHT CALCULATION

| Measured Parameter | Units | Value |
|---|---|---|
| Total Delivered Weight (UVW) | kg | 1799.6 |
| Weight of 1 P572E ATD & 1 P572O ATD | kg | 139.3 |
| Rated Cargo/Luggage Weight (RCLW) | kg | 50.0 |
| Vehicle Target Weight (TVTW) | kg | 1988.9 |

### TEST VEHICLE ATTITUDES AND CG

| | Units | LF | RF | LR | RR | CG (aft of front) |
|---|---|---|---|---|---|---|
| As Delivered | mm | 776 | 777 | 788 | 790 | 1157 |
| As Tested | mm | 772 | 782 | 771 | 769 | 1252 |
| Post Test | mm | 730 | 770 | 765 | 753 | |

### GENERAL TEST VEHICLE DATA

| Measurement Description | Units | Value |
|---|---|---|
| Test Vehicle Wheel Base | mm | 2790 |
| Total Vehicle Length at Left Side | mm | 4500 |
| Total Vehicle Length at Centerline | mm | 4680 |
| Total Vehicle Length at Right Side | mm | 4500 |
| Weight of Ballast in Cargo Area | kg | 0.0 |
| Weight of Vehicle Components Removed | kg | 12.6 |
| Amount of Stoddard Solvent in Fuel Tank | liters | 56.0 |

**LIST OF COMPONENTS REMOVED TO MEET TEST WEIGHT:** Rear interior door panels, speakers and tail lights.

**DATA SHEET NO. 1 - GENERAL TEST AND VEHICLE PARAMETER DATA (CONT'D)**

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

**TARGET VEHICLE STRUCTURAL MEASUREMENT**

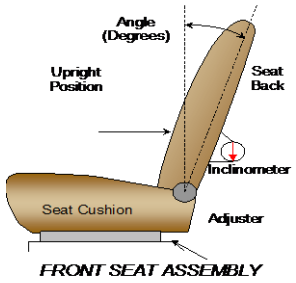
| | Elements | Pre-Test (mm) |
|---|---|---|
| 1 | Total Length | 4680 |
| 2 | Total Width | 1905 |
| 3 | Bumper Top Height | 570 |
| 4 | Bumper Bottom Height | 470 |
| 5 | Longitudinal Member Top Height | 500 |
| 6 | Distance Between Longitudinal Members | 890 |
| 7 | Longitudinal Member Width | 75 |
| 8 | Engine Top Height | 975 |
| 9 | Engine Bottom Height | 258 |
| 10 | Engine and Gearbox Width | 850 |
| 11 | Front Bumper-Engine Distance | 515 |
| 12 | Front Shock Absorber Fixing Height | 960 |
| 13 | Bonnet Leading Edge Height | 905 |
| 14 | Front Shock Absorber Fixing Width | 1255 |
| 15 | Front Bumper – Front Axle Distance | 930 |
| 16 | Front Axle – A-Pillar Distance | 515 |
| 17 | A-Pillar – B-Pillar Distance | 1070 |
| 18 | B-Pillar – Rear Axle Distance | 1150 |
| 19 | B-Pillar – C-Pillar Distance | 945 |
| 20 | Roof Sill Bottom Height | 1470 |
| 21 | Roof Sill Top Height | 1535 |
| 22 | Floor Sill Bottom Height | 365 |
| 23 | Floor Sill Top Height | 1430 |

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

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

**NORMAL DESIGN RIDING POSITION**

For adjustable driver and passenger seat backs. Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent, if applicable




| | Degree |
|---|---|
| Driver Seat back angle: | 0.4 |
| Passenger Seat back angle: | -0.3 |

**SEAT FORE/AFT POSITIONS**

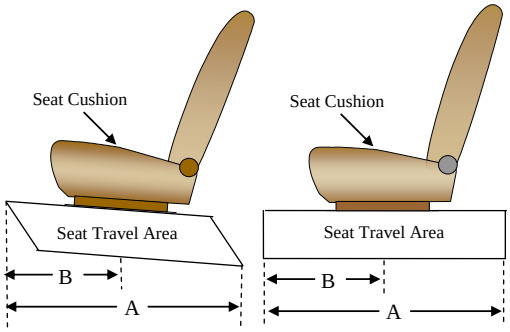
Describe the method of determining seat fore/aft positions.
Driver: Mid position, Positioned according to Form 1
Passenger: Full forward, Positioned according to Form 1

| | Total Fore/Aft Travel | Placed in Position No. |
|---|---|---|
| Driver Seat | 296 | Mid, 148 |
| Passenger Seat | 260 | FF, 0 |

**SEAT BELT UPPER ANCHORAGE**

Describe the method of positioning seat belt upper anchorages.
Driver: Uppermost, Positioned according to Form 1
Passenger: Uppermost, Positioned according to Form 1

| | Total No. of Positions | Placed in Position No. |
|---|---|---|
| Driver Seat | 4 | 0 |
| Passenger Seat | 4 | 0 |



## DATA SHEET NO. 2 - SEAT ADJUSTMENT, FUEL SYSTEM AND STEERING WHEEL DATA (CONT'D)

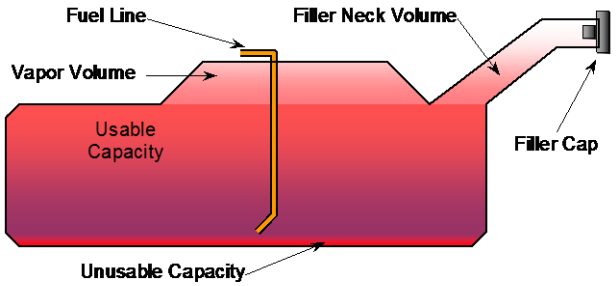
Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### FUEL TANK CAPACITY

| | Liters |
|---|---|
| Usable Capacity of "Standard Tank" | 60.2 |
| Usable Capacity of "Optional Tank" | N/A |
| 92%-94% of Usable Capacity | 56.0 |
| Actual Amount of Solvent Used | 56.0 |
| 1/3 of Usable Capacity | 20.1 |

Describe the fuel system - what type of fuel pump, details about how it operates, etc.

1) For 1.0 seconds after the ignition is switched to "ON".
2) While the engine is running.
3) For 1.5 seconds after the engine stops running.

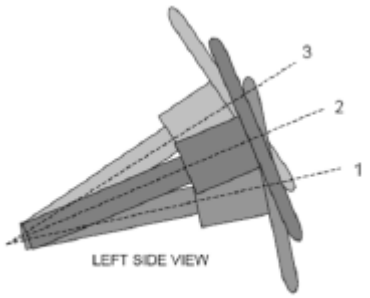


*VEHICLE FUEL TANK ASSEMBLY*

### 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. Describe how this measurement was taken.

Steel square was placed across the rim of the steering wheel, an inclinometer was placed on plate and the angle was measured. Telescope travel was measured full in and full out and set at the midpoint.



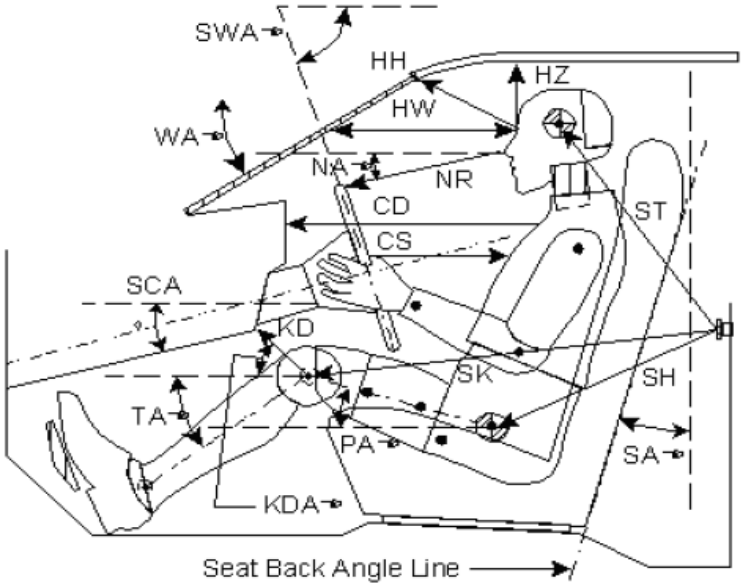
*STEERING COLUMN ASSEMBLY*

### STEERING COLUMN POSITIONS

| | Degrees | Fore/Aft Position (mm) |
|---|---|---|
| Lowermost Position No. 1 | 23.0 | 0 |
| Geometric Center Position No. 2 | 25.6 | 26 |
| Uppermost Position No. 3 | 28.2 | 52 |
| Telescoping Steering Wheel Travel | | 52 |
| Test Position | 25.6 | 26 |

## DATA SHEET NO. 3 - DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

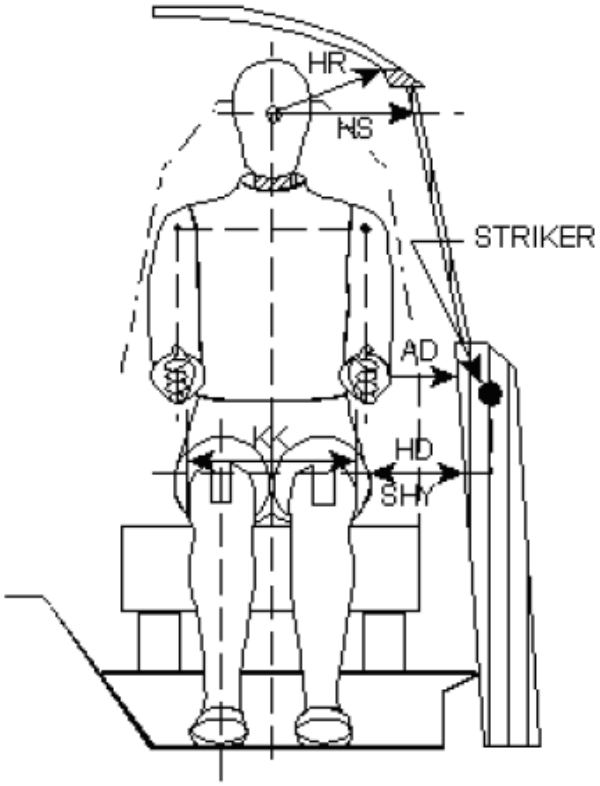
Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019




| Code | Measurement Description | Driver | | Passenger | |
|---|---|---|---|---|---|
| | | Length (mm) | Angle (°) | Length (mm) | Angle (°) |
| **WAº** | Windshield Angle | | 30.1 | | |
| **SWAº** | Steering Wheel Angle | | 64.4 | | |
| **SCAº** | Steering Column Angle | | 25.6 | | |
| **SAº** | Seat Back Angle (on head rest post) | | 0.4 | | -0.3 |
| **HZ** | Head to Roof (Z) | 243 | | 257 | |
| **HH** | Head to Header | 422 | | 359 | |
| **HW** | Head to Windshield | 721 | | 685 | |
| **NR** | Nose to Rim | 392 | 9.4 | | |
| **CD** | Chest to Dash | 540 | | 407 | |
| **CS** | Chest to Steering Hub | 302 | | | |
| **RA** | Rim to Abdomen | 189 | | | |
| **KDL** | Left Knee to Dash | 203 | 16.6 | 75 | 37.6 |
| **KDR** | Right Knee to Dash | 185 | 16.1 | 94 | 38.1 |
| **PAº** | Pelvic Angle | | 23.2 | | 22.0 |
| **TAº** | Tibia Angle | | 51.5 | | 65.8 |
| **SK** | Striker to Knee | 542 | 8.5 | 676 | 5.4 |
| **ST** | Striker to Head | 470 | -78.4 | 449 | -64.9 |
| **SH** | Striker to H-Point | 285 | 44.8 | 397 | 23.5 |

## DATA SHEET NO. 4 - DUMMY LATERAL CLEARANCE DIMENSIONS

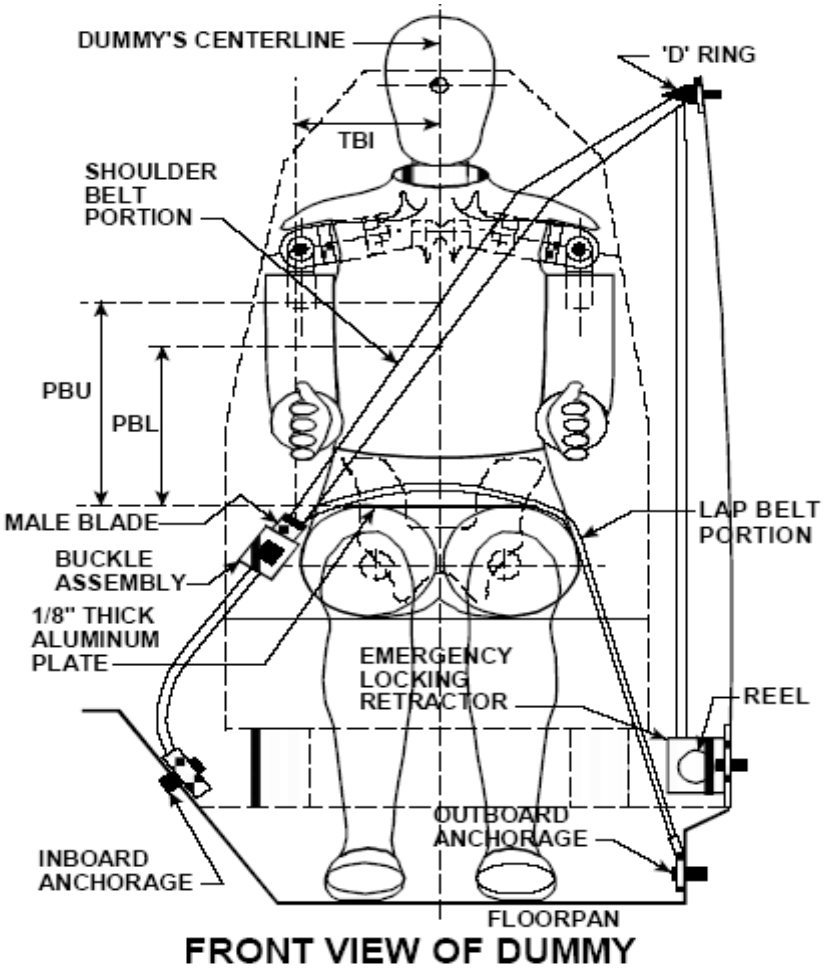
Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019




| Code | Measurement Description | Driver | Passenger |
|---|---|---|---|
| AD | Arm to Door | 127 | 78 |
| HD | H-Point to Door | 160 | 253 |
| HR | Head to Side Header | 255 | 305 |
| HS | Head to Side Window | 369 | 394 |
| KK | Knee to Knee | 302 | 167 |
| SHY | Striker to H-Point (Y Direction) | 257 | 280 |
| AA | Ankle to Ankle | 315 | 174 |

## DATA SHEET NO. 5 - SEAT BELT POSITIONING DATA

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019



FRONT VIEW OF DUMMY

### SEAT BELT POSITIONING MEASUREMENTS

| Measurement Description | Units | Driver | Passenger |
|---|---|---|---|
| **PBU –** Top surface of reference to belt upper edge | mm | 352 | 303 |
| **PBL –** Top surface of reference to belt lower edge | mm | 285 | 216 |

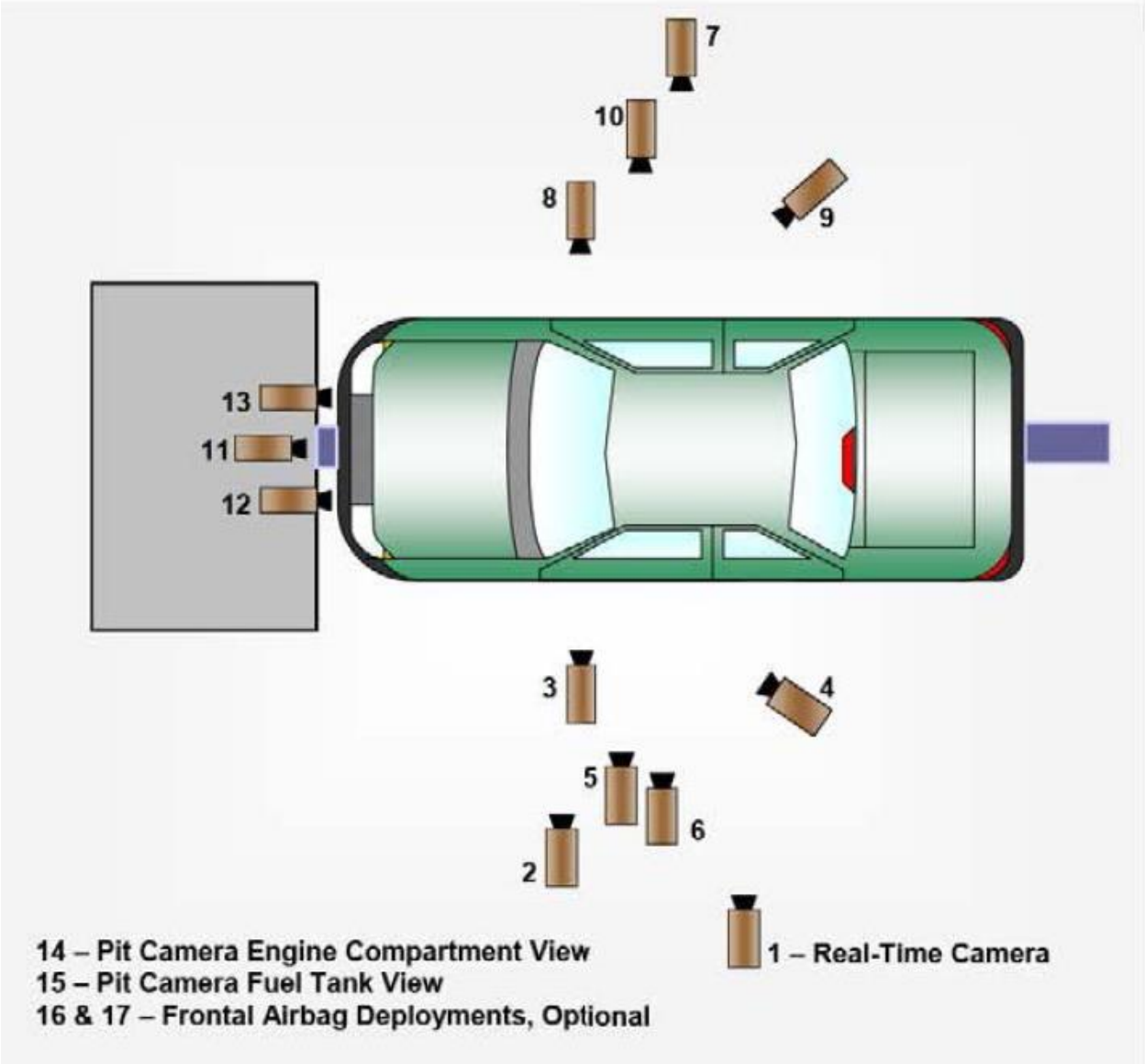
### BELT LENGTH DATA

| Measurement Description | Units | Driver | Passenger |
|---|---|---|---|
| Shoulder belt length as measured on ATD | mm | 916 | 982 |
| Lap belt length as measured on ATD | mm | 871 | 921 |
| Remainder of belt on reel | mm | 1223 | 907 |
| Total belt length for continuous webbing systems | mm | 2810 | 2810 |

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

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

**CAMERA POSITIONS FOR FRONTAL IMPACTS**



**DATA SHEET NO. 6 - HIGH SPEED CAMERA LOCATIONS AND DATA (CONT'D)**

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

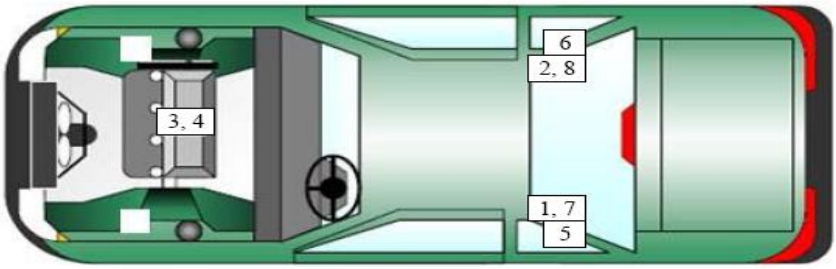
**CAMERA LOCATIONS**

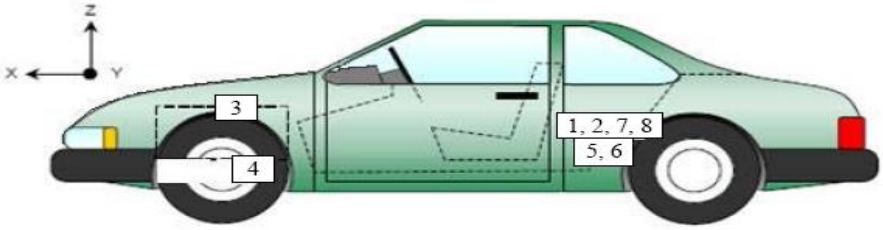
| No. | Camera View | Location (mm) | | | Lens (mm) | Frame Speed (fps) |
|---|---|---|---|---|---|---|
| | | X | Y | Z | | |
| 1 | REAL-TIME LEFT OVERALL | -1084 | 4851 | -1364 | Zoom | 30 |
| 2 | LEFT OVERALL | -1613 | 4965 | -1540 | 20 | 1000 |
| 3 | DRIVER CLOSE-UP | -2696 | 4515 | -1637 | 50 | 1000 |
| 4 | LEFT FRONT HALF | -2096 | 4582 | -1537 | 28 | 1000 |
| 5 | LEFT ANGLE | -4498 | 2800 | -1986 | 20 | 1000 |
| 6 | STEERING COLUMN | -3122 | 4909 | -1679 | 50 | 1000 |
| 7 | RIGHT OVERALL | -3255 | 4987 | -1484 | 20 | 1000 |
| 8 | PASSENGER CLOSE-UP | -2368 | 4783 | -1494 | 50 | 1000 |
| 9 | RIGHT FRONT HALF | -1628 | 4378 | -1601 | 28 | 1000 |
| 10 | RIGHT ANGLE | -4737 | 2533 | -1847 | 20 | 1000 |
| 11 | WINDSHIELD | 0 | -608 | -2591 | 20 | 1000 |
| 12 | DRIVER WINDSHIELD | 0 | 0 | -2591 | 16 | 1000 |
| 13 | PASSENGER WINDSHIELD | 0 | 620 | -2591 | 16 | 1000 |
| 14 | PIT FRONT | -516 | 0 | 3214 | 25 | 1000 |
| 15 | PIT REAR | -1623 | 0 | 3214 | 12.5 | 1000 |
| 16 | DRIVER ONBOARD | | | | 25 | 1000 |
| 17 | PASSENGER ONBOARD | | | | 25 | 1000 |

Reference Points: +X – forward of impact plane
+Y – right of monorail center
+Z – into ground

## DATA SHEET NO. 7 - VEHICLE ACCELEROMETER DATA

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019




### VEHICLE ACCELEROMETER PRE-TEST LOCATIONS

| No. | Accelerometer Location | Measurements (mm) | | |
|---|---|---|---|---|
| | | X | Y | Z |
| 1 | Left Rear Accelerometer – X Direction | 1800 | -280 | -492 |
| 2 | Right Rear Accelerometer – X Direction | 1800 | 280 | -485 |
| 3 | Engine Top X | 4040 | 95 | -848 |
| 4 | Engine Bottom X | 3990 | 200 | -259 |
| 5 | Left Rear Accelerometer – Z Direction | 1800 | -280 | -496 |
| 6 | Right Rear Accelerometer – Z Direction | 1800 | 280 | -493 |
| 7 | Left Rear Accelerometer – X Direction Redundant | 1800 | -340 | -492 |
| 8 | Right Rear Accelerometer- X Direction Redundant | 1800 | 360 | -485 |

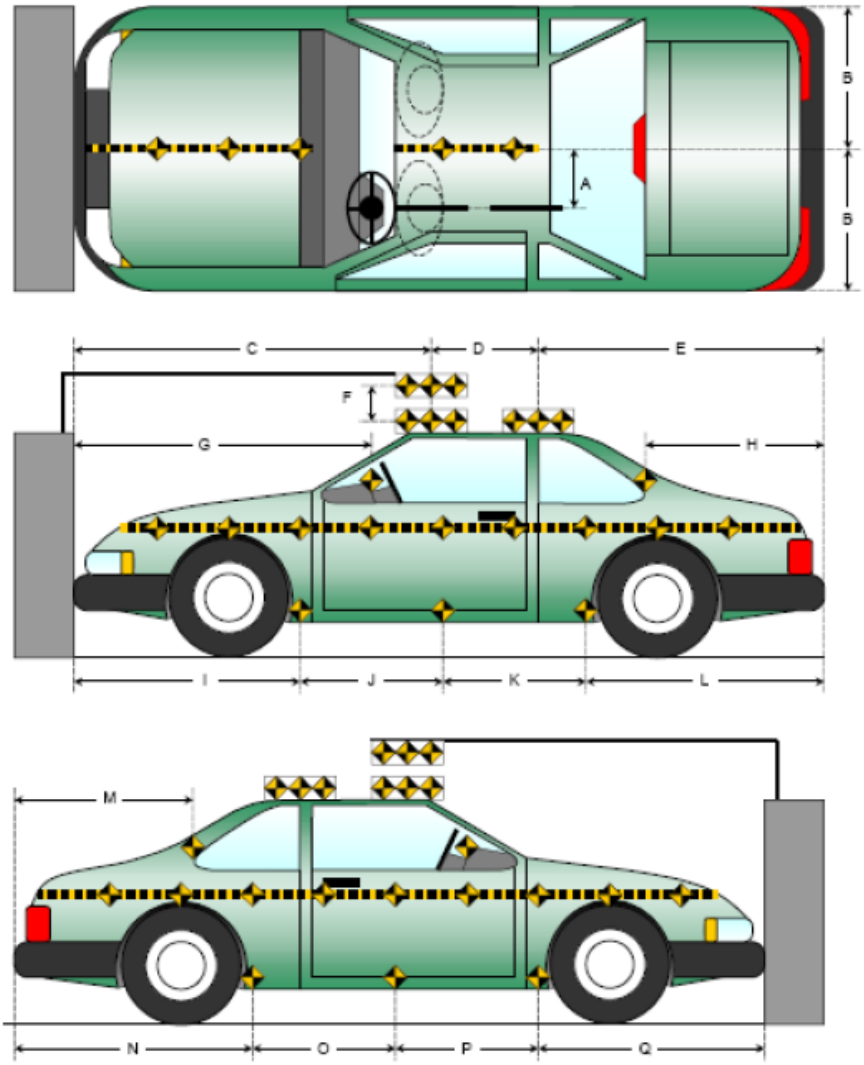
Reference Points: X – Rear Surface of Vehicle (+ forward)
Y – Vehicle Centerline (+ to right)
Z – Ground Plane (+ down)

## DATA SHEET NO. 8 - PHOTOGRAPHIC REFERENCE TARGET LOCATIONS

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

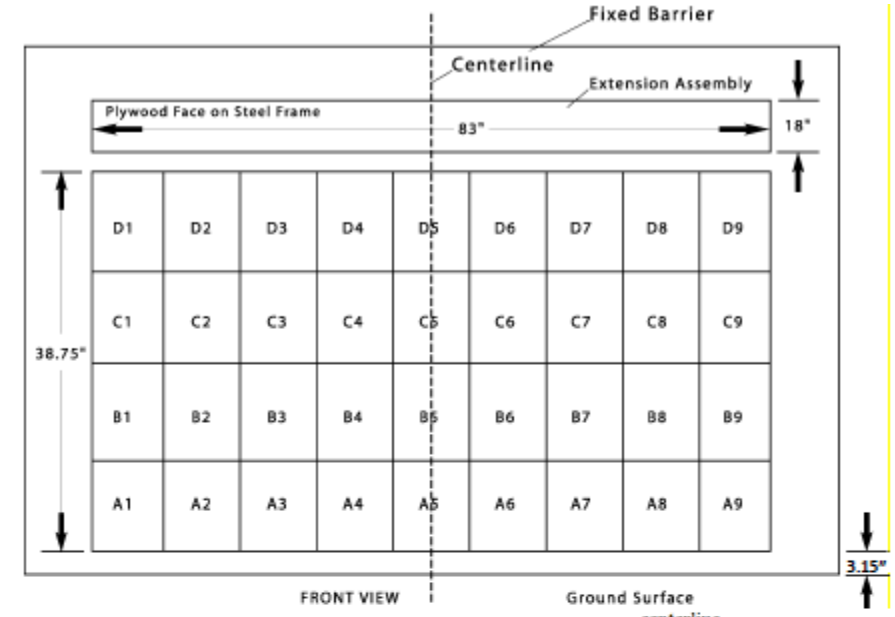
| Item | Value |
|---|---|
| A | 410 |
| B | 953 |
| C | 2336 |
| D | 600 |
| E | 1780 |
| F | 203 |
| G | 1730 |
| H | 1310 |
| I | 1435 |
| J | 905 |
| K | 910 |
| L | 1430 |
| M | 1315 |
| N | 1440 |
| O | 920 |
| P | 900 |
| Q | 1420 |

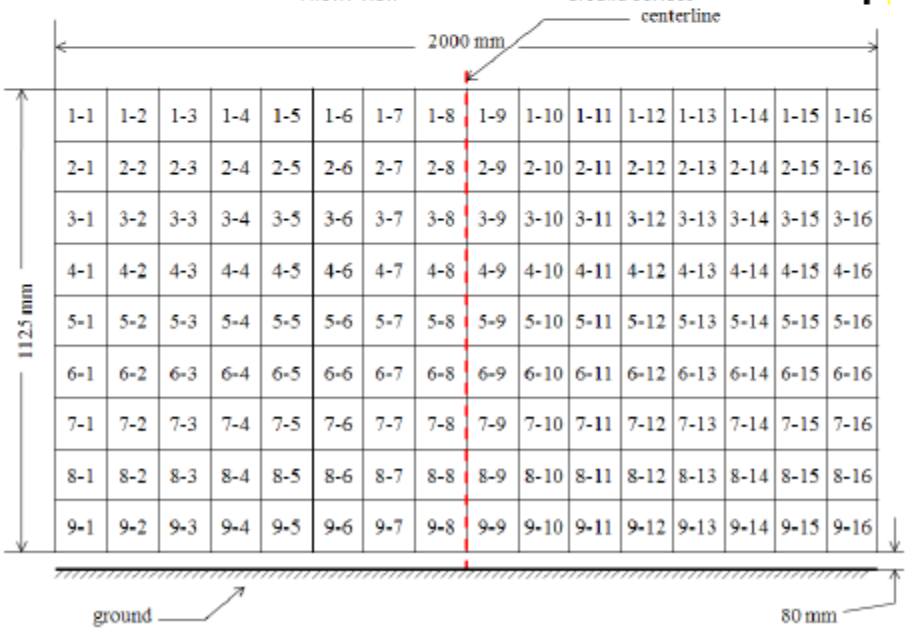
All units in millimeters



## DATA SHEET NO. 9 - LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019



## DATA SHEET NO. 10 - TEST VEHICLE SUMMARY OF RESULTS

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### INSTRUMENTATION

| Instrumentation | Number of Channels Collected |
|---|---|
| Driver Dummy Accelerometers | 47 |
| Passenger Dummy Accelerometers | 47 |
| Vehicle Structure Accelerometers | 8 |
| **Total** | 102 |

### CAMERA COVERAGE

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

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

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### TEST DUMMY INFORMATION AND CONTACT LOCATIONS

| Description | Driver | Passenger |
|---|---|---|
| Dummy Type / Serial No. | Hybrid III 50th / 037 | Hybrid III 5th / 070 |
| Head Contact | Frontal Airbag and Head Restraint | Frontal Airbag and Head Restraint |
| Upper Torso Contact | Airbag | Airbag |
| Lower Torso Contact | Airbag | Airbag |
| Left Knee Contact | Knee Airbag | Knee Airbag |
| Right Knee Contact | Knee Airbag | Knee Airbag |

### DOOR OPENING, TRUNK OPENING, AND SEAT TRACK INFORMATION

| Description | Driver | Passenger | Other |
|---|---|---|---|
| Locked/Unlocked Doors** | Unlocked | Unlocked | |
| Front Door Opening** | No | No | |
| Rear Door Opening** | No | No | |
| Trunk/Hatch/Tailgate Opening** | | | No |
| Seat Track Shift (mm) ** | No | No | |
| Seat Back Movement from Initial Position** | No | No | |

**NOTE: Indicate "No", "N/A, or "Yes", and if "Yes", describe

### POST- OTHER VEHICLE POST-TEST OBSERVATIONS

| Critical Areas of Performance | Observations |
|---|---|
| Windshield Damage | Cracked along lower edge |
| Window Damage | None |
| Other Notable Effects | None |

### VEHICLE REBOUND FROM BARRIER

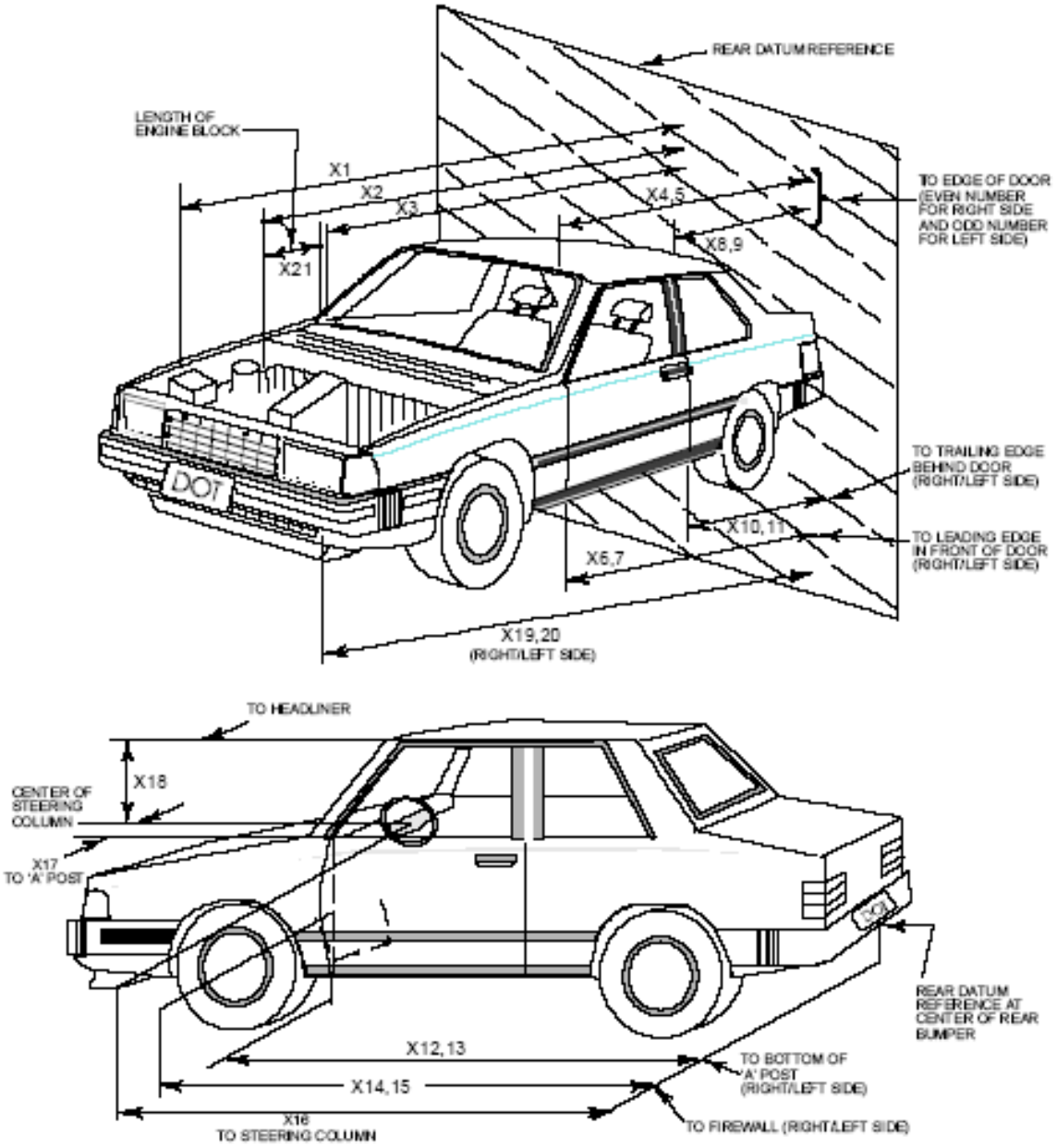
| Measured Parameter | Units | Value |
|---|---|---|
| Left Side | mm | 1741 |
| Center | mm | 1875 |
| Right Side | mm | 1892 |
| Average | mm | 1836 |

### SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION

| Restraint Type | Driver (Occupant 1) | | Passenger (Occupant 2) | |
|---|---|---|---|---|
| | Installed | Deployed | Installed | Deployed |
| Front Airbag | Yes | Yes | Yes | Yes |
| Torso/Pelvis Side Airbag | Yes | No | Yes | No |
| Curtain Side Airbag | Yes | No | Yes | Yes |
| Knee Airbag | Yes | Yes | Yes | Yes |
| Seat Belt Pretensioner | Yes | Yes | Yes | Yes |
| Seat Belt Load Limiter | Yes | Yes | Yes | Yes |
| Seat Belt Buckle Pretensioner | No | N/A | No | N/A |
| Other | No | N/A | No | N/A |

## DATA SHEET NO. 12 - VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019



## DATA SHEET NO. 12 - VEHICLE PROFILE MEASUREMENTS (CONT'D)

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

| No. | Measurement Description | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|
| 1 | Total Length of Vehicle at Centerline | 4680 | 4180 | 500 |
| 2 | Rear Surface of Vehicle (RSOV) to Front of Engine | 4170 | 3970 | 200 |
| 3 | RSOV to Firewall | 3675 | 3545 | 130 |
| 4 | RSOV to Upper Leading Edge of Right Door | 3185 | 3182 | 3 |
| 5 | RSOV to Upper Leading Edge of Left Door | 3185 | 3190 | -5 |
| 6 | RSOV to Lower Leading Edge of Right Door | 3180 | 3170 | 10 |
| 7 | RSOV to Lower Leading Edge of Left Door | 3172 | 3160 | 12 |
| 8 | RSOV to Upper Trailing Edge of Right Door | 2135 | 2132 | 3 |
| 9 | RSOV to Upper Trailing Edge of Left Door | 2130 | 2133 | -3 |
| 10 | RSOV to Lower Trailing Edge of Right Door | 2165 | 2155 | 10 |
| 11 | RSOV to Lower Trailing Edge of Left Door | 2155 | 2144 | 11 |
| 12 | RSOV to Bottom of "A" Post-of Right Side | 3170 | 3170 | 0 |
| 13 | RSOV to Bottom of "A" Post-of Left Side | 3175 | 3175 | 0 |
| 14 | RSOV to Firewall, Right Side | 3670 | 3635 | 35 |
| 15 | RSOV to Firewall, Left Side | 3690 | 3615 | 75 |
| 16 | RSOV to Steering Column | 2747 | 2780 | -33 |
| 17 | Center of Steering Column to "A" Post | 330 | 360 | -30 |
| 18 | Center of Steering Column to Headliner | 440 | 450 | -10 |
| 19 | RSOV to Right Side of Front Bumper | 4500 | 4095 | 405 |
| 20 | RSOV to Left Side of Front Bumper | 4500 | 4100 | 400 |
| 21 | Length of Engine Block | 500 | 500 | 0 |
| RD | RSOV to Right Side of Dash Panel | 3050 | 3045 | 5 |
| CD | RSOV to Center of Dash Panel | 3045 | 3045 | 0 |
| LD | RSOV to Left Side of Dash Panel | 3050 | 3055 | -5 |

All Dimensions in mm

## DATA SHEET NO. 13 - ACCIDENT INVESTIGATION DIVISION DATA

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### VEHICLE INFORMATION

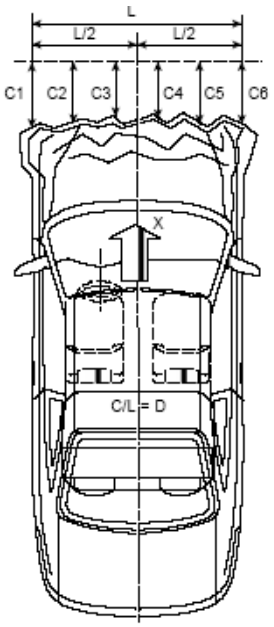
VIN: 3PCAJ5M33KF105784 Wheelbase: 2790
Vehicle Size Category: MPV Test Weight (kg): 1983.0

### ACCELEROMETER DATA

Accelerometer Locations: As listed on Page 15 of this report.
Cal. Procedure/Interval: TRC procedure / 6 month interval
Integration Algorithm: Trapezoidal
Linearity: > 99%
Impact Velocity (km/h): 56.48
Velocity Change (km/h): 65.71
Time of Separation (ms): 155

### CRUSH PROFILE

Collision Deformation Classification: 12FDEW2
Midpoint of Damage: Centerline
Damage Region Length (mm): 1524
Impact Mode: Frontal




| No. | Measurement Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| C1 | Crush zone 1 at left side | mm | 4500 | 4100 | 400 |
| C2 | Crush zone 2 at left side | mm | 4660 | 4160 | 500 |
| C3 | Crush zone 3 at left side | mm | 4680 | 4170 | 510 |
| C4 | Crush zone 4 at right side | mm | 4680 | 4170 | 510 |
| C5 | Crush zone 5 at right side | mm | 4660 | 4180 | 480 |
| C6 | Crush zone 6 at right side | mm | 4500 | 4095 | 405 |
| L | C1 to C6 | mm | 1524 | 1125 | 399 |

## DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS

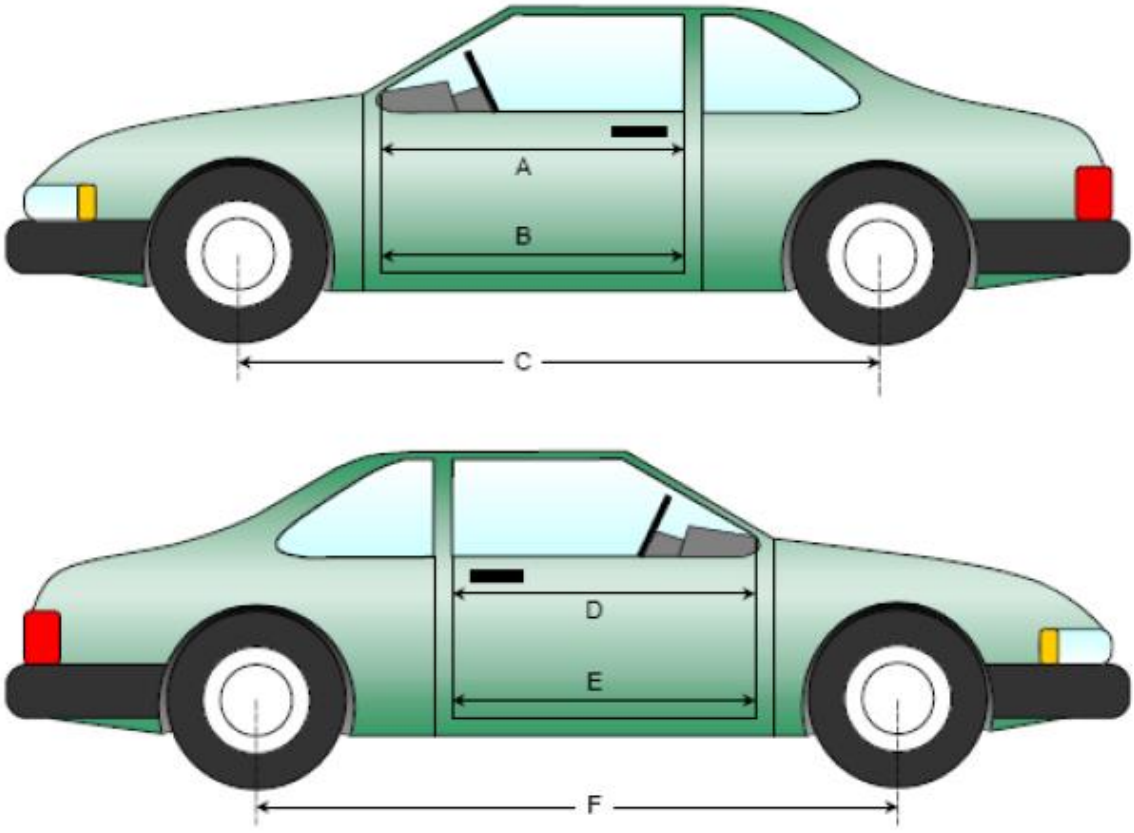
Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### DOOR OPENING WIDTH

| No. | Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| A | Left Side Upper | mm | 1000 | 1000 | 0 |
| B | Left Side Lower | mm | 900 | 900 | 0 |
| D | Right Side Upper | mm | 1000 | 1000 | 0 |
| E | Right Side Lower | mm | 900 | 900 | 0 |

### WHEELBASE MEASUREMENTS

| No. | Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| C | Left Side Wheelbase | mm | 2790 | 2725 | 65 |
| F | Right Side Wheelbase | mm | 2790 | 2740 | 50 |



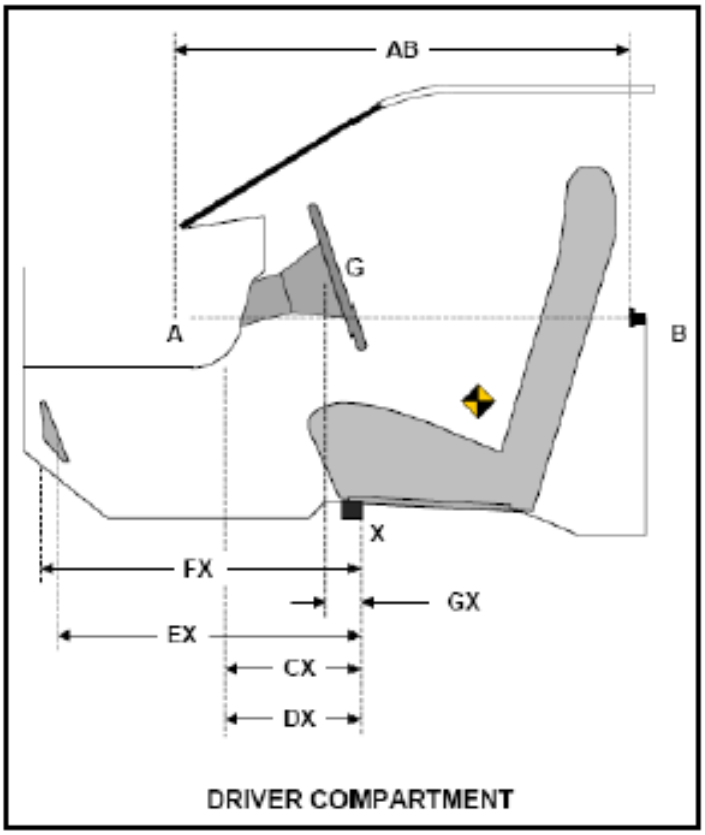
## DATA SHEET NO. 14 - VEHICLE INTRUSION MEASUREMENTS (CONT'D)

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### DRIVER COMPARTMENT INTRUSION

| Item | Description | Units | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|---|
| AB | Door Opening (Inside Window Jam) | mm | 995 | 995 | 0 |
| CX | Left Knee Bolster to X | mm | 335 | 328 | 7 |
| DX | Right Knee Bolster to X | mm | 335 | 315 | 20 |
| EX | Brake Pedal to X | mm | 560 | 540 | 20 |
| FX | Foot Rest to X | mm | 550 | 540 | 10 |
| GX | Center of Steering Column Wheel Hub to X | mm | 25 | 65 | -40 |

X = Front of Seat Track (Stationary)



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

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

Please provide windshield mounting details.

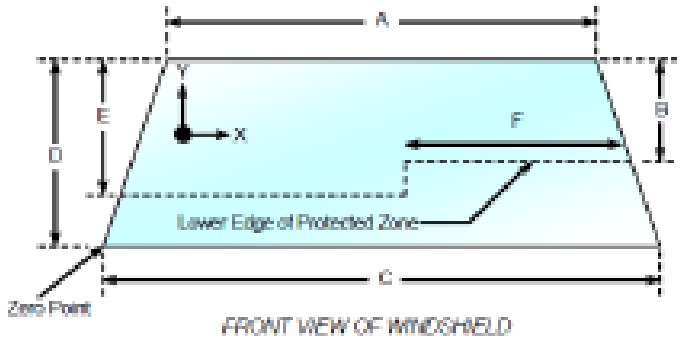
The standard requires that the post-test retention measurement be a minimum of 75% of the pre-test total periphery measurement for vehicle not equipped with occupant passive restraint and 50% for each side of the windshield for vehicle which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 22.1°C

**WINDSHIELD PERIPHERY MEASUREMENTS**

| Measurement | Pre-Test (mm) | Post-Test (mm) | % Retention |
|---|---|---|---|
| Left Side | 2924 | 2924 | 100.0 |
| Right Side | 2944 | 2944 | 100.0 |
| Total | 5868 | 5868 | 100.0 |

| Item | Units | Value |
|---|---|---|
| A | mm | 1245 |
| B | mm | 527 |
| C | mm | 1490 |
| D | mm | 944 |
| E | mm | 544 |
| F | mm | 500 |



FRONT VIEW OF WINDSHIELD

**AREAS OF PROTECTED ZONE FAILURES**

A. Provide coordinates of the area that the protected zone was penetrated more than .25 inches by a vehicle component other than one that is normally in contact with the windshield.

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

B. The inner surface of the windshield was penetrated by the hood support beneath the protected zone.

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

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

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

### FMVSS 301 FUEL SYSTEM INTEGRTY POST IMPACT DATA

Temperature at Time of Impact: 21.3°C Test Time: 16:07

Stoddard Solvent Spillage Measurements

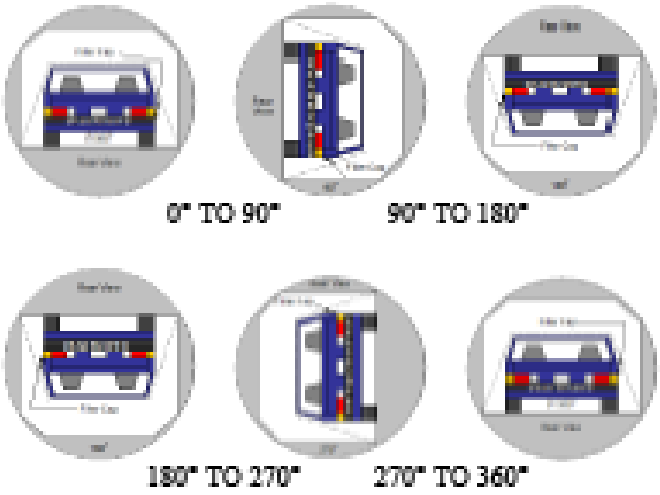
| | | |
|---|---|---|
| A | From impact until vehicle motion ceases: (maximum allowable – 1 oz.) | 0 oz. |
| B | For the 5-minute period after motion ceases: (maximum allowable – 5 oz.) | 0 oz. |
| C | For the following 25 minutes: (maximum allowable – 1 oz./minutes) | 0 oz. |
| D | Spillage: None | |

**DATA SHEET NO. 16 - FMVSS 301 BARRIER IMPACT AND STATIC ROLLOVER RESULTS (CONT'D)**

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

1. The specified fixture rollover rate for each 90º of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage:

None




**SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase | Rotation Time | Hold Time | Total Time |
|---|---|---|---|
| 0º to 90º | 90 | 330 | 420 |
| 90º to 180º | 90 | 330 | 840 |
| 180º to 270º | 90 | 330 | 1260 |
| 270º to 360º | 90 | 330 | 1480 |

**FMVSS 301 SPILLAGE TABLE**

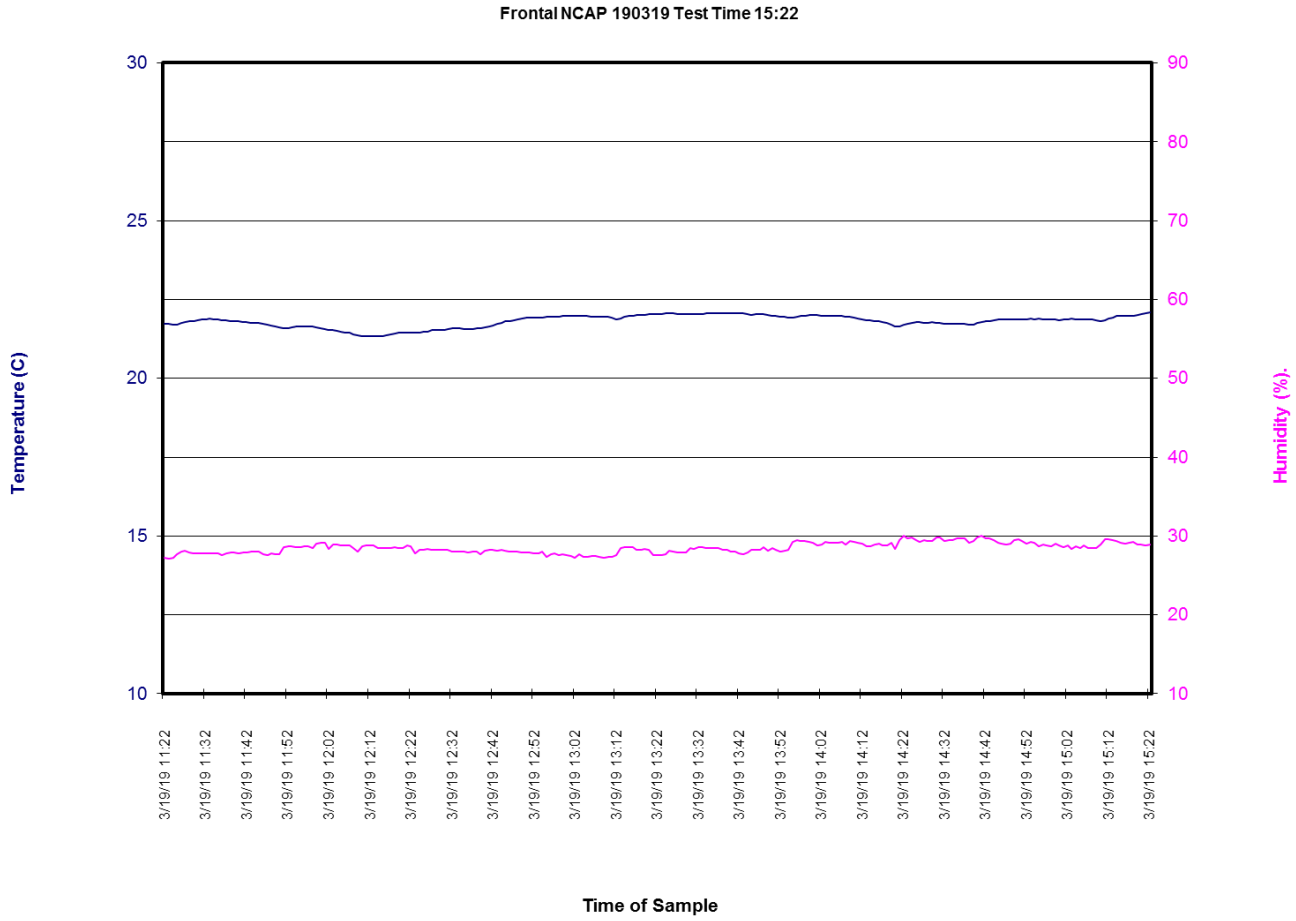
| Test Phase | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|---|---|---|---|---|
| 0º to 90º | 0 | 0 | 0 | N/A |
| 90º to 180º | 0 | 0 | 0 | N/A |
| 180º to 270º | 0 | 0 | 0 | N/A |
| 270º to 360º | 0 | 0 | 0 | N/A |

**SOLVENT SPILLAGE LOCATION TABLE**

| Test Phase | Spillage Location |
|---|---|
| 0º to 90º | None |
| 90º to 180º | None |
| 180º to 270º | None |
| 270º to 360º | None |

## DATA SHEET NO. 17 - DUMMY/VEHICLE TEMPERATURE STABILIZATION

Test Vehicle: 2019 Infiniti QX50 SUV NHTSA No.: M20195213
Test Program: NCAP Frontal Impact Test Date: 3/19/2019

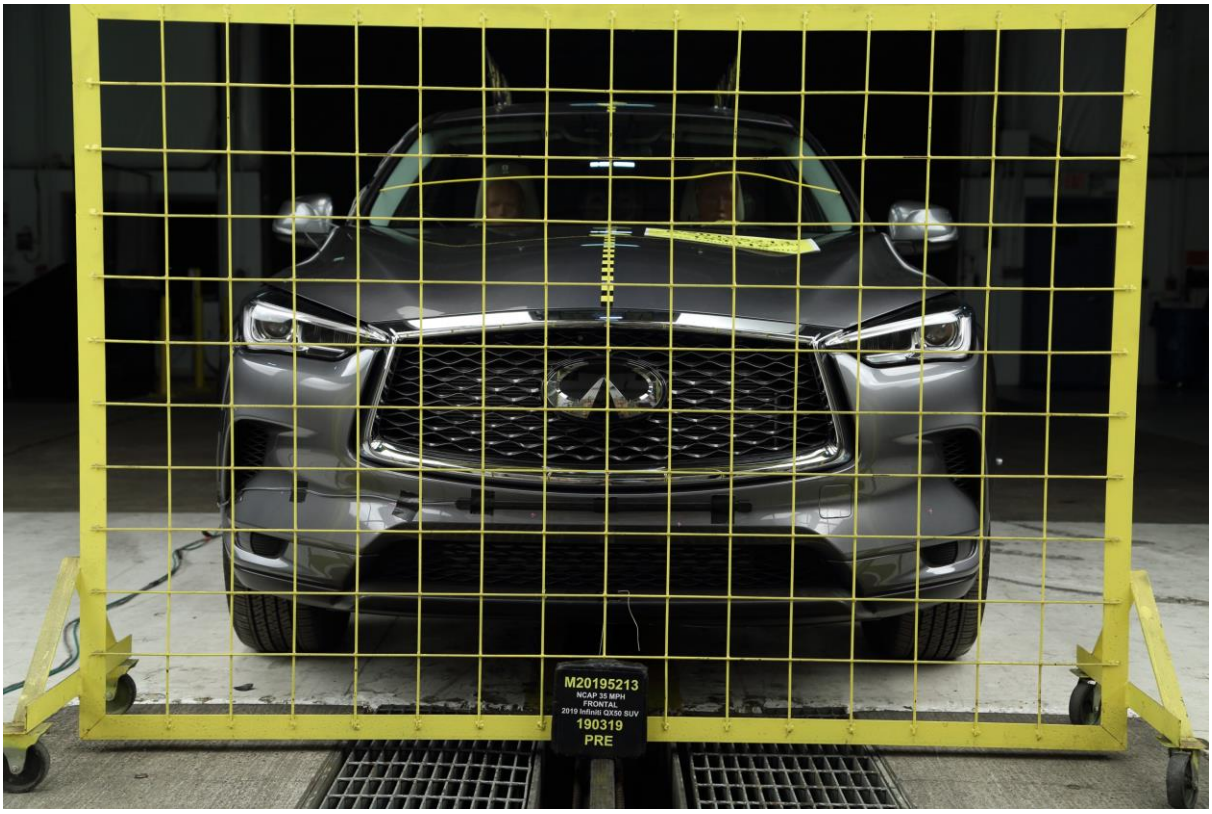


# APPENDIX A
# PHOTOGRAPHS

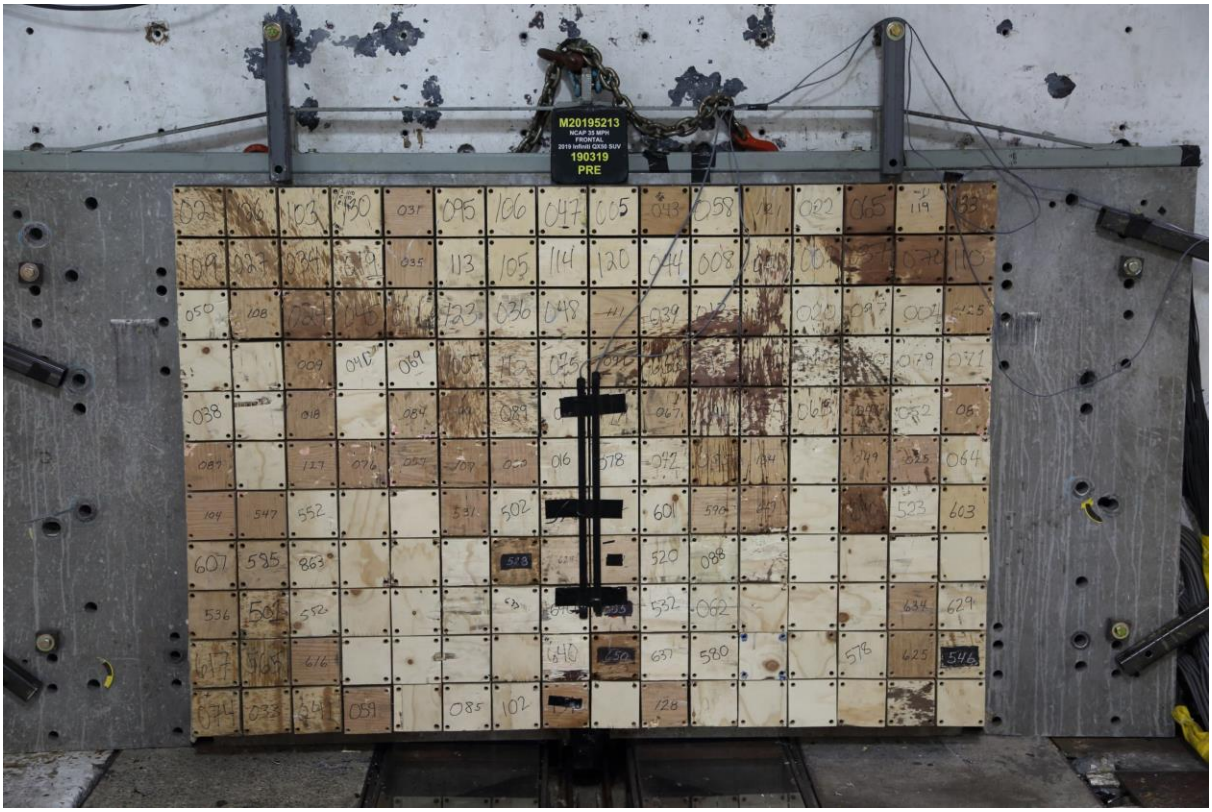
## TABLE OF PHOTOGRAPHS

## TABLE OF PHOTOGRAPHS (CONTINUED)

## TABLE OF PHOTOGRAPHS (CONTINUED)




**001 Load Cell Location**




**002 Pre-Test Load Cell Wall**


**003 Post-Test Load Cell Wall**


**004 Manufacturer's Label**

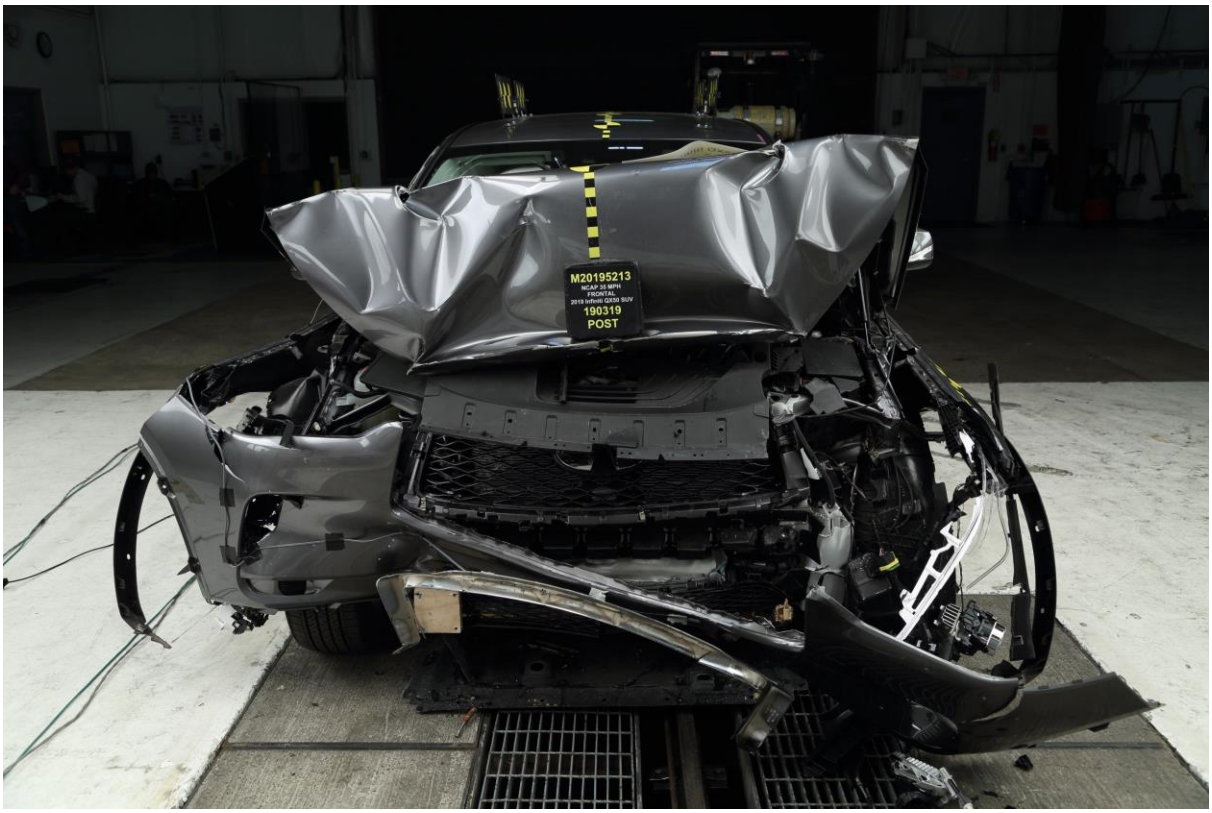

**005 Tire Placard**

**Intentionally Left Blank**

**006  2019 Infiniti QX50 SUV Frontal As Delivered**

**007  Left Rear 3-4 View, as Received**


**008 Pre-Test Front View of Test Vehicle**




**009 Post-Test Front View of Test Vehicle**


**010 Pre-Test Left View of Test Vehicle**


**011 Post-Test Left View of Test Vehicle**


**012 Pre-Test Right View of Test Vehicle**


**013 Post-Test Right View of Test Vehicle**


**014 Pre-Test Right Front 3-4 View**


**015 Post-Test Right Front 3-4 View**

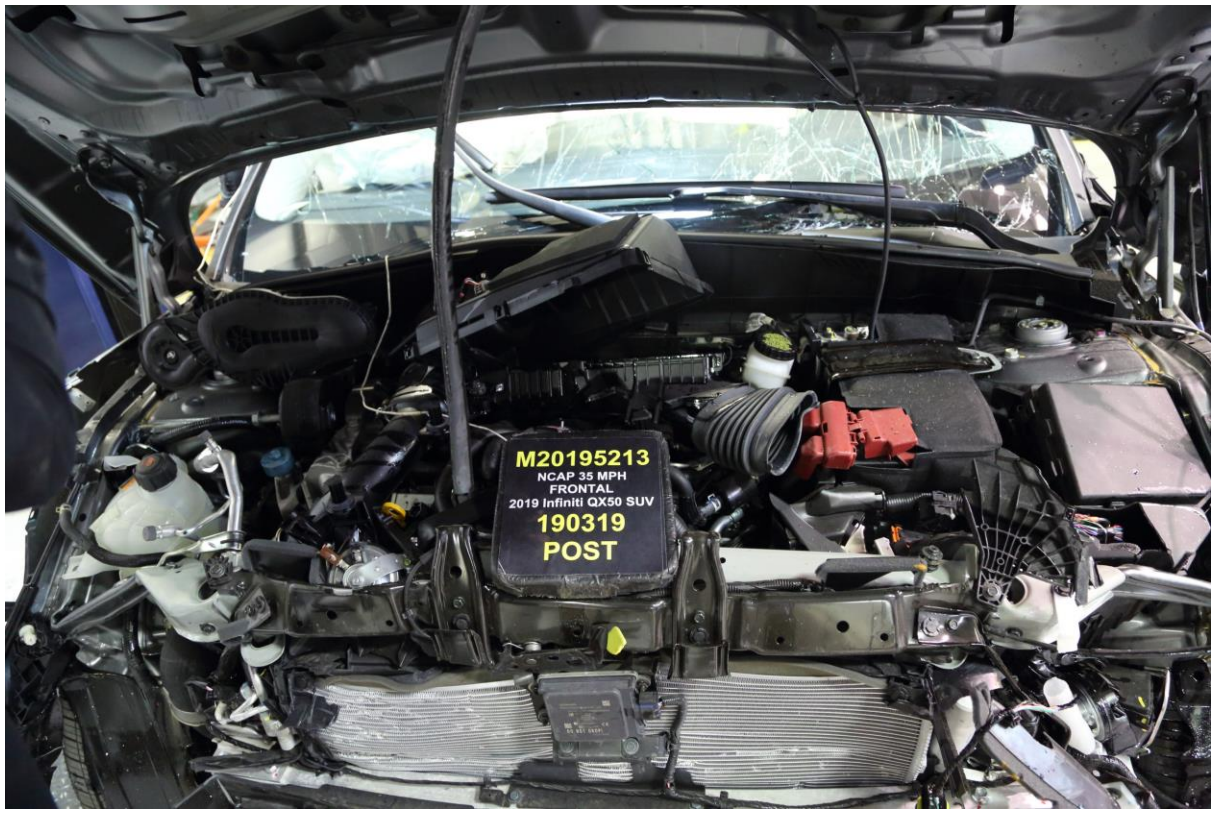

**016 Pre-Test Left Rear 3-4 View**


**017 Post-Test Left Rear 3-4 View**


**018 Pre-Test Windshield View**


**019 Post-Test Windshield View**

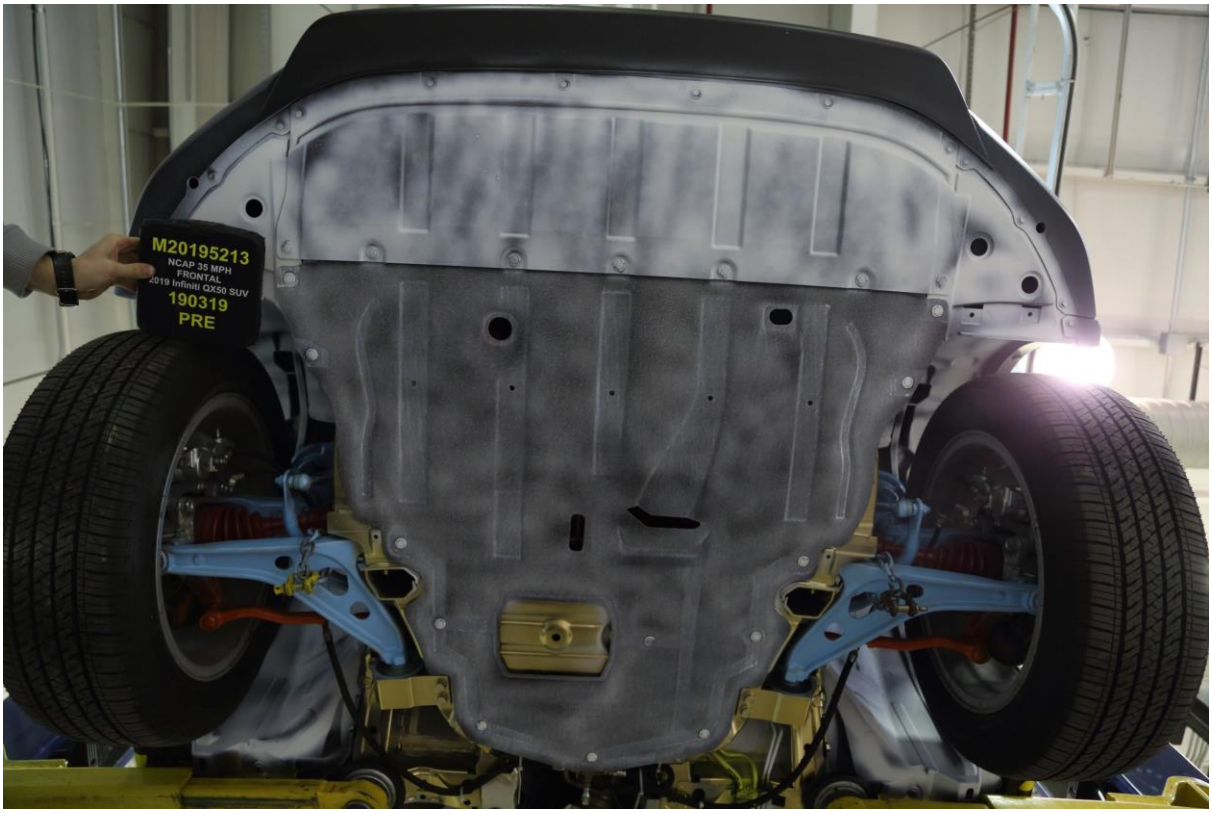

**020 Pre-Test Engine Compartment View**



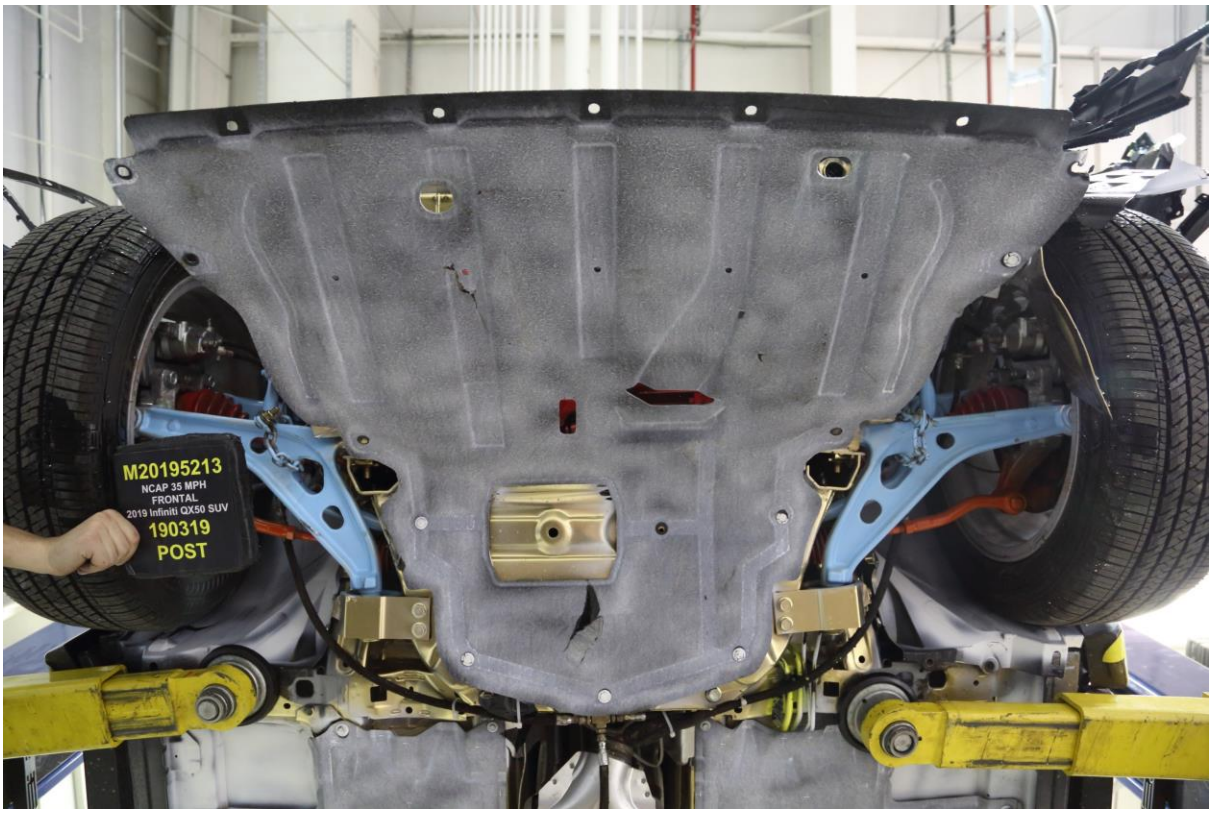

**021 Post-Test Engine Compartment View**


**022 Pre-Test Fuel Filler Cap View**

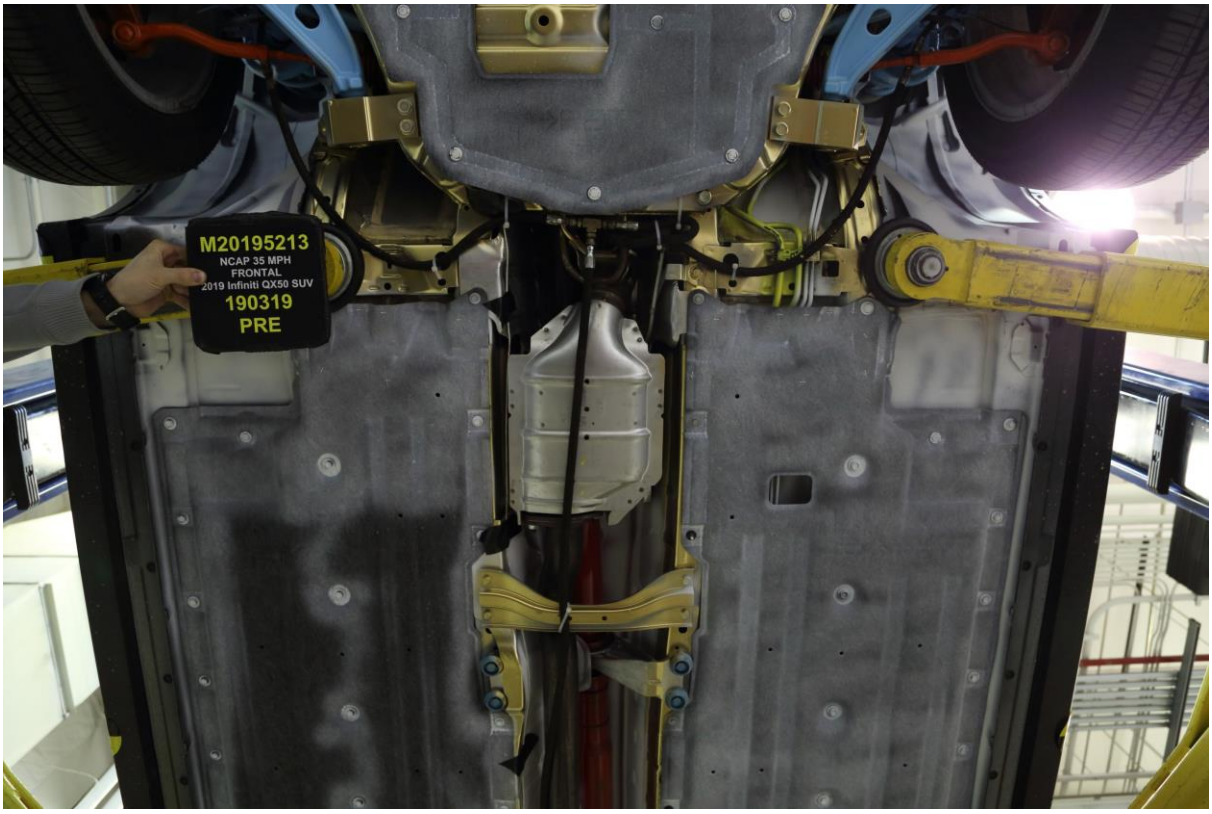

**023 Post-Test Fuel Filler Cap View**



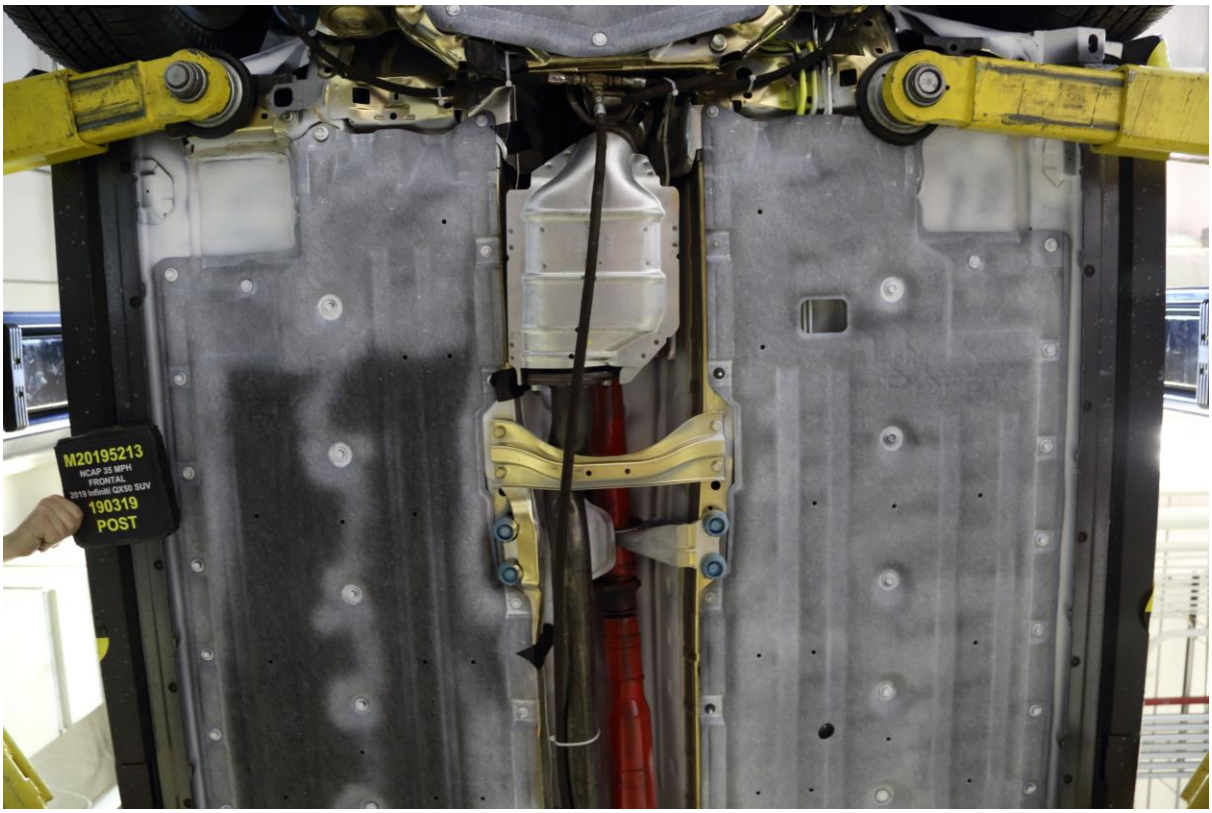

**024 Pre-Test Front Underbody View**



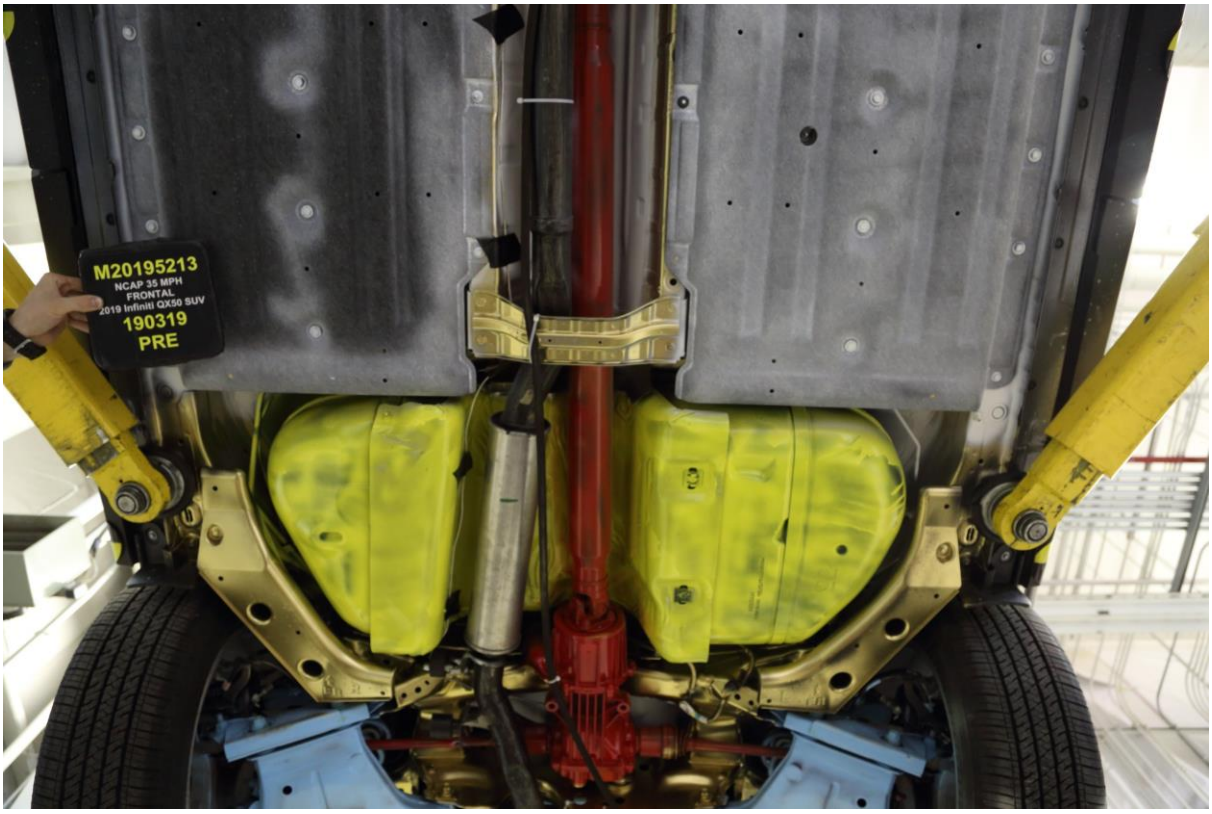

**025 Post-Test Front Underbody View**



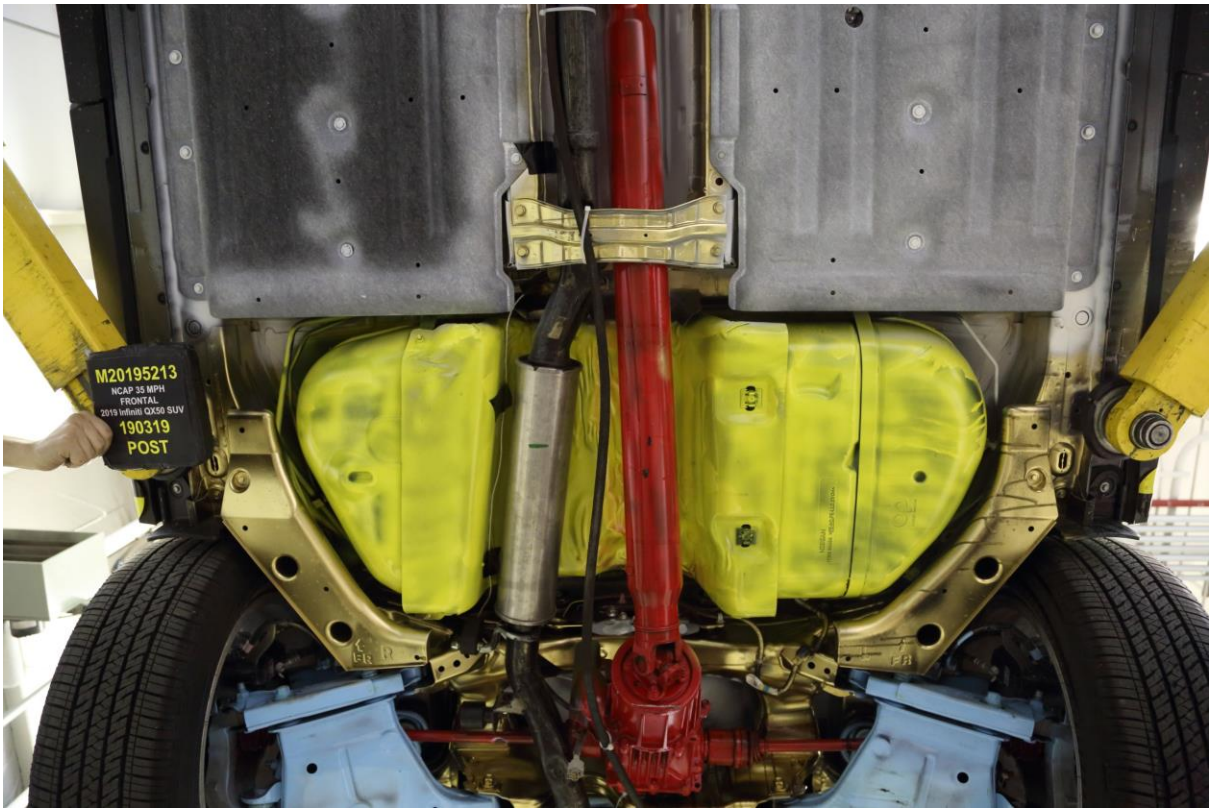

**025a Pre-Test Mid Front Underbody View**



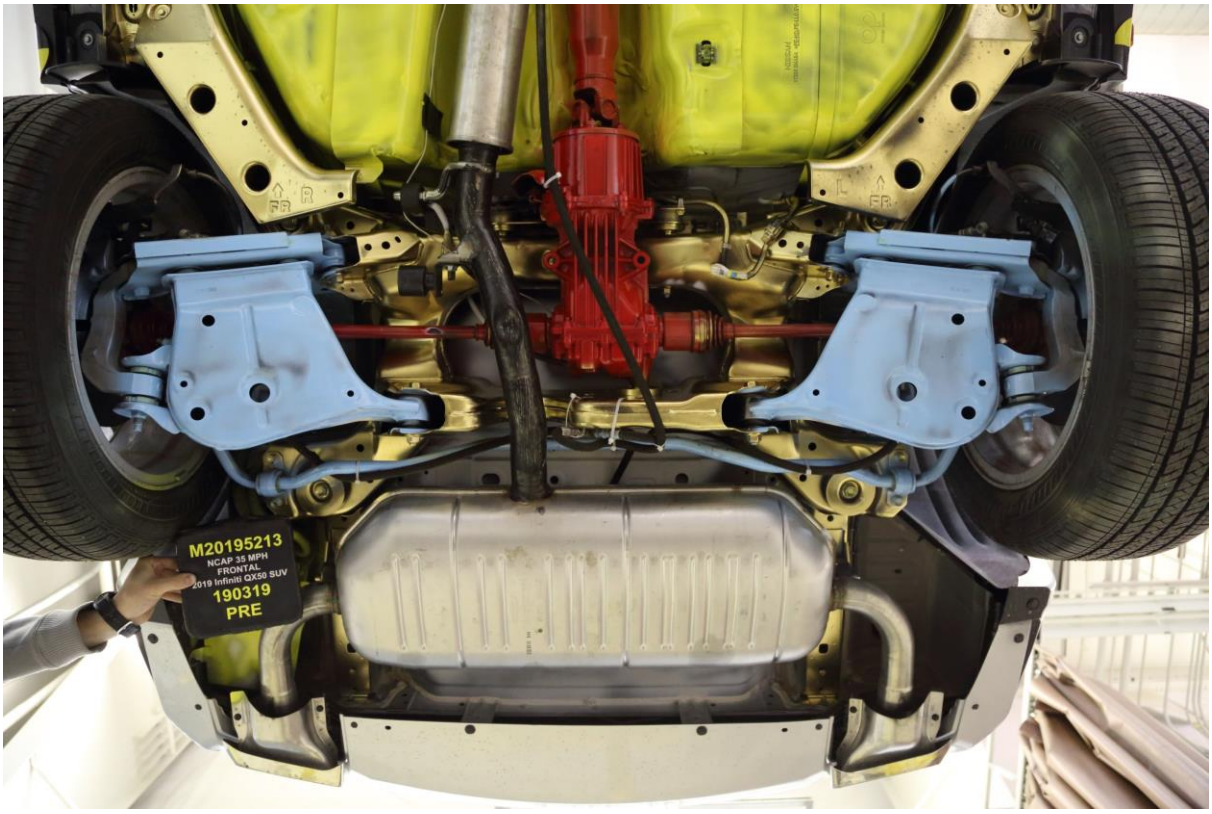

**025b Post-Test Mid Front Underbody View**



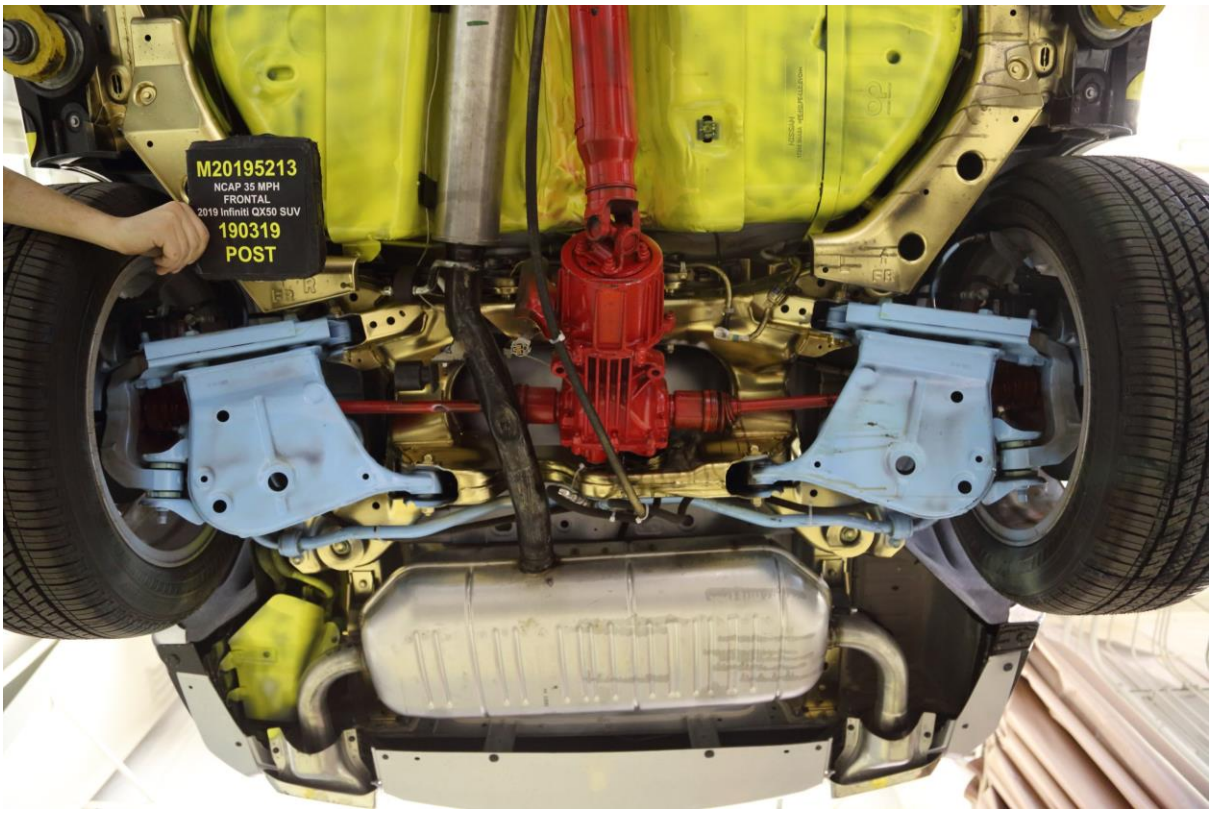

**025c Pre-Test Mid Rear Underbody View**




**025d Post-Test Mid Rear Underbody View**




**026 Pre-Test Rear Underbody View**




**027 Post-Test Rear Underbody View**


**028 Pre-Test Dummy Cable Routing**


**029 Post-Test Dummy Cable Routing**


**030 Pre-Test Driver Dummy Front View**


**031 Post-Test Driver Dummy Front View**


**032 Pre-Test Driver Dummy Window View**


**033 Post-Test Driver Dummy Window View**


**034 Pre-Test Driver Dummy and Vehicle Interior View**


**035 Post-Test Driver Dummy and Vehicle Interior View**


**036 Pre-Test Driver's Seat Fore-Aft Markings**


**037 Post-Test Driver's Seat Fore-Aft Markings**


**038 Pre-Test View of Belt Anchorage for Driver Dummy**


**039 Post-Test View of Belt Anchorage for Driver Dummy**


**040 Pre-Test View of Belt Buckle and Latch Plate for Driver Dummy**


**041 Post-Test View of Belt Buckle and Latch Plate for Driver Dummy**


**042 Pre-Test Driver Dummy Feet**

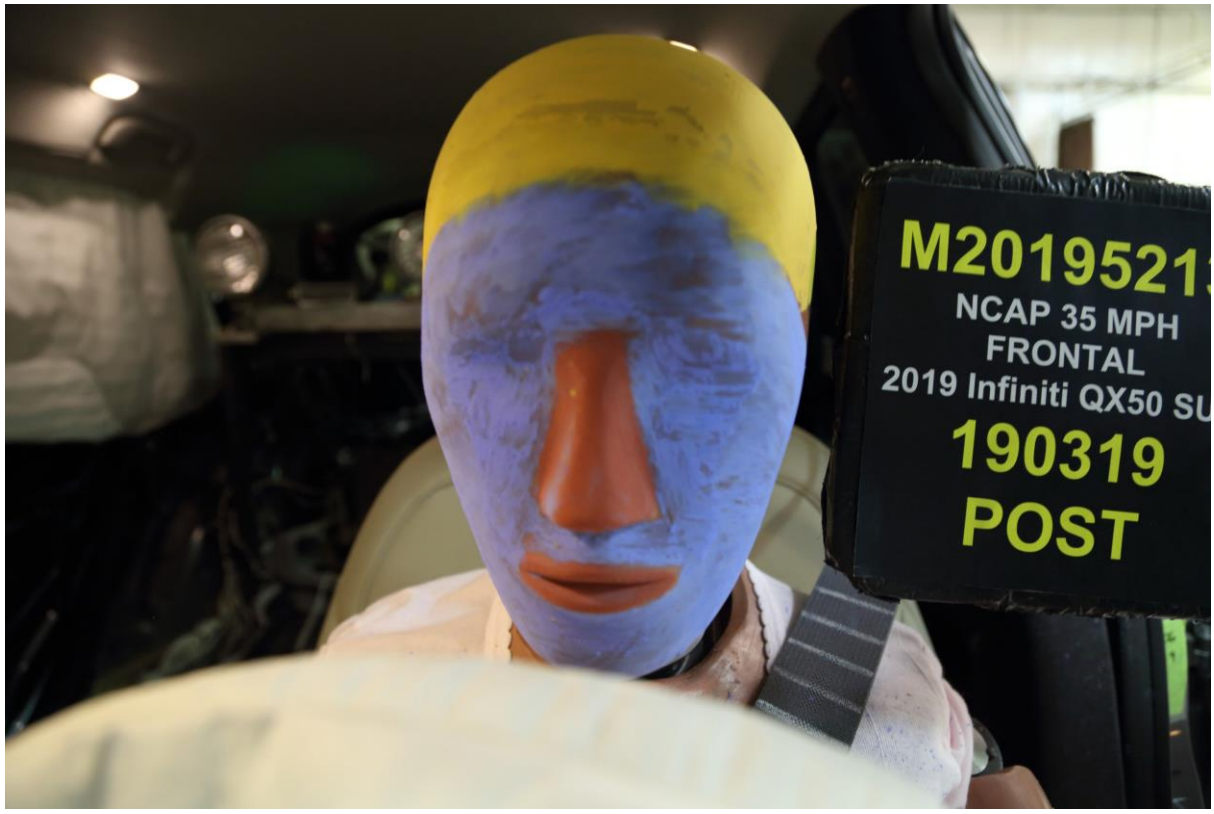

**043 Post-Test Driver Dummy Feet**


**044 Pre-Test Driver's Side Knee Bolster**


**045 Post-Test Driver's Side Knee Bolster**


**046 Pre-Test Driver's Side Floorpan**


**047 Post-Test Driver's Side Floorpan**

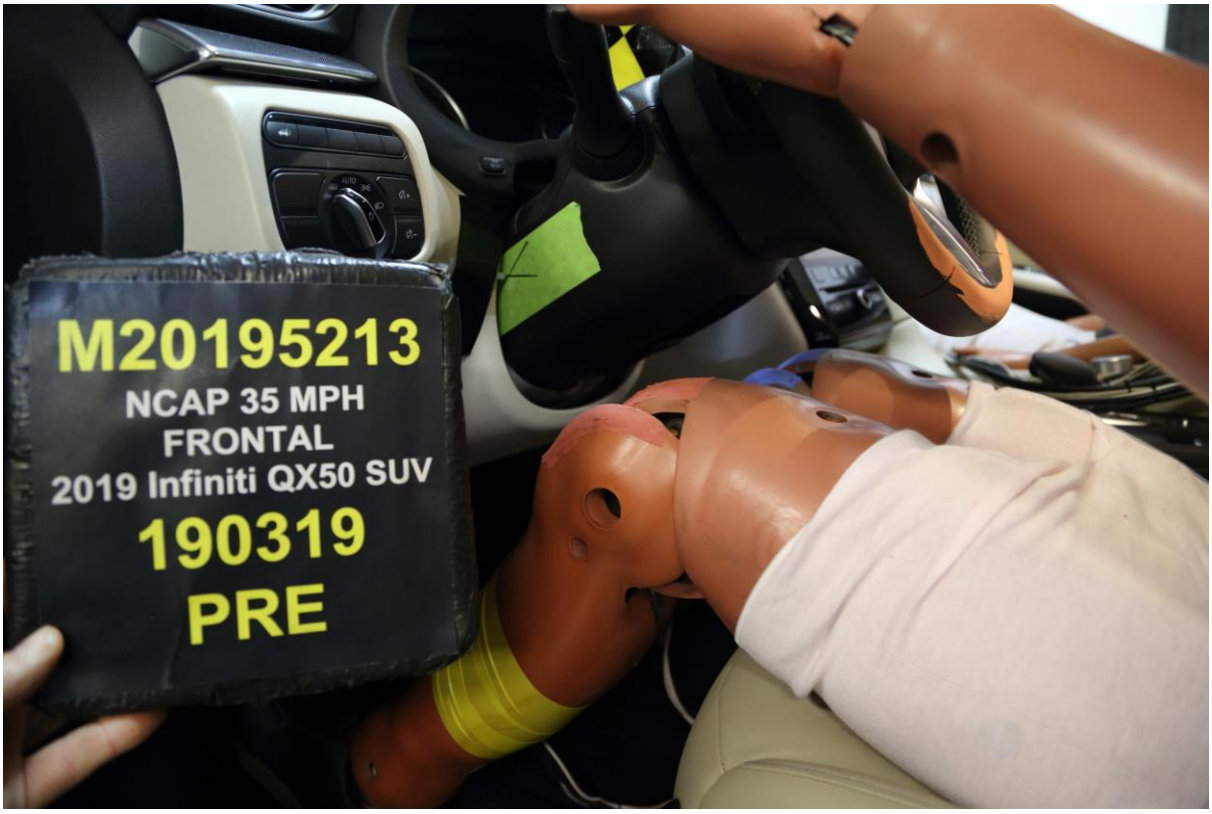



**048 Post-Test Driver Dummy Face**


**049 Post-Test Driver Dummy Contact with Airbag**


**050 Post-Test Driver Dummy Contact with Headrest**

**Intentionally Left Blank**




**051 Pre-Test View of the Steering Wheel**


**052 Post-Test View of the Steering Wheel**


**053 Pre-Test Passenger Dummy Front View**


**054 Post-Test Passenger Dummy Front View**


**055 Pre-Test Passenger Dummy Window View**


**056 Post-Test Passenger Dummy Window View**


**057 Pre-Test Passenger Dummy and Vehicle Interior View**

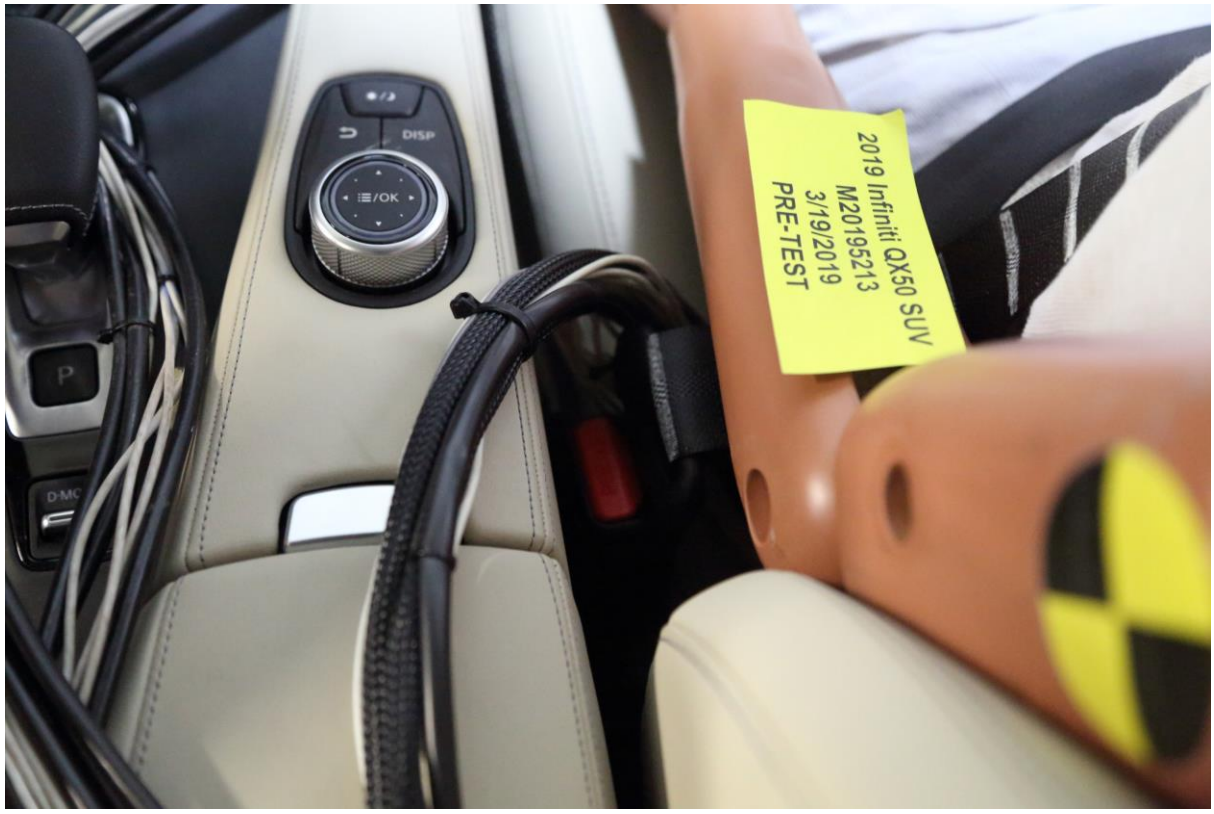

**058 Post-Test Passenger Dummy and Vehicle Interior View**


**059 Pre-Test Passenger's Seat Fore-Aft Markings**


**060 Post-Test Passenger's Seat Fore-Aft Markings**


**061 Pre-Test View of Belt Anchorage for Passenger Dummy**


**062 Post-Test View of Belt Anchorage for Passenger Dummy**




**063 Pre-Test View of Belt Buckle and Latch Plate for Passenger Dummy**


**064 Post-Test View of Belt Buckle and Latch Plate for Passenger Dummy**


**065 Pre-Test Passenger Dummy Feet**


**066 Post-Test Passenger Dummy Feet**


**067 Pre-Test Passenger's Side Knee Bolster**


**068 Post-Test Passenger's Side Knee Bolster**

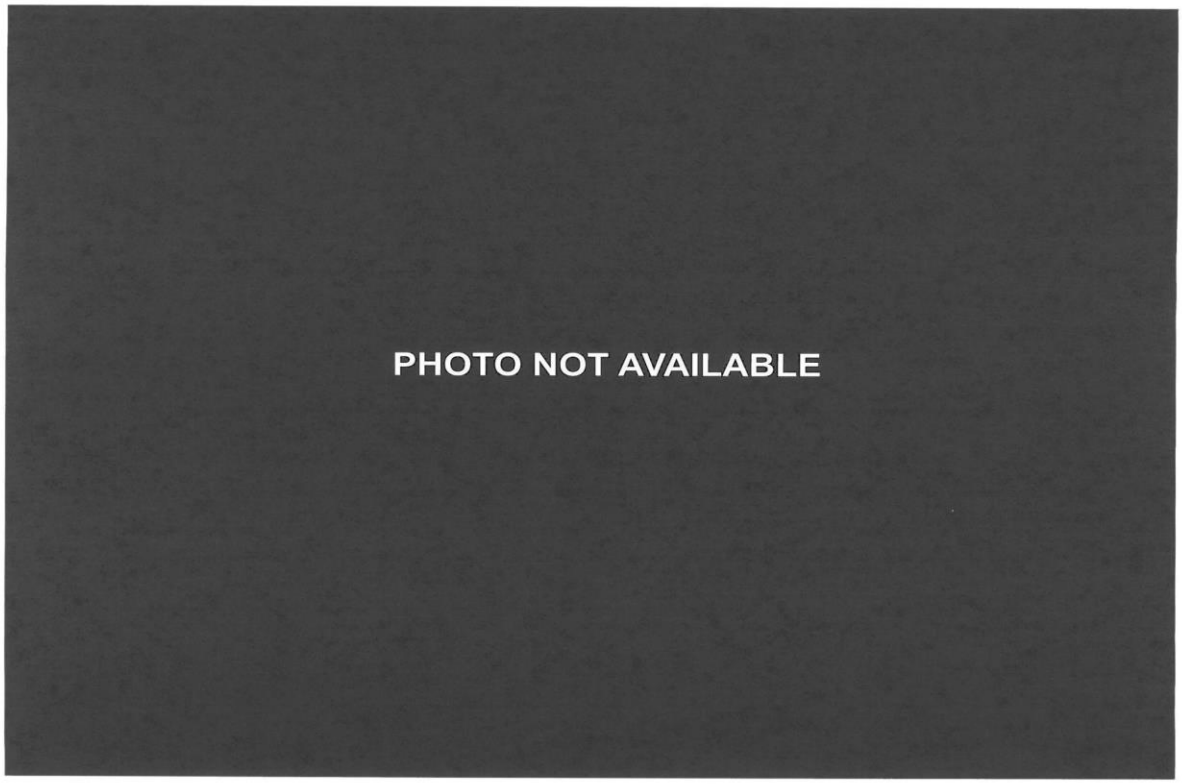

**069 Pre-Test Passenger's Side Floorpan**


**070 Post-Test Passenger's Side Floorpan**

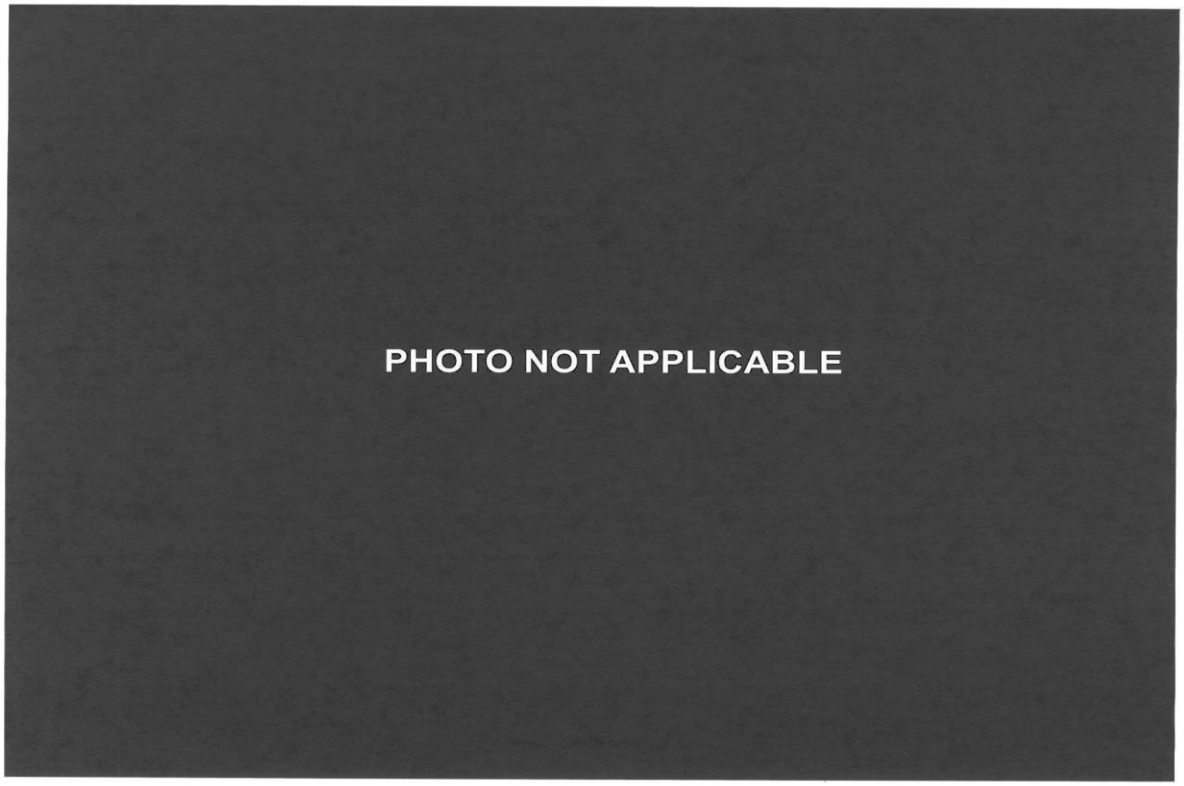

**071 Post-Test Passenger Dummy Face**


**072 Post-Test Passenger Dummy Contact with Airbag**


**073 Post-Test Passenger Dummy Contact with Headrest**

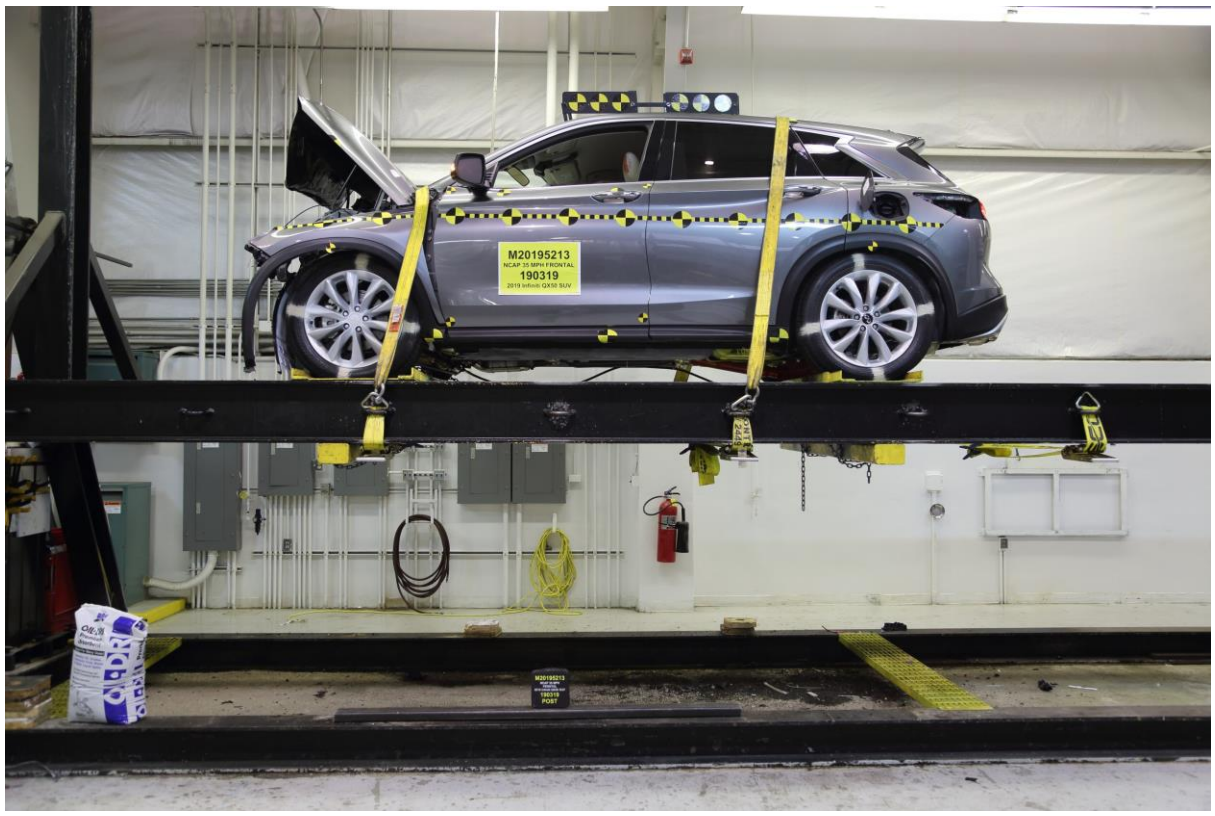



**074 Photograph of Ballast Installed in Vehicle**

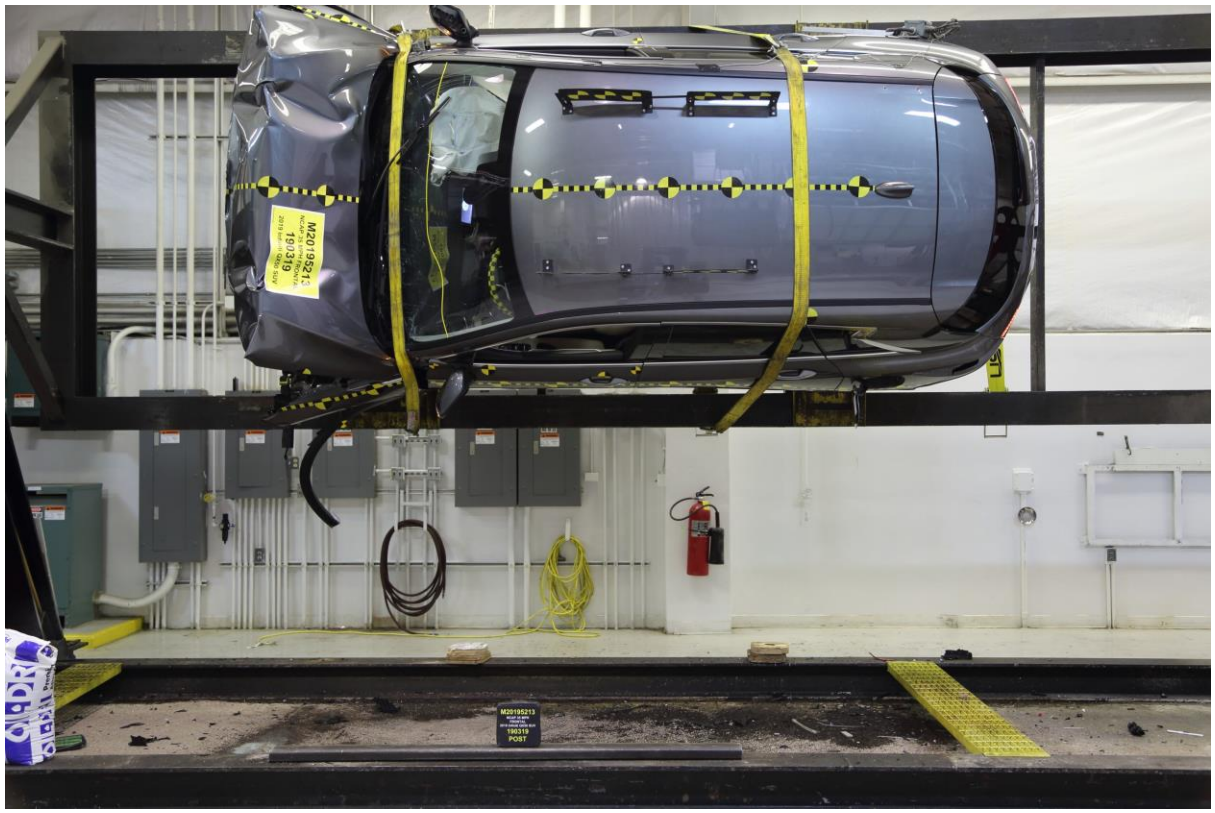



**075 Post-Test Stoddard Spillage Location View**

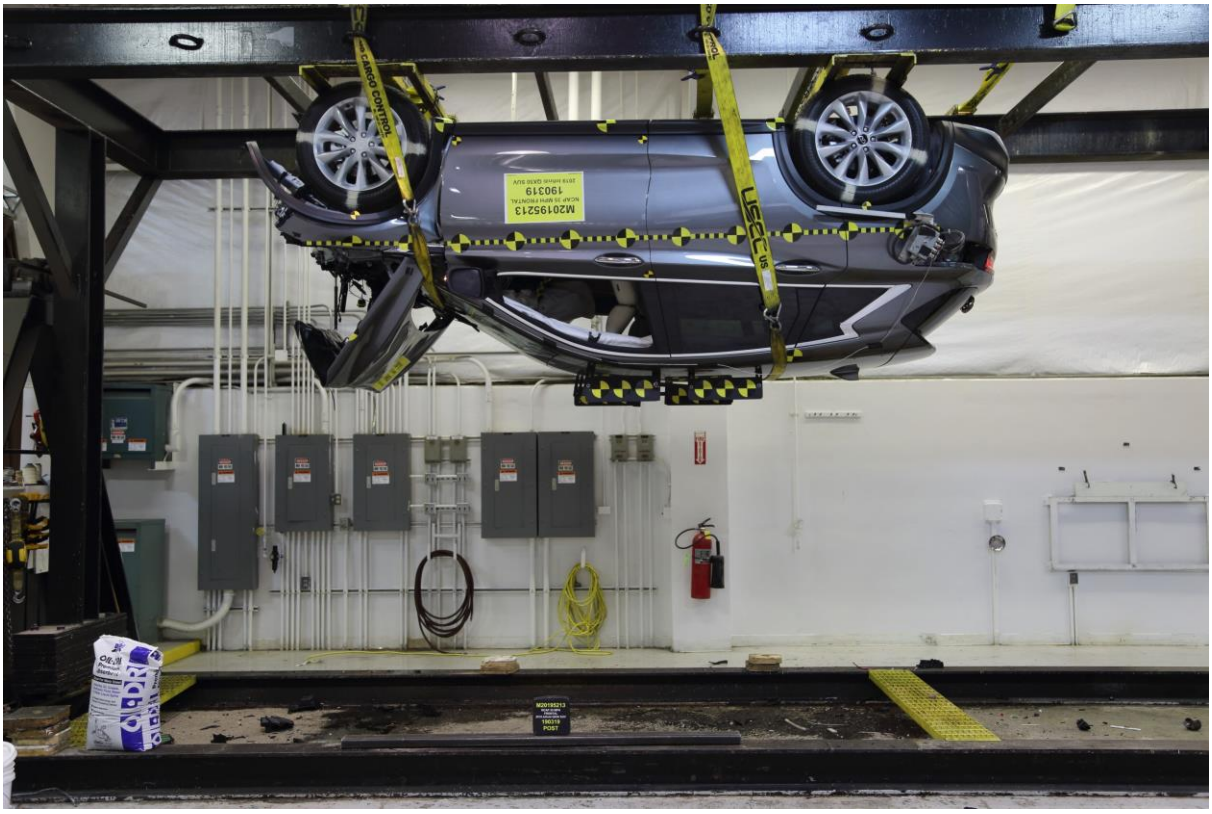

**076 Post-Test Speed Trap Read out**



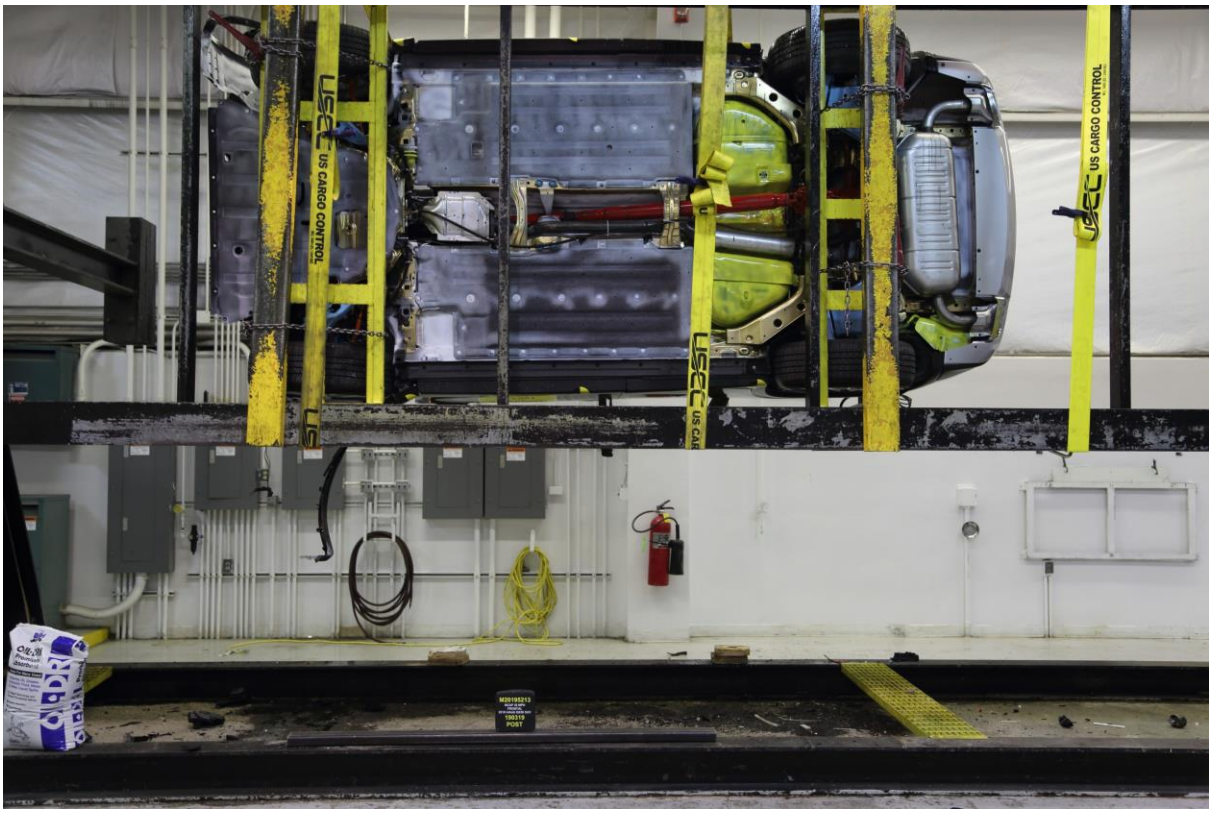

**077 Vehicle at 0º on Static Rollover Device**



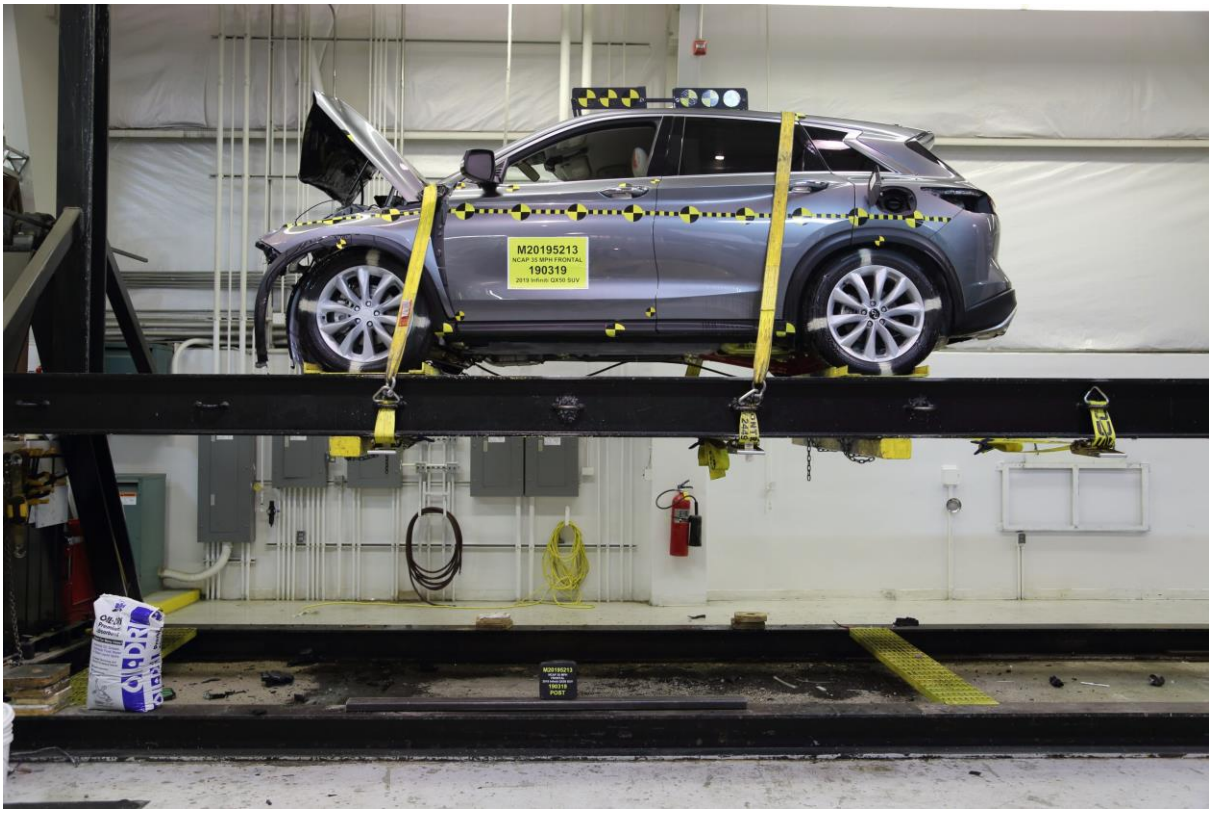

**078 Vehicle at 90º on Static Rollover Device**



**079 Vehicle at 180º on Static Rollover Device**

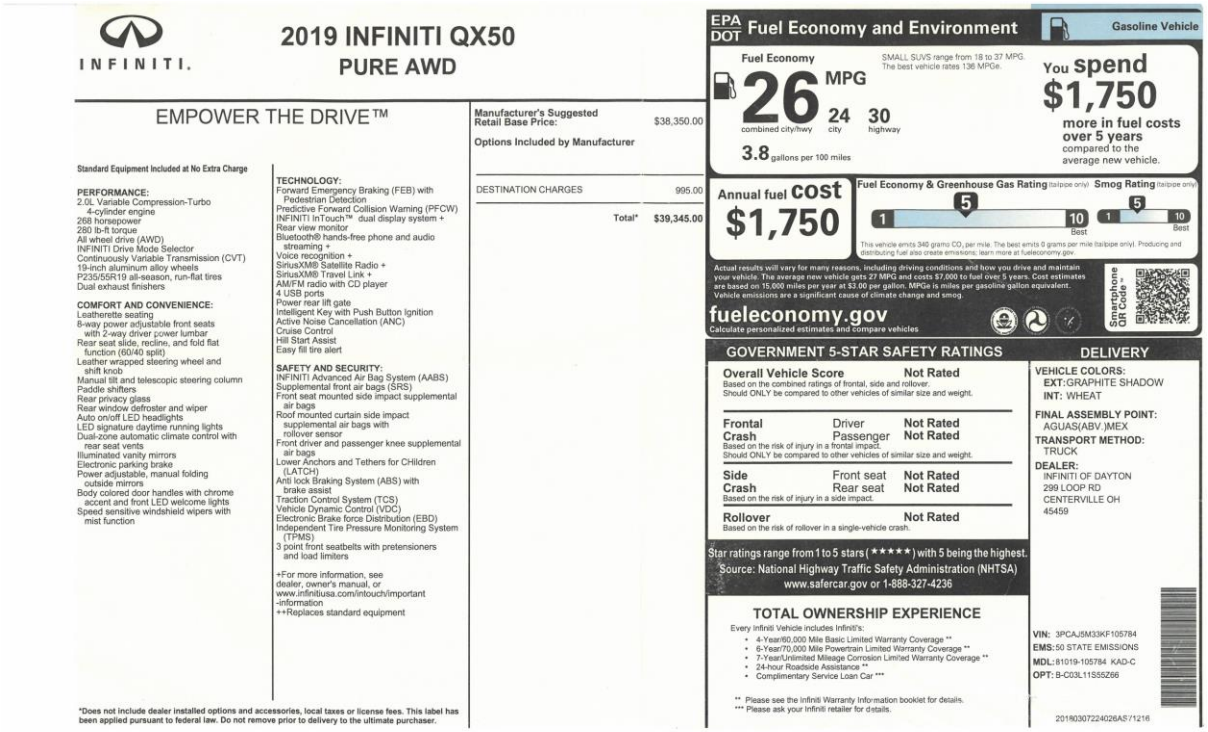


**080 Vehicle at 270º on Static Rollover Device**




**081 Vehicle at 360º on Static Rollover Device**


**082 2019 Infiniti QX50 SUV Frontal Impact Event**



INFINITI.

2019 INFINITI QX50
PURE AWD

EMPOWER THE DRIVE™

Standard Equipment Included at No Extra Charge

**PERFORMANCE:**
2.0L Variable Compression-Turbo 4-cylinder engine
268 horsepower
280 lb-ft torque
All wheel drive (AWD)
INFINITI Drive Mode Selector
Continuously Variable Transmission (CVT)
19-inch aluminum alloy wheels
P235/55R19 all-season, run-flat tires
Dual exhaust finishers

**COMFORT AND CONVENIENCE:**
Leatherette seating
8-way power adjustable front seats with 2-way driver power lumbar
Rear seat slide, recline, and fold flat function (60/40 split)
Leather wrapped steering wheel and shift knob
Manual tilt and telescopic steering column
Paddle shifters
Rear privacy glass
Rear window defroster and wiper
Auto on/off LED headlights
LED signature daytime running lights
Dual-zone automatic climate control with rear seat vents
Illuminated vanity mirrors
Electronic parking brake
Power adjustable, manual folding outside mirrors
Body colored door handles with chrome accent and front LED welcome lights
Speed sensitive windshield wipers with mist function

**TECHNOLOGY:**
Forward Emergency Braking (FEB) with Pedestrian Detection
Predictive Forward Collision Warning (PFCW)
INFINITI InTouch™ dual display system +
Rear view monitor
Bluetooth® hands-free phone and audio streaming +
Voice recognition +
SiriusXM® Satellite Radio +
SiriusXM® Travel Link +
AM/FM radio with CD player
4 USB ports
Power rear lift gate
Intelligent Key with Push Button Ignition
Active Noise Cancellation (ANC)
Cruise Control
Hill Start Assist
Easy fill tire alert

**SAFETY AND SECURITY:**
INFINITI Advanced Air Bag System (AABS)
Supplemental front air bags (SRS)
Front seat mounted side impact supplemental air bags
Roof mounted curtain side impact supplemental air bags with rollover sensor
Front driver and passenger knee supplemental air bags
Lower Anchors and Tethers for CHildren (LATCH)
Anti lock Braking System (ABS) with brake assist
Traction Control System (TCS)
Vehicle Dynamic Control (VDC)
Electronic Brake force Distribution (EBD)
Independent Tire Pressure Monitoring System (TPMS)
3 point front seatbelts with pretensioners and load limiters

+For more information, see dealer, owner's manual, or www.infinitiusa.com/intouch/important -information
++Replaces standard equipment

*Does not include dealer installed options and accessories, local taxes or license fees. This label has been applied pursuant to federal law. Do not remove prior to delivery to the ultimate purchaser.

| | |
|---|---|
| Manufacturer's Suggested Retail Base Price: | $38,350.00 |
| Options Included by Manufacturer | |
| DESTINATION CHARGES | 995.00 |
| Total* | $39,345.00 |

EPA DOT Fuel Economy and Environment — Gasoline Vehicle

Fuel Economy: 26 MPG (combined city/hwy) — 24 city — 30 highway
3.8 gallons per 100 miles
SMALL SUVS range from 18 to 37 MPG. The best vehicle rates 136 MPGe.

You spend $1,750 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 (1–10, Best)
Smog Rating (tailpipe only): 5 (1–10, Best)
This vehicle emits 346 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 $7,000 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $3.00 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

TOTAL OWNERSHIP EXPERIENCE

Every Infiniti Vehicle includes Infiniti's:
- 4-Year/60,000 Mile Basic Limited Warranty Coverage **
- 6-Year/70,000 Mile Powertrain Limited Warranty Coverage **
- 7-Year/Unlimited Mileage Corrosion Limited Warranty Coverage **
- 24-hour Roadside Assistance **
- Complimentary Service Loan Car ***

** Please see the Infiniti Warranty Info-mation booklet for details.
*** Please ask your Infiniti retailer for details.

DELIVERY

VEHICLE COLORS:
EXT: GRAPHITE SHADOW
INT: WHEAT

FINAL ASSEMBLY POINT:
AGUAS(ABV.)MEX

TRANSPORT METHOD:
TRUCK

DEALER:
INFINITI OF DAYTON
299 LOOP RD
CENTERVILLE OH
45459

VIN: 3PCAJ5M33KF105784
EMS: 50 STATE EMISSIONS
MDL: 81019-105784 KAD-C
OPT: B-C03L11S55Z66

2018030722402GAS71216

**083 Monroney Label Photograph**

# APPENDIX B
# VEHICLE AND DUMMY RESPONSE DATA PLOTS

## 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.gov.

Driver Head Acceleration X Redundant
Driver Head Acceleration Y Redundant
Driver Head Acceleration Z 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 Pelvis Resultant
Driver Left Femur Redundant
Driver Right Femur Redundant
Driver Left Upper Tibia Moment X
Driver Left Upper Tibia Moment Y
Driver Left Upper Tibia Force Z
Driver Left Lower Tibia Moment X
Driver Left Lower Tibia Moment Y
Driver Left Lower Tibia Force Z
Driver Right Upper Tibia Moment X
Driver Right Upper Tibia Moment Y
Driver Right Upper Tibia Force Z
Driver Right Lower Tibia Moment X
Driver Right Lower Tibia Moment Y
Driver Right Lower Tibia Force Z
Driver Left Foot Fore Z
Driver Left Foot Aft X
Driver Left Foot Aft Z
Driver Right Foot Fore Z
Driver Right Foot Aft X
Driver Right Foot Aft Z

Driver Head Angular Velocity X
Driver Head Angular Velocity Y
Driver Head Angular Velocity Z
Passenger Head Acceleration X Redundant
Passenger Head Acceleration Y Redundant
Passenger Head Acceleration Z Redundant
Passenger Upper Neck Force Y
Passenger Upper Neck Moment X
Passenger Upper Neck Moment Z
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 Pelvis Resultant
Passenger Left Femur Redundant
Passenger Right Femur Redundant
Passenger Left Upper Tibia Moment X
Passenger Left Upper Tibia Moment Y
Passenger Left Upper Tibia Force Z
Passenger Left Lower Tibia Moment X
Passenger Left Lower Tibia Moment Y
Passenger Left Lower Tibia Force Z
Passenger Right Upper Tibia Moment X
Passenger Right Upper Tibia Moment Y
Passenger Right Upper Tibia Force Z
Passenger Right Lower Tibia Moment X
Passenger Right Lower Tibia Moment Y
Passenger Right Lower Tibia Force Z
Passenger Left Foot Fore Z
Passenger Left Foot Aft X
Passenger Left Foot Aft Z
Passenger Right Foot Fore Z
Passenger Right Foot Aft X
Passenger Right Foot Aft Z

Passenger Head Angular Velocity X
Passenger Head Angular Velocity Y
Passenger Head Angular Velocity Z
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

**NHTSA**

Test Date: 03/19/2019

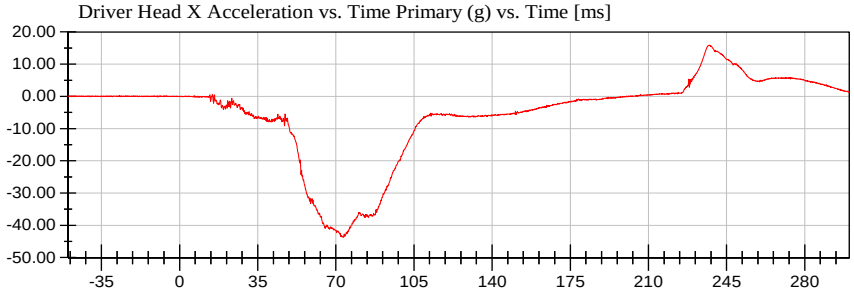
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Driver Head X Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

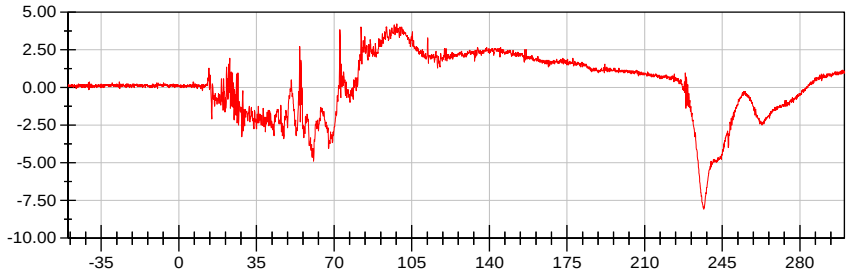
15.83 g at 236.96 ms

**<Min>**

-43.70 g at 73.44 ms

CFC_1000

Driver Head Y Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

4.23 g at 98.24 ms

**<Min>**

-8.09 g at 236.64 ms

CFC_1000

Driver Head Z Acceleration vs. Time Primary (g) vs. Time [ms]


**<Max>**

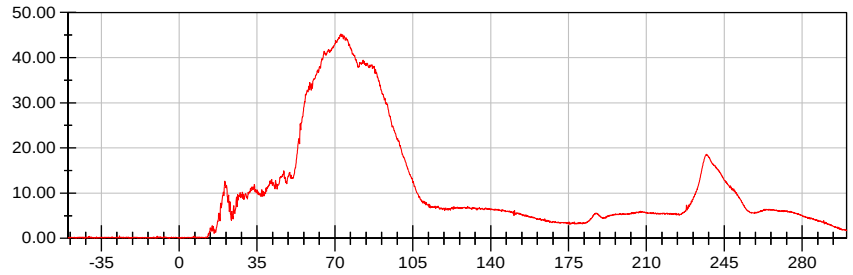
13.75 g at 75.68 ms

**<Min>**

-2.21 g at 15.44 ms

CFC_1000

Driver Head Resultant Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

45.26 g at 72.64 ms

**<Min>**

0.03 g at -42.24 ms

CFC_1000

**NHTSA**

Test Date: 03/19/2019

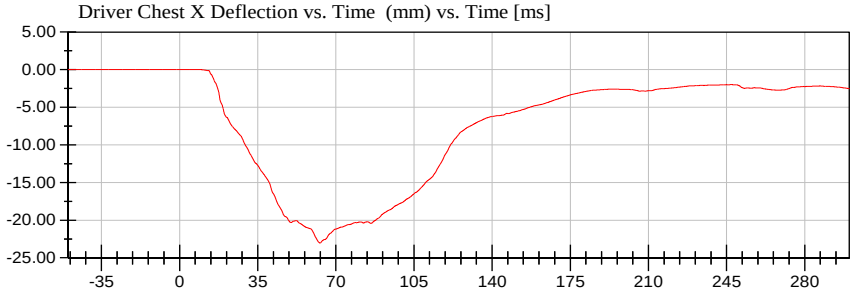
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Driver Chest X Deflection vs. Time (mm) vs. Time [ms]




**<Max>**

0.02 mm at -43.04 ms

**<Min>**

-23.05 mm at 62.88 ms

CFC_600

**NHTSA**

Test Date: 03/19/2019

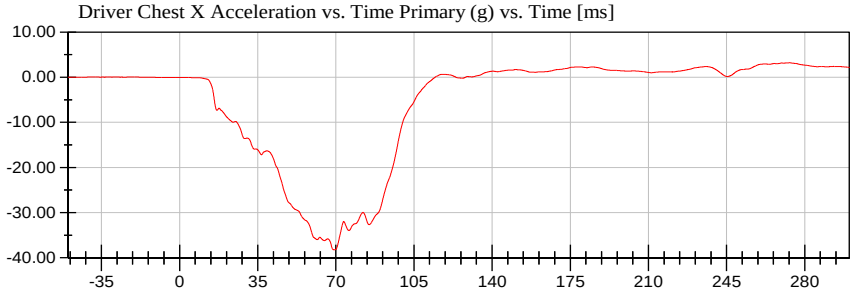
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Driver Chest X Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

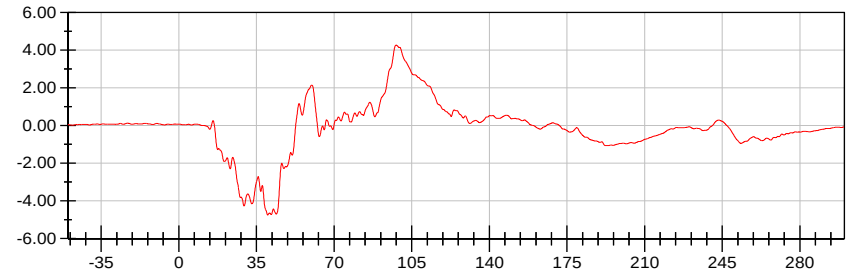
3.19 g at 273.20 ms

**<Min>**

-38.24 g at 69.04 ms

CFC_180

Driver Chest Y Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

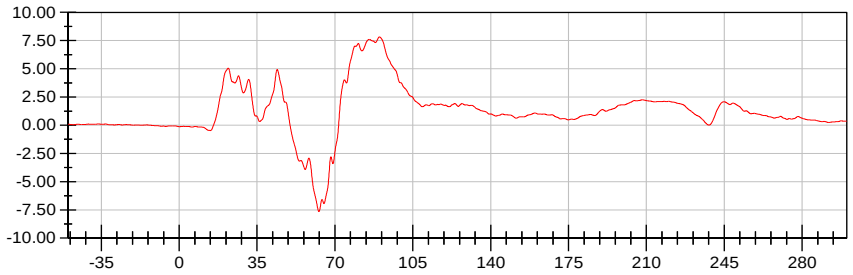
4.27 g at 97.92 ms

**<Min>**

-4.75 g at 40.08 ms

CFC_180

Driver Chest Z Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

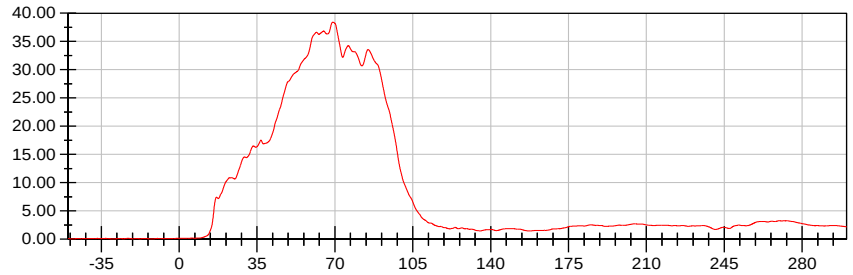
7.83 g at 90.08 ms

**<Min>**

-7.65 g at 62.80 ms

CFC_180

Driver Chest Resultant Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

38.39 g at 69.04 ms

**<Min>**

0.05 g at -47.68 ms

CFC_180

**NHTSA**

Test Date: 03/19/2019

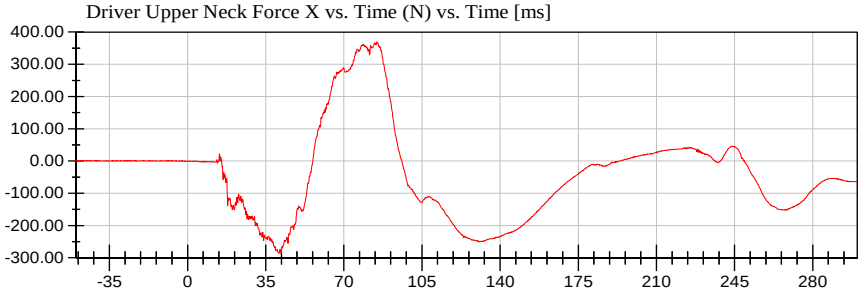
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Driver Upper Neck Force X vs. Time (N) vs. Time [ms]




**<Max>**

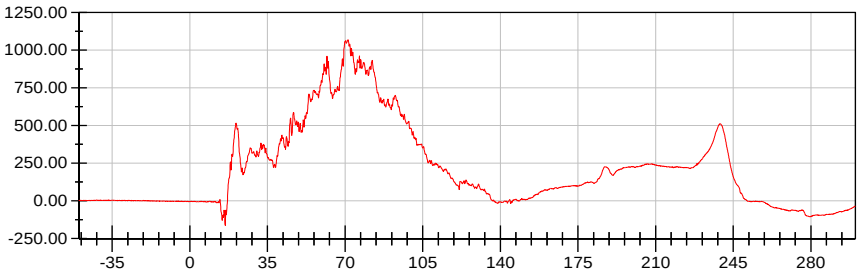
369.89 N at 84.72 ms

**<Min>**

-286.78 N at 41.84 ms

CFC_1000

Driver Upper Neck Force Z vs. Time (N) vs. Time [ms]




**<Max>**

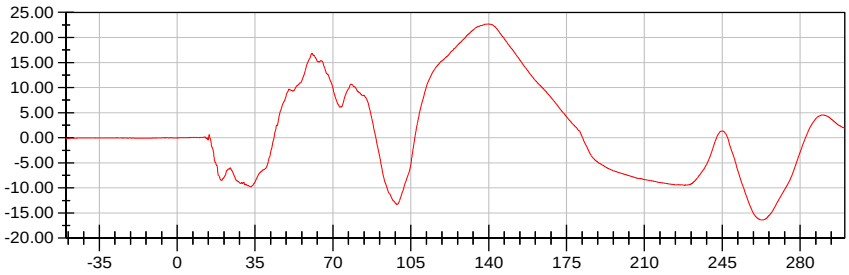
1,069.00 N at 71.20 ms

**<Min>**

-163.04 N at 16.00 ms

CFC_1000

Driver Upper Neck Moment Y vs. Time (Nm) vs. Time [ms]




**<Max>**

22.68 Nm at 139.76 ms

**<Min>**

-16.38 Nm at 263.28 ms

CFC_600

# 2019 Infiniti QX50 SUV NCAP 35 mph Frontal Impact

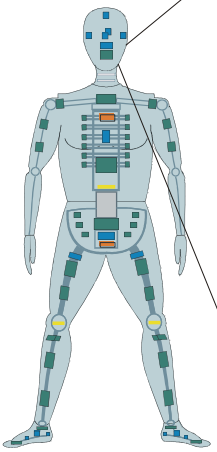
## Neck Injury Predictor (NIJ)

Date: 03/19/2019
Time: 15:22

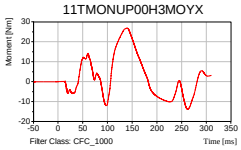
**Customer: NHTSA**
**Test Number: M20195213**

**TRC Inc. Test Lab: CTF**
**Test Number: 190319**

Test Orientation = Frontal
Fzc(Tension) = 6806
Fzc(Compression) = 6160
Myc(Extension) = 135
Myc(Flexion) = 310

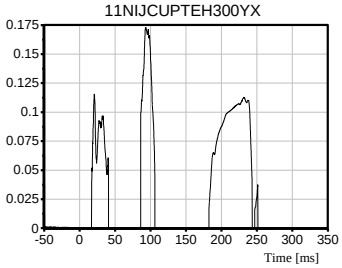


11TMONUP00H3MOYX



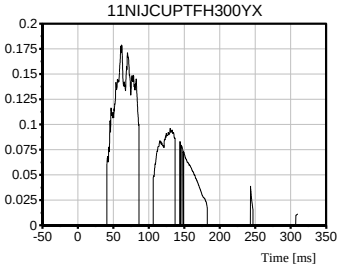

11NECKUP00H3FOZA


11NIJCUPTEH300YX



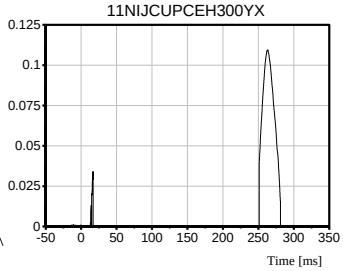

**Max [NTE] 0.1730 at 93.44 ms**

11NIJCUPTFH300YX



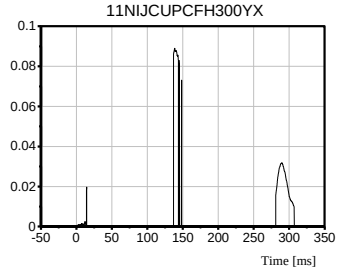

**Max [NTF] 0.1785 at 61.84 ms**

11NIJCUPCEH300YX




**Max [NCE] 0.1096 at 263.36 ms**

11NIJCUPCFH300YX




**Max [NCF] 0.0890 at 138.80 ms**

Dummy:HIII 50th Male
Seating Position:
Driver

NIJ Source Code: (Fz/Fzc)+(My/Myc)

**NHTSA**

Test Date: 03/19/2019

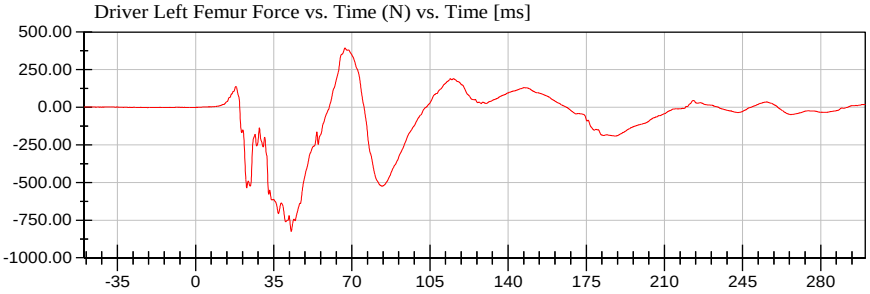
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Driver Left Femur Force vs. Time (N) vs. Time [ms]




**<Max>**

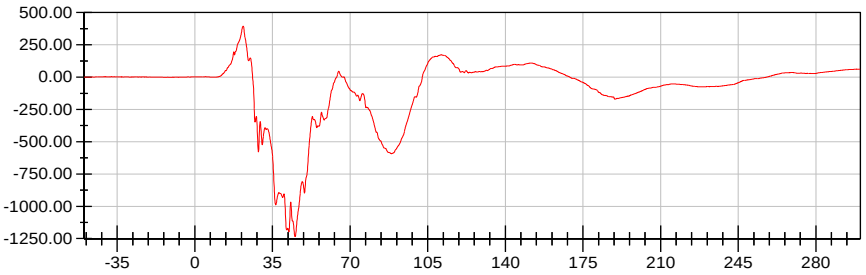
393.93 N at 66.96 ms

**<Min>**

-824.16 N at 42.88 ms

CFC_600

Driver Right Femur Force vs. Time (N) vs. Time [ms]




**<Max>**

395.33 N at 21.76 ms

**<Min>**

-1,235.60 N at 45.20 ms

CFC_600

**NHTSA**

Test Date: 03/19/2019

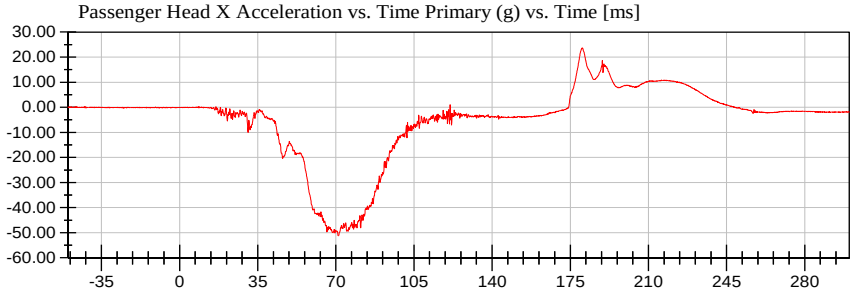
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Passenger Head X Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

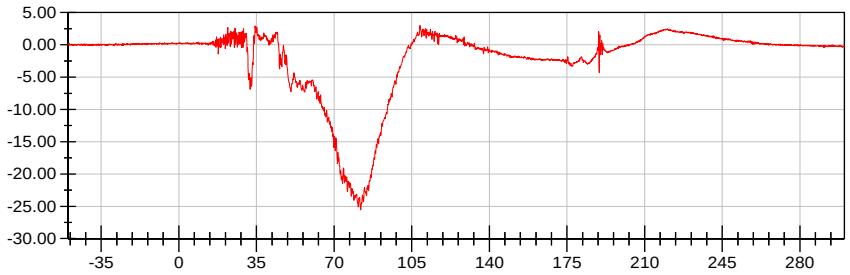
23.69 g at 180.32 ms

**<Min>**

-51.25 g at 71.04 ms

CFC_1000

Passenger Head Y Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

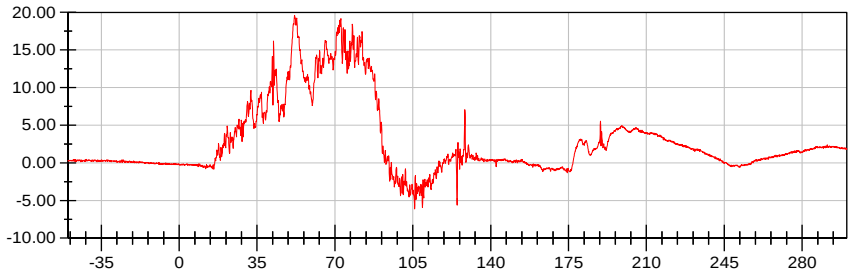
3.01 g at 108.72 ms

**<Min>**

-25.55 g at 82.00 ms

CFC_1000

Passenger Head Z Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

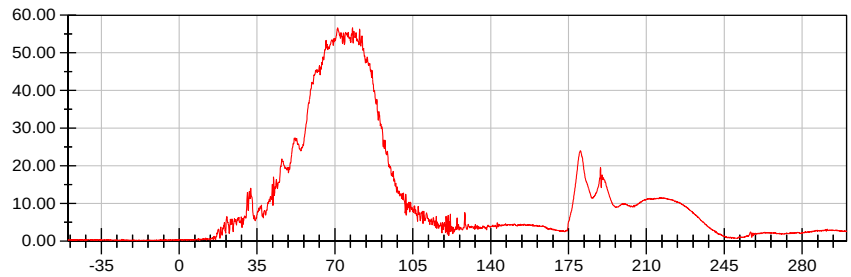
19.62 g at 51.84 ms

**<Min>**

-6.14 g at 105.84 ms

CFC_1000

Passenger Head Resultant Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

56.67 g at 71.20 ms

**<Min>**

0.07 g at -22.96 ms

CFC_1000

**NHTSA**

Test Date: 03/19/2019

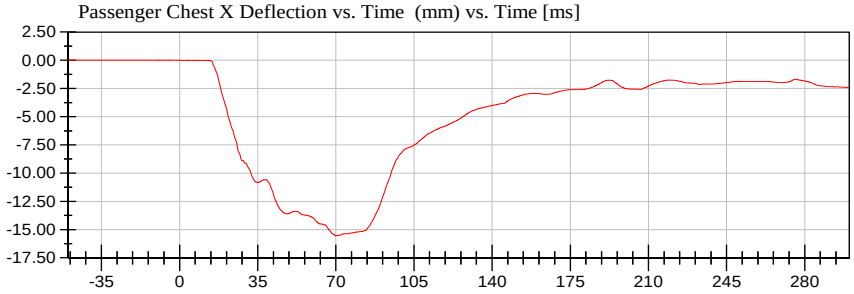
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Passenger Chest X Deflection vs. Time (mm) vs. Time [ms]




**<Max>**

0.01 mm at -38.88 ms

**<Min>**

-15.57 mm at 70.08 ms

CFC_600

**NHTSA**

Test Date: 03/19/2019

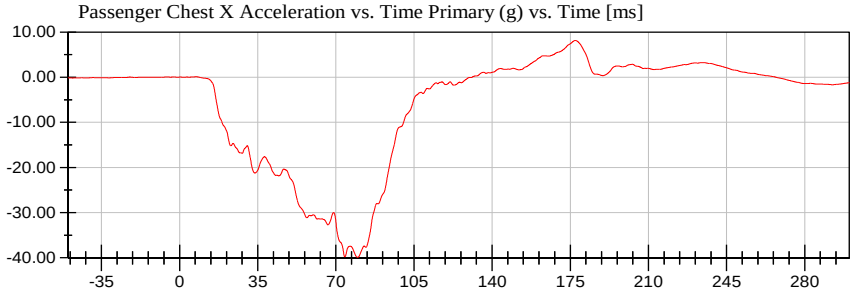
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Passenger Chest X Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

8.13 g at 177.20 ms

**<Min>**

-39.90 g at 79.76 ms

CFC_180

Passenger Chest Y Acceleration vs. Time Primary (g) vs. Time [ms]


**<Max>**

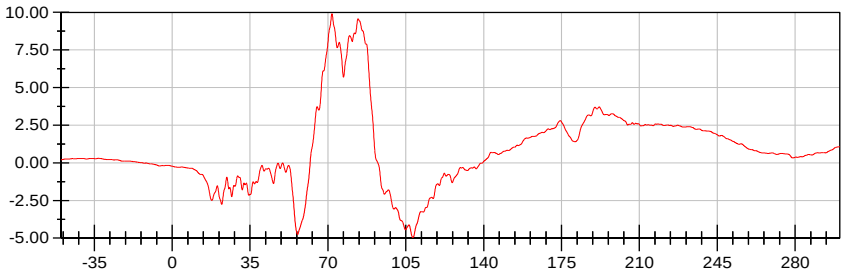
4.71 g at 47.12 ms

**<Min>**

-4.48 g at 72.88 ms

CFC_180

Passenger Chest Z Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

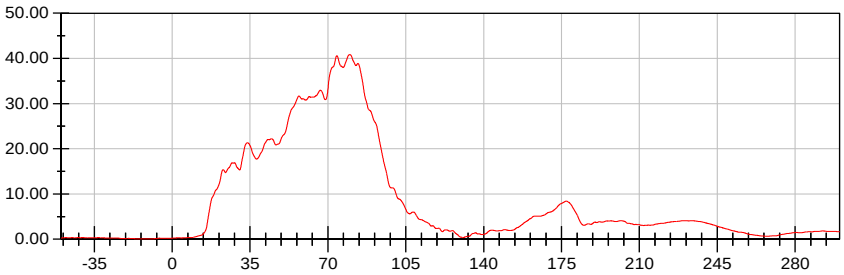
9.90 g at 71.84 ms

**<Min>**

-4.96 g at 108.16 ms

CFC_180

Passenger Chest Resultant Acceleration vs. Time Primary (g) vs. Time [ms]




**<Max>**

40.87 g at 79.76 ms

**<Min>**

0.07 g at -11.04 ms

CFC_180

**NHTSA**

Test Date: 03/19/2019

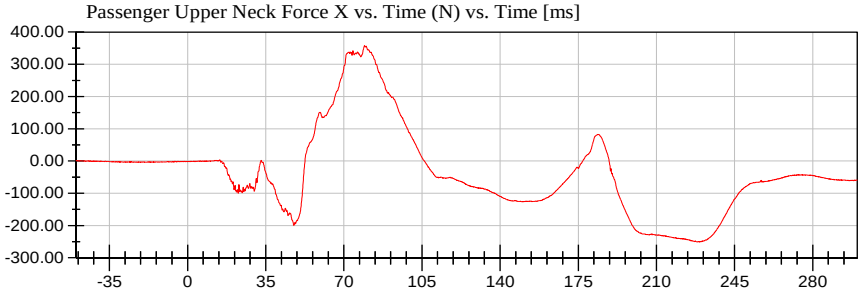
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Passenger Upper Neck Force X vs. Time (N) vs. Time [ms]




**<Max>**

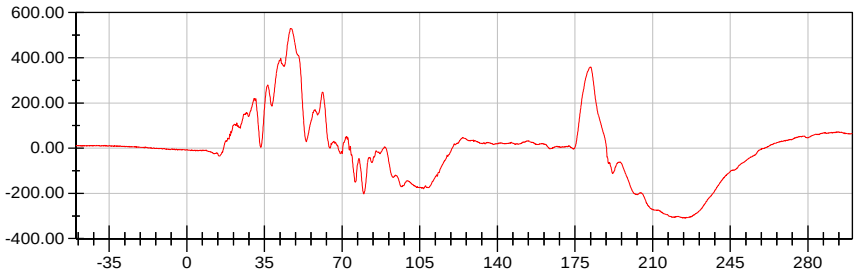
357.56 N at 79.28 ms

**<Min>**

-250.85 N at 228.32 ms

CFC_1000

Passenger Upper Neck Force Z vs. Time (N) vs. Time [ms]




**<Max>**

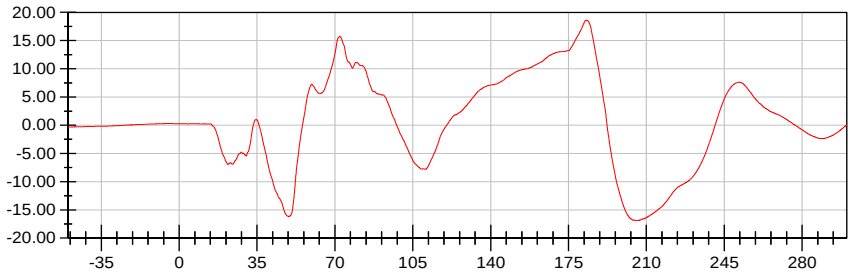
529.29 N at 46.72 ms

**<Min>**

-309.63 N at 224.72 ms

CFC_1000

Passenger Upper Neck Moment Y vs. Time (Nm) vs. Time [ms]




**<Max>**

18.61 Nm at 182.96 ms

**<Min>**

-16.88 Nm at 205.52 ms

CFC_600

# 2019 Infiniti QX50 SUV NCAP 35 mph Frontal Impact

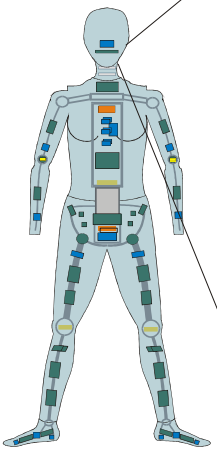
## Neck Injury Predictor (NIJ)

Date: 03/19/2019
Time: 15:22

**Customer: NHTSA**
**Test Number: M20195213**

**TRC Inc. Test Lab: CTF**
**Test Number: 190319**

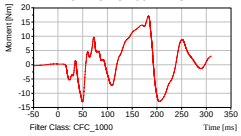
Test Orientation = Frontal
Fzc(Tension) = 4287
Fzc(Compression) = 3880
Myc(Extension) = 67
Myc(Flexion) = 155



Dummy:HIII 5th Female
Seating Position:
Right Front Passenger

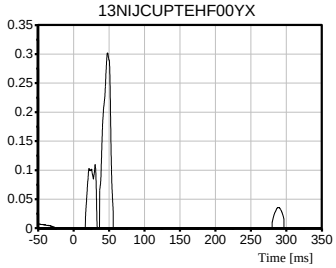
NIJ Source Code: (Fz/Fzc)+(My/Myc)

13TMONUP00HFMOYX



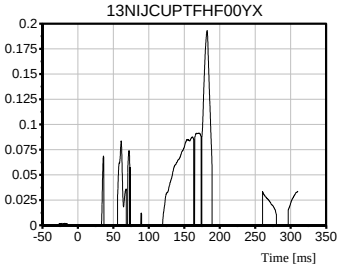

13NECKUP00HFFOZA


13NIJCUPTEHF00YX



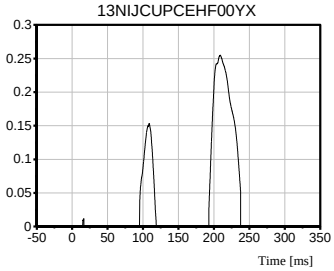

**Max [NTE] 0.3020 at 48.16 ms**

13NIJCUPTFHF00YX



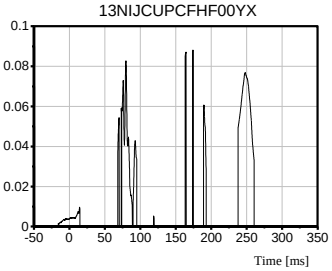

**Max [NTF] 0.1931 at 182.08 ms**

13NIJCUPCEHF00YX




**Max [NCE] 0.2552 at 208.96 ms**

13NIJCUPCFHF00YX




**Max [NCF] 0.0882 at 174.24 ms**

**NHTSA**

Test Date: 03/19/2019

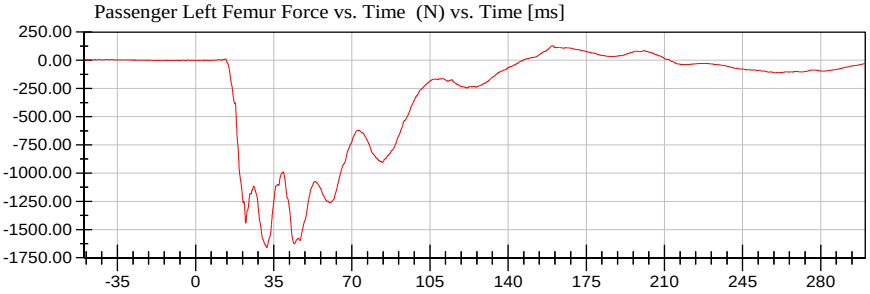
Test Lab: CTF

Position #1 Hybrid III Mid-Sized Adult Male Dummy (037)

Test Number: 190319 (M20195213)

Position #2 Hybrid III Small Adult Female (070)

Passenger Left Femur Force vs. Time (N) vs. Time [ms]




**<Max>**

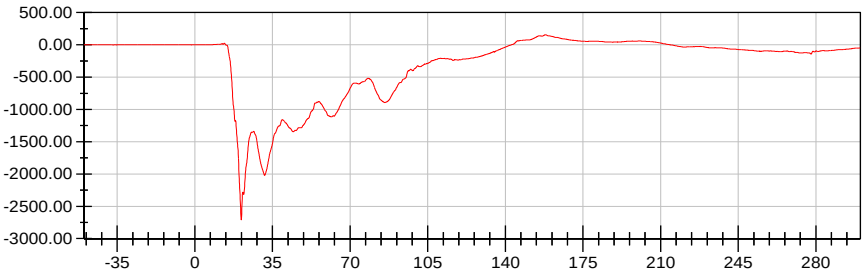
128.12 N at 160.00 ms

**<Min>**

-1,659.31 N at 31.92 ms

CFC_600

Passenger Right Femur Force vs. Time (N) vs. Time [ms]




**<Max>**

156.59 N at 158.16 ms

**<Min>**

-2,709.76 N at 20.96 ms

CFC_600

# APPENDIX C
# DUMMY CALIBRATION AND PERFORMANCE VERIFICATION

**Pre-Test Calibration Sheets**

**Driver S/N 037**

**Transportation Research Center Inc.**
**572E HIII 50th Male Dummy**
**External Dimensions**
**Serial No. 037**
**Calibration No. 56**

| Symbol | Description | Specification | Results | Pass |
|---|---|---|---|---|
| | | mm | mm | |
| A | Total Sitting Height | 878.8 - 889.0 | 880 | Yes |
| B | Shoulder Pivot Height | 505.5 - 520.7 | 511 | Yes |
| C | H-Point Height | 83.8 - 88.9 | 86 | Yes |
| D | H-Point From Seatback | 134.6 - 139.7 | 137 | Yes |
| E | Shoulder Pivot From Backline | 83.8 - 94.0 | 91 | Yes |
| F | Thigh Clearance | 139.7 - 154.9 | 145 | Yes |
| G | Back Of Elbow To Wrist Pivot | 289.6 - 304.8 | 295 | Yes |
| H | Skull Cap To Backline | 40.6 - 45.7 | 45 | Yes |
| I | Shoulder-Elbow Length | 330.2 - 345.4 | 337 | Yes |
| J | Elbow Rest Height | 190.5 - 210.8 | 199 | Yes |
| K | Buttock Knee Length | 579.1 - 604.5 | 601 | Yes |
| L | Popliteal Height | 429.3 - 454.7 | 440 | Yes |
| M | Knee Pivot Height | 485.1 - 500.4 | 494 | Yes |
| N | Buttock Popliteal Length | 452.1 - 477.5 | 470 | Yes |
| O | Chest Depth | 213.4 - 228.6 | 222 | Yes |
| P | Foot Length | 251.5 - 266.7 | 264 | Yes |
| V | Shoulder Breadth | 421.6 - 436.9 | 425 | Yes |
| W | Foot Breadth | 91.4 - 106.7 | 96 | Yes |
| Y | Chest Circumference | 970.3 - 1000.8 | 991 | Yes |
| Z | Waist Circumference | 835.7 - 866.1 | 865 | Yes |
| AA | Location For Chest Circumference | 429.3 - 434.3 | 432 | Yes |
| BB | Location For Waist Circumference | 226.1 - 231.1 | 229 | Yes |

# Transportation Research Center Inc.

Front Head Drop
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.5 °C | 21.7 °C | Yes |
| Relative Humidity | 10 - 70 % | 46 % | Yes |
| Peak Head Resultant Acceleration | 225 - 275 g | 261.1 g | Yes |
| Peak Head Lateral Acceleration | (-15) - 15 g | 5.9 g | Yes |
| Is Acceleration Curve Unimodal within 10% of Peak? | Yes | Yes | Yes |

**Test meets specifications.**

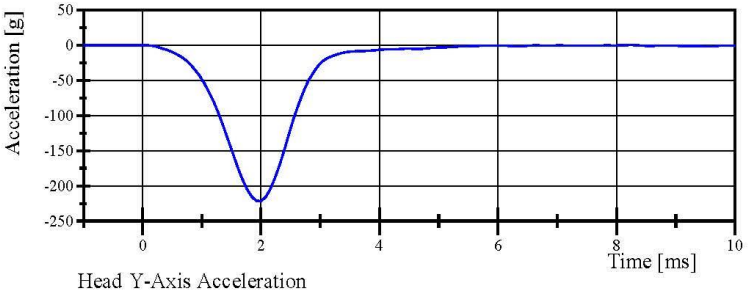
**Condition: Used**

**Comments:**
**Head Skin S/N: N/A**

# Transportation Research Center Inc.

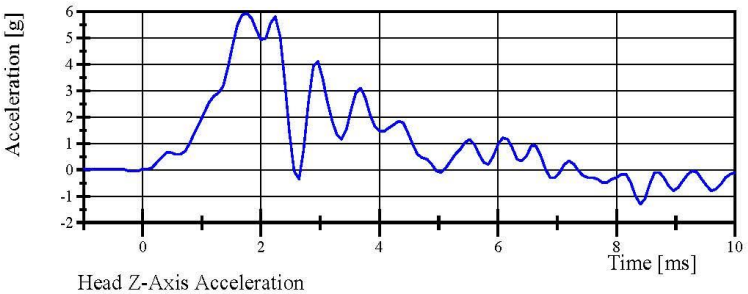
Front Head Drop
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/20/2019

Head X-Axis Acceleration



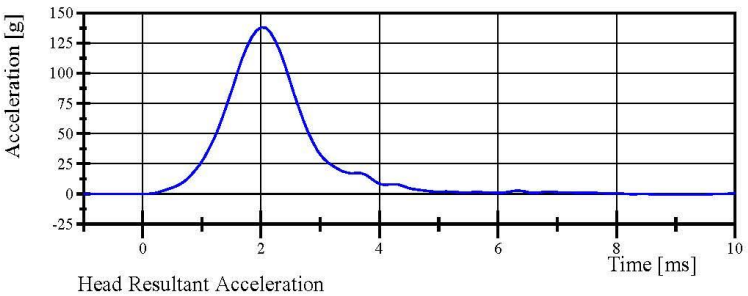

Filter Class: CFC_1000
Max: 0.3 g at 8.2 ms
Min: -221.4 g at 2.0 ms

Head Y-Axis Acceleration



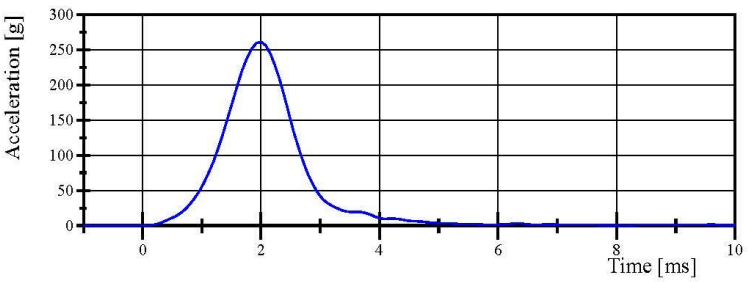

Filter Class: CFC_1000
Max: 5.9 g at 1.8 ms
Min: -1.3 g at 8.4 ms

Head Z-Axis Acceleration




Filter Class: CFC_1000
Max: 138.2 g at 2.0 ms
Min: -0.7 g at 8.8 ms

Head Resultant Acceleration




Filter Class: CFC_1000
Max: 261.1 g at 2.0 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.20.2019 08:31:53 578

# Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 40 % | Yes |
| Pendulum Velocity | 6.89 - 7.13 m/s | 6.917 m/s | Yes |
| Pendulum Acceleration Decay Crossing -5g | 34 - 42 ms | 36.8 ms | Yes |
| Pendulum Acceleration at 10ms | (-22.5) - (-27.5) g | -26.26 g | Yes |
| Pendulum Acceleration at 20ms | (-17.6) - (-22.6) g | -20.18 g | Yes |
| Pendulum Acceleration at 30ms | (-12.5) - (-18.5) g | -16.27 g | Yes |
| Pendulum Acceleration > 30ms | >= (-29.0) g | -16.27 g | Yes |
| Total Head D-Plane Rotation | | | |
| Peak | (-64) - (-78) ° | -72.1 ° | Yes |
| Time of Peak | 57 - 64 ms | 57.6 ms | Yes |
| Total Head D-Plane Rotation Decay to 0° | 113 - 128 ms | 115.8 ms | Yes |
| Total Neck Occipital Condyles Moment | | | |
| Peak | 88.1 - 108.4 N·m | 99.81 N·m | Yes |
| Time of Peak | 47 - 58 ms | 49.8 ms | Yes |
| Total Neck Occipital Condyles Moment Decay to 0 N·m | 97 - 107 ms | 99.4 ms | Yes |

**Test meets specifications.**

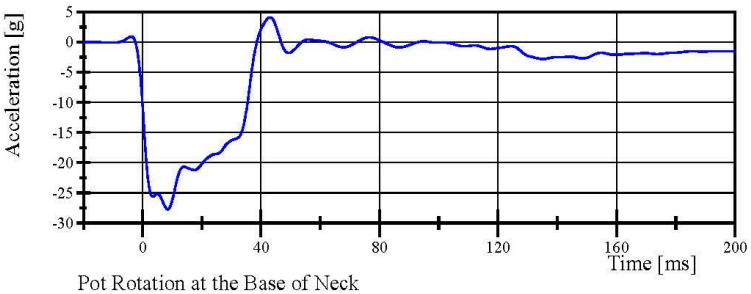
**Condition: Used**

**Comments:**
**Neck S/N: 4728**

## Transportation Research Center Inc.

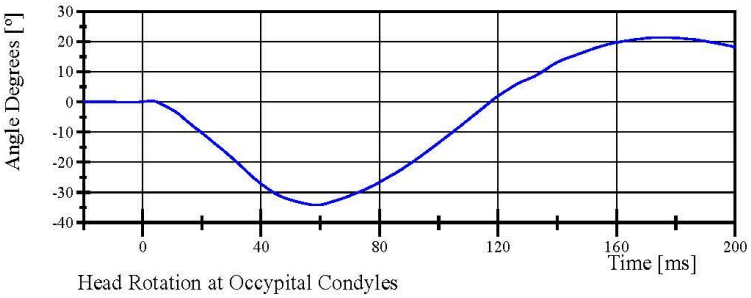
Neck Flexion
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/20/2019

Pendulum Acceleration



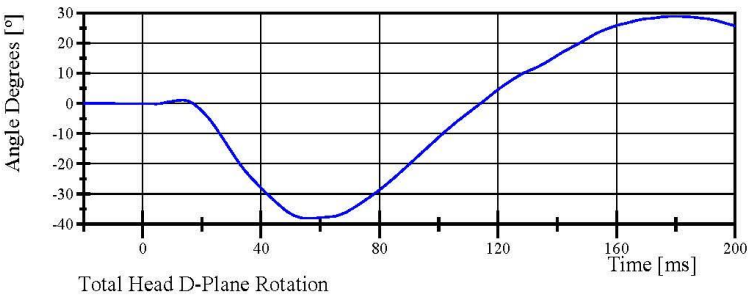

Filter Class: CFC_60
Max: 4.1 g at 43.0 ms
Min: -27.7 g at 8.5 ms

Pot Rotation at the Base of Neck



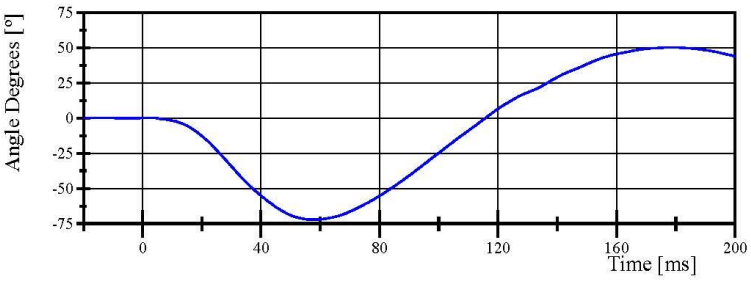

Filter Class: CFC_60
Max: 21.4 ° at 174.4 ms
Min: -34.1 ° at 58.6 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 29.0 ° at 179.6 ms
Min: -38.1 ° at 56.4 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 50.3 ° at 178.4 ms
Min: -72.1 ° at 57.6 ms

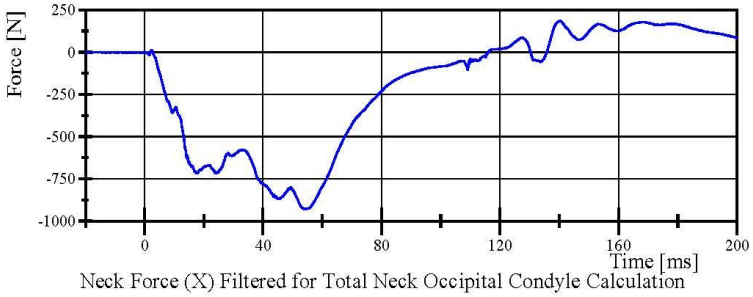
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.20.2019 15:40:41 1837

## Transportation Research Center Inc.

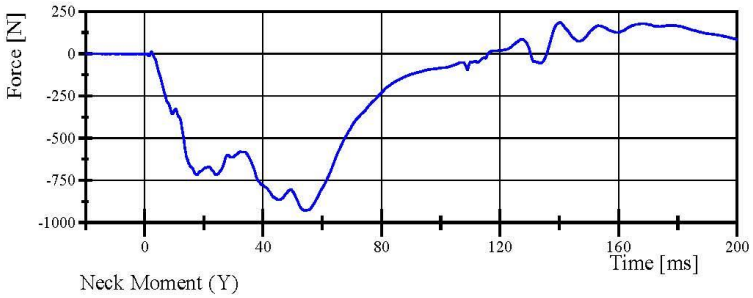
Neck Flexion
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/20/2019

Neck Force (X)



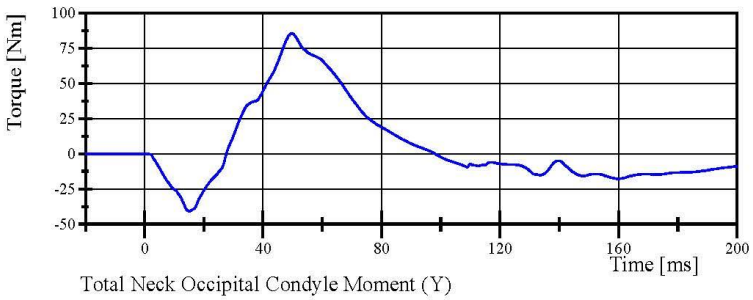

Filter Class: CFC_1000
Max: 185.2 N at 140.0 ms
Min: -928.4 N at 54.1 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



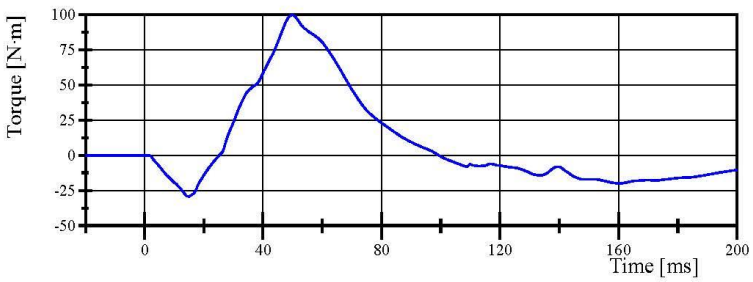

Filter Class: CFC_600
Max: 185.3 N at 140.2 ms
Min: -927.9 N at 54.2 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 85.5 Nm at 49.7 ms
Min: -40.7 Nm at 15.0 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 99.8 N·m at 49.8 ms
Min: -29.2 N·m at 14.9 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.20.2019 15:40:42 1837

# Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 55-3
Test Date: 2/21/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 39 % | Yes |
| Pendulum Velocity | (-5.95) - (-6.19) m/s | -5.969 m/s | Yes |
| Pendulum Acceleration Decay Crossing 5g | 38 - 46 ms | 40.0 ms | Yes |
| Pendulum Acceleration at 10ms | 17.2 - 21.2 g | 20.48 g | Yes |
| Pendulum Acceleration at 20ms | 14.0 - 19.0 g | 17.41 g | Yes |
| Pendulum Acceleration at 30ms | 11.0 - 16.0 g | 13.27 g | Yes |
| Pendulum Acceleration > 30ms | <= 22.0 g | 13.27 g | Yes |
| Total Head D-Plane Rotation | | | |
| Peak | 81 - 106 ° | 99.9 ° | Yes |
| Time of Peak | 72 - 82 ms | 77.5 ms | Yes |
| Total Head D-Plane Rotation Decay to 0° | 147 - 174 ms | 158.3 ms | Yes |
| Total Neck Occipital Condyles Moment | | | |
| Peak | (-52.9) - (-80) N·m | -70.13 N·m | Yes |
| Time of Peak | 65 - 79 ms | 71.7 ms | Yes |
| Total Neck Occipital Condyles Moment Decay to 0 N·m | 120 - 148 ms | 147.1 ms | Yes |

**Test meets specifications.**

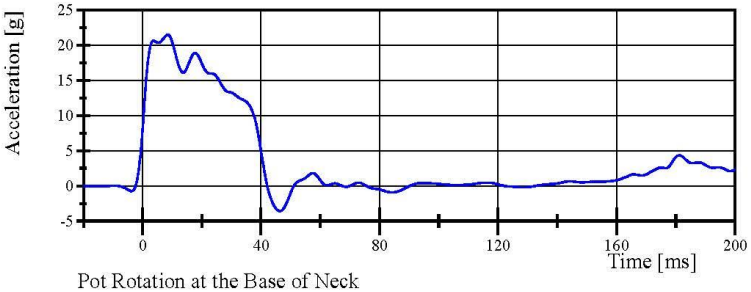
**Condition: Used**

**Comments:**
**Neck S/N: 4728**

# Transportation Research Center Inc.

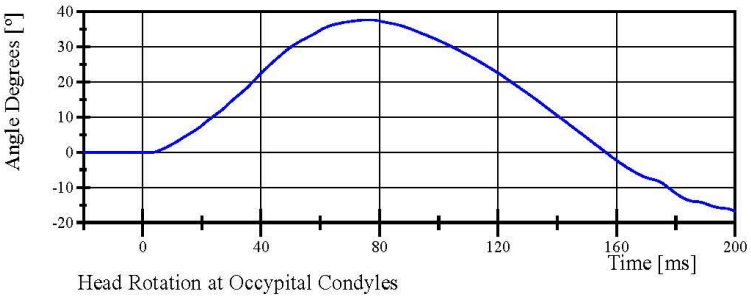
Neck Extension
HIII 50th Serial No. 037 Certification No. 55-3
Test Date: 2/21/2019

Pendulum Acceleration



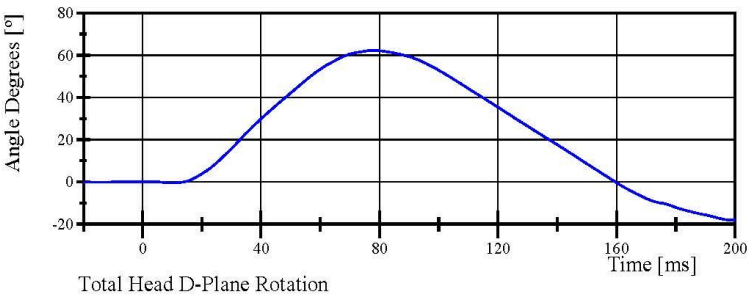

Filter Class: CFC_60
Max: 21.5 g at 8.5 ms
Min: -3.6 g at 46.4 ms

Pot Rotation at the Base of Neck



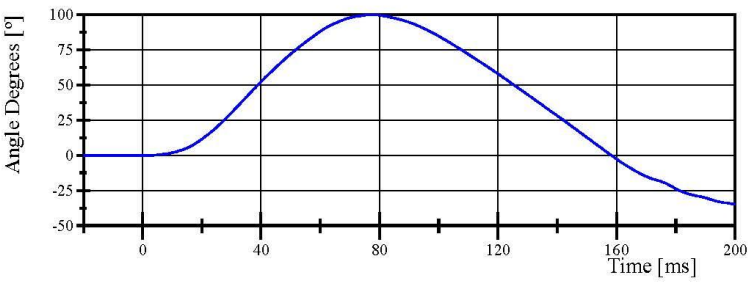

Filter Class: CFC_60
Max: 37.6 ° at 76.7 ms
Min: -16.7 ° at 200.0 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 62.3 ° at 78.1 ms
Min: -18.1 ° at 200.0 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 99.9 ° at 77.5 ms
Min: -34.8 ° at 200.0 ms

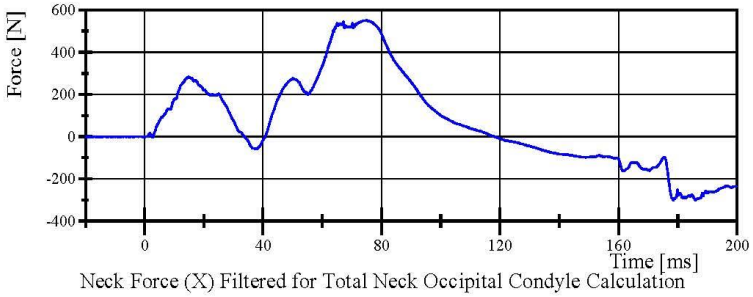
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.21.2019 07:45:33 1984

# Transportation Research Center Inc.

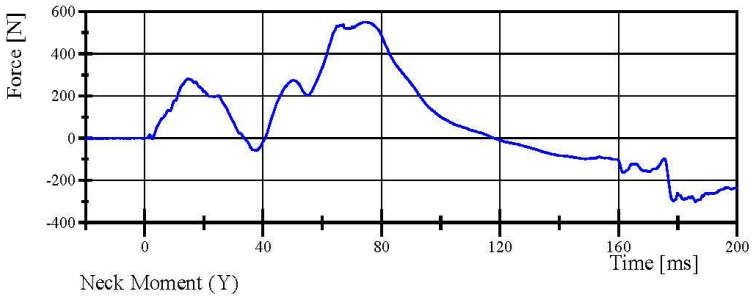
Neck Extension
HIII 50th Serial No. 037 Certification No. 55-3
Test Date: 2/21/2019

Neck Force (X)



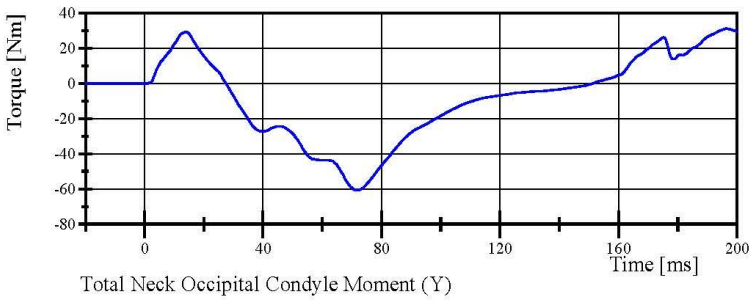

Filter Class: CFC_1000
Max: 551.7 N at 74.9 ms
Min: -301.7 N at 186.0 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



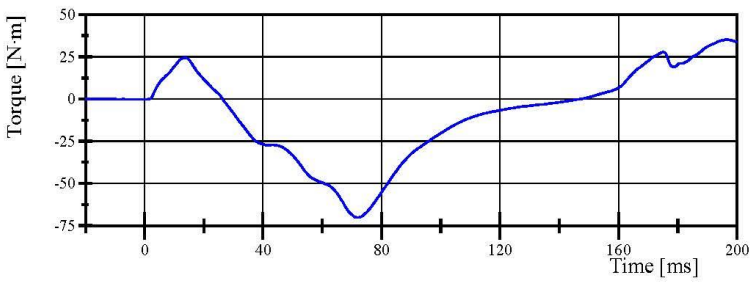

Filter Class: CFC_600
Max: 550.7 N at 74.0 ms
Min: -300.6 N at 186.1 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 31.1 Nm at 196.5 ms
Min: -60.7 Nm at 71.6 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 35.2 N·m at 196.4 ms
Min: -70.1 N·m at 71.7 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.21.2019 07:45:34 1984

# Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 56-3
Test Date: 2/27/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.3 °C | Yes |
| Relative Humidity | 10 - 70 % | 38 % | Yes |
| Probe Velocity | 6.59 - 6.83 m/s | 6.816 m/s | Yes |
| Probe Force Peak | (-5,160) - (-5,894) N | -5,829.6 N | Yes |
| Maximum Chest Compression | (-63.5) - (-72.6) mm | -63.85 mm | Yes |
| Internal Hysteresis | 69 - 85 % | 74.9 % | Yes |

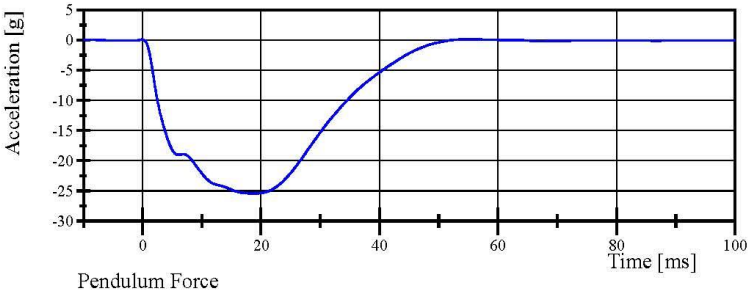
**Test meets specifications.**

**Condition: Used**
**Comments:**
**Jacket S/N: 2565**
**Rib Set S/N: 02033121A**

# Transportation Research Center Inc.

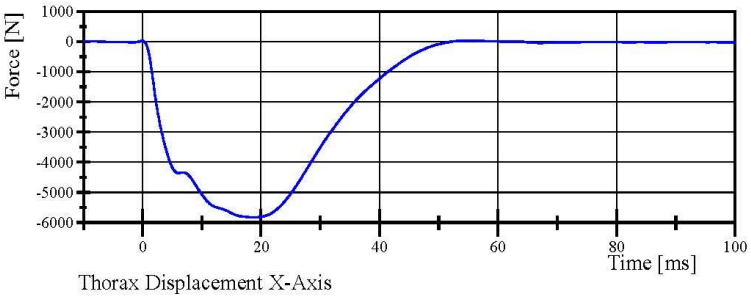
Front Thorax
HIII 50th Serial No. 037 Certification No. 56-3
Test Date: 2/27/2019

Pendulum Acceleration



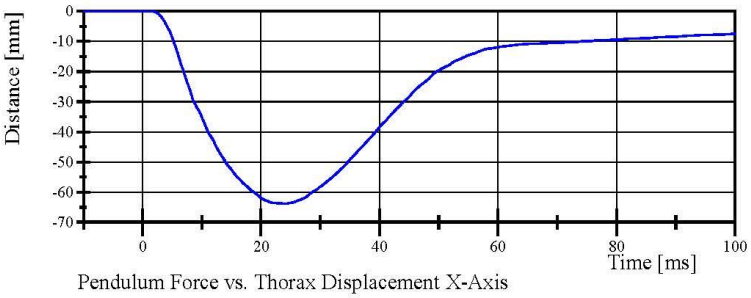

Filter Class: CFC_180
Max: 0.1 g at 55.9 ms
Min: -25.4 g at 18.8 ms

Pendulum Force



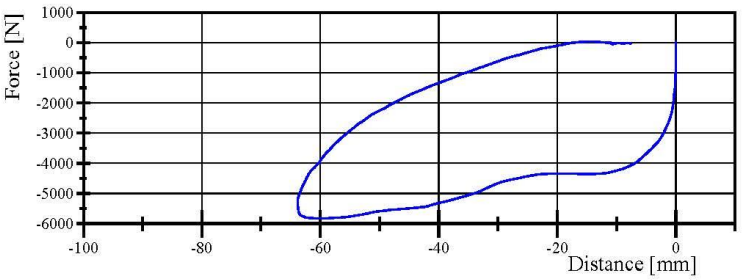

Filter Class: CFC_180
Max: 33.6 N at 55.9 ms
Min: -5,829.6 N at 18.8 ms

Thorax Displacement X-Axis




Filter Class: CFC_600
Max: 0.0 mm at -9.5 ms
Min: -63.8 mm at 24.2 ms

Pendulum Force vs. Thorax Displacement X-Axis




Filter Class: CFC_180
Max: 33.6 N at -14.1 mm
Min: -5,829.6 N at -60.1 mm

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.27.2019 09:30:12 376

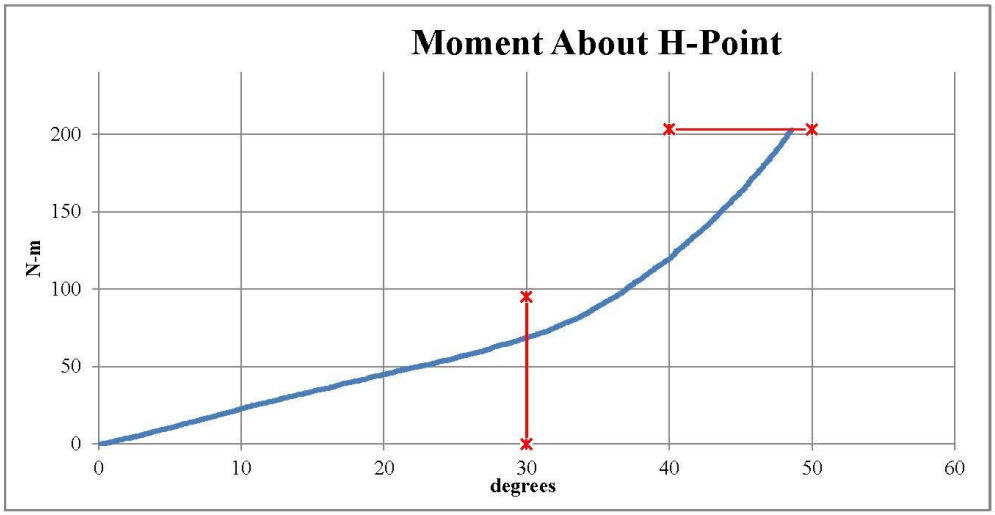
# Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion

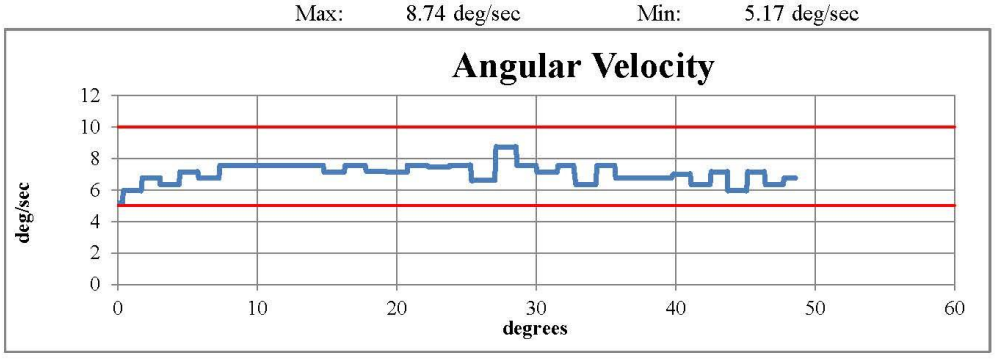
NHTSA

| | | | |
|---|---|---|---|
| Serial Number: | 037 | Date: | 20-Feb-2019 |
| Side Tested: | Left Hip | Time: | 14:58 |
| Test Number: | 1 | | |

| TEST PARAMETER | SPECIFICATION | | | TEST RESULTS | | |
|---|---|---|---|---|---|---|
| Temperature | 18.9 | - | 25.6 | 21.4 | °C | Pass |
| Humidity | 10 | - | 70 | 31 | % | Pass |
| Moment at 30° | 0 | ≤ | 94.9 | 68.71 | N-m | Pass |
| Angle at 203 Nm | 40 | - | 50 | 48.66 | deg | Pass |
| Average Velocity | 5 | - | 10 | 7.07 | deg/sec | Pass |




Max: 8.74 deg/sec Min: 5.17 deg/sec




Comments:
Pelvis Skin S/N: N/A
Lumbar Spine S/N: 0551
Lumbar Cable S/N: N/A

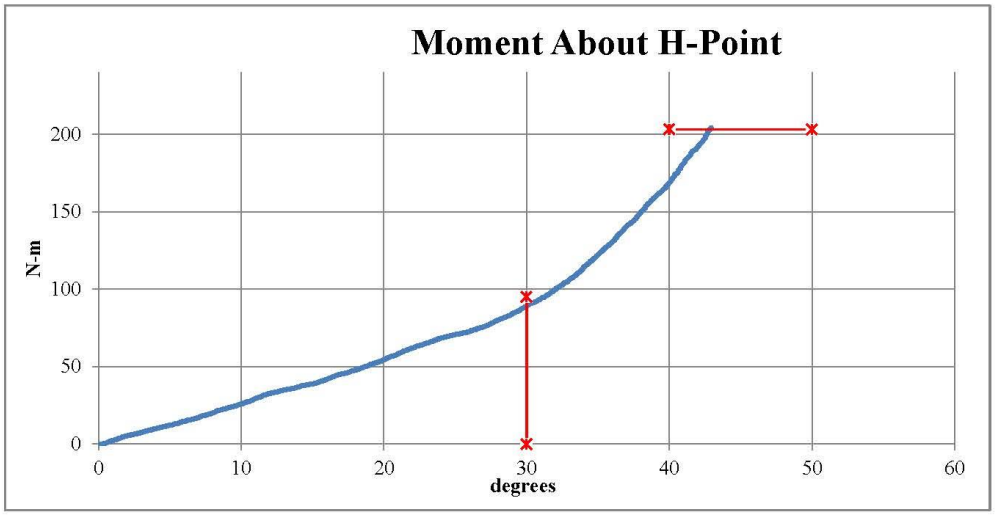
# Transportation Research Center Inc.

Hybrid III 50th Male Hip Range of Motion

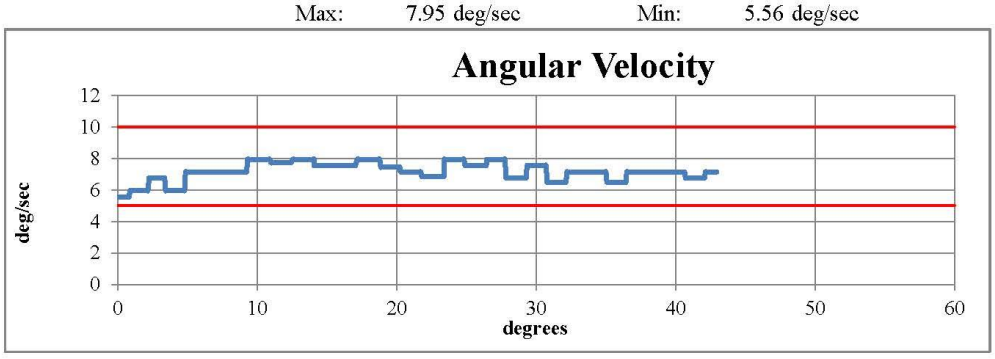
NHTSA

| | | | |
|---|---|---|---|
| Serial Number: | 037 | Date: | 20-Feb-2019 |
| Side Tested: | Right Hip | Time: | 16:01 |
| Test Number: | 1 | | |

| TEST PARAMETER | SPECIFICATION | | | TEST RESULTS | | |
|---|---|---|---|---|---|---|
| Temperature | 18.9 | - | 25.6 | 21.3 | °C | Pass |
| Humidity | 10 | - | 70 | 35 | % | Pass |
| Moment at 30° | 0 | ≤ | 94.9 | 89.14 | N-m | Pass |
| Angle at 203 Nm | 40 | - | 50 | 42.94 | deg | Pass |
| Average Velocity | 5 | - | 10 | 7.16 | deg/sec | Pass |




Max: 7.95 deg/sec Min: 5.56 deg/sec




Comments:
Pelvis Skin S/N: N/A
Lumbar Spine S/N: 0551
Lumbar Cable S/N: N/A

# Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/21/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.5 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 40 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.123 m/s | Yes |
| Peak Femur Force | (-4,715) - (-5,782) N | -5,706.6 N | Yes |

**Test meets specifications.**

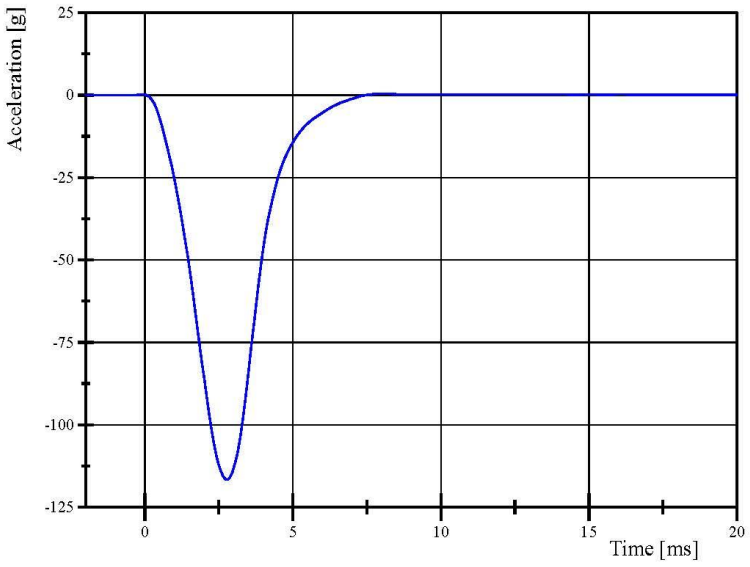
**Condition: Used**

**Comments:**
**Knee Skin S/N: 2672**

# Transportation Research Center Inc.

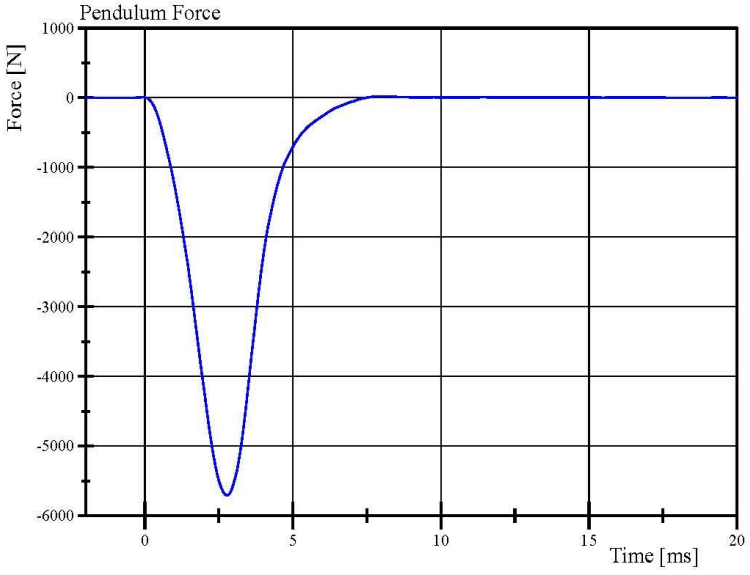
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/21/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 0.5 g at 8.1 ms
Min: -116.6 g at 2.8 ms

Pendulum Force




Filter Class: CFC_600
Max: 22.2 N at 8.1 ms
Min: -5,706.6 N at 2.8 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.21.2019 07:07:38 1722

# Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/21/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.5 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 39 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.111 m/s | Yes |
| Peak Femur Force | (-4,715) - (-5,782) N | -5,586.7 N | Yes |

**Test meets specifications.**

**Condition: Used**

**Comments:**
**Knee Skin S/N: 3131**

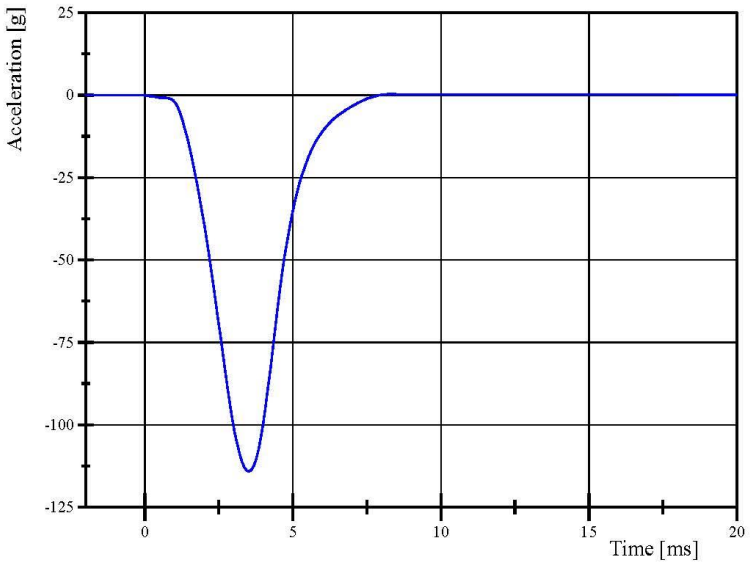
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.21.2019 07:36:24 1718

# Transportation Research Center Inc.

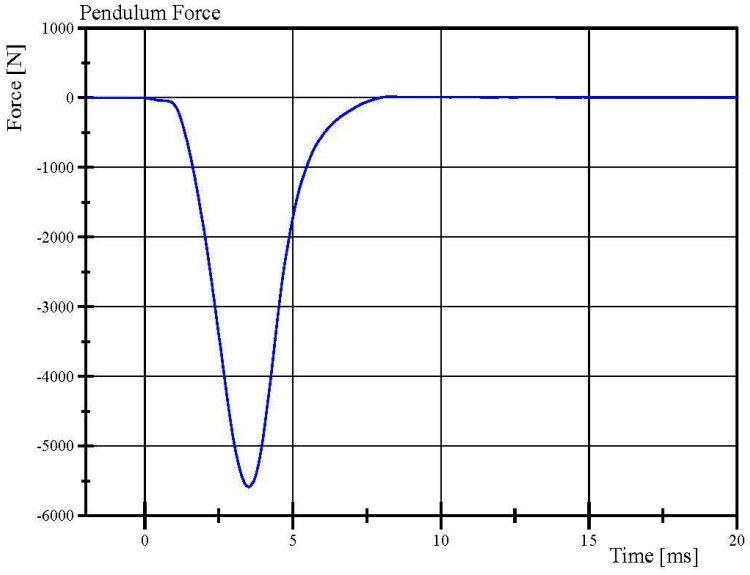
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 55-1
Test Date: 2/21/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 0.3 g at 8.3 ms
Min: -114.2 g at 3.5 ms

Pendulum Force




Filter Class: CFC_600
Max: 16.8 N at 8.3 ms
Min: -5,586.7 N at 3.5 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

02.21.2019 07:37:11 1718

**Post-Test Calibration Sheets**

**Driver S/N 037**

**Transportation Research Center Inc.**
**572E HIII 50th Male Dummy**
**External Dimensions**
**Serial No. 037**
**Calibration No. 57**

| Symbol | Description | Specification | Results | Pass |
|---|---|---|---|---|
| | | mm | mm | |
| A | Total Sitting Height | 878.8 - 889.0 | 880 | Yes |
| B | Shoulder Pivot Height | 505.5 - 520.7 | 511 | Yes |
| C | H-Point Height | 83.8 - 88.9 | 86 | Yes |
| D | H-Point From Seatback | 134.6 - 139.7 | 137 | Yes |
| E | Shoulder Pivot From Backline | 83.8 - 94.0 | 91 | Yes |
| F | Thigh Clearance | 139.7 - 154.9 | 145 | Yes |
| G | Back Of Elbow To Wrist Pivot | 289.6 - 304.8 | 295 | Yes |
| H | Skull Cap To Backline | 40.6 - 45.7 | 45 | Yes |
| I | Shoulder-Elbow Length | 330.2 - 345.4 | 337 | Yes |
| J | Elbow Rest Height | 190.5 - 210.8 | 199 | Yes |
| K | Buttock Knee Length | 579.1 - 604.5 | 601 | Yes |
| L | Popliteal Height | 429.3 - 454.7 | 440 | Yes |
| M | Knee Pivot Height | 485.1 - 500.4 | 494 | Yes |
| N | Buttock Popliteal Length | 452.1 - 477.5 | 470 | Yes |
| O | Chest Depth | 213.4 - 228.6 | 222 | Yes |
| P | Foot Length | 251.5 - 266.7 | 264 | Yes |
| V | Shoulder Breadth | 421.6 - 436.9 | 425 | Yes |
| W | Foot Breadth | 91.4 - 106.7 | 96 | Yes |
| Y | Chest Circumference | 970.3 - 1000.8 | 991 | Yes |
| Z | Waist Circumference | 835.7 - 866.1 | 865 | Yes |
| AA | Location For Chest Circumference | 429.3 - 434.3 | 432 | Yes |
| BB | Location For Waist Circumference | 226.1 - 231.1 | 229 | Yes |

# Transportation Research Center Inc.

Front Head Drop
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 36 % | Yes |
| Peak Head Resultant Acceleration | 225 - 275 g | 271.7 g | Yes |
| Peak Head Lateral Acceleration | (-15) - 15 g | 9.0 g | Yes |
| Is Acceleration Curve Unimodal within 10% of Peak? | Yes | Yes | Yes |

**Test meets specifications.**

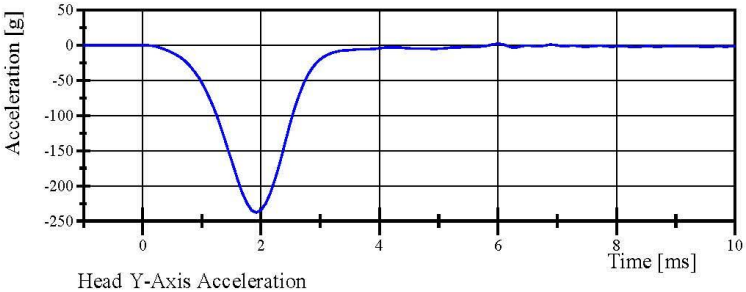
**Condition: Used**

**Comments:**
**Head Skin S/N: N/A**

# Transportation Research Center Inc.

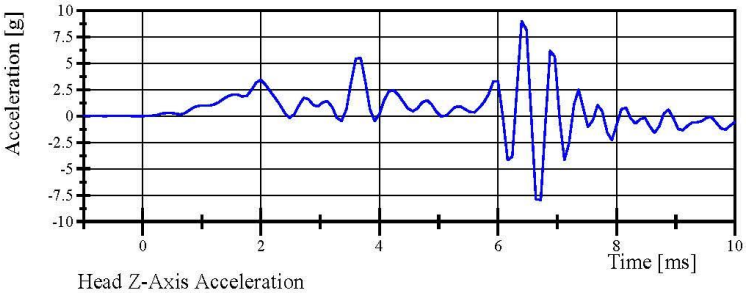
Front Head Drop
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Head X-Axis Acceleration



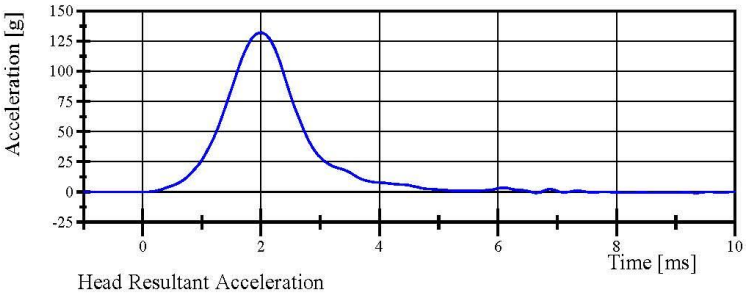

Filter Class: CFC_1000
Max: 2.1 g at 6.0 ms
Min: -237.9 g at 1.9 ms

Head Y-Axis Acceleration



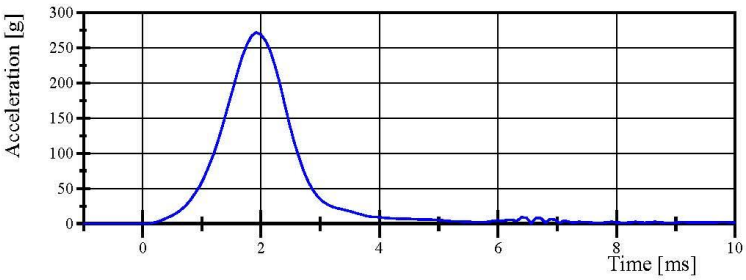

Filter Class: CFC_1000
Max: 9.0 g at 6.4 ms
Min: -7.9 g at 6.7 ms

Head Z-Axis Acceleration




Filter Class: CFC_1000
Max: 132.3 g at 2.0 ms
Min: -0.8 g at 6.6 ms

Head Resultant Acceleration




Filter Class: CFC_1000
Max: 271.7 g at 1.9 ms
Min: 0.0 g at -0.6 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

03.20.2019 10:22:18 578

# Transportation Research Center Inc.

Neck Flexion
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 38 % | Yes |
| Pendulum Velocity | 6.89 - 7.13 m/s | 6.914 m/s | Yes |
| Pendulum Acceleration Decay Crossing -5g | 34 - 42 ms | 38.9 ms | Yes |
| Pendulum Acceleration at 10ms | (-22.5) - (-27.5) g | -23.92 g | Yes |
| Pendulum Acceleration at 20ms | (-17.6) - (-22.6) g | -20.45 g | Yes |
| Pendulum Acceleration at 30ms | (-12.5) - (-18.5) g | -16.73 g | Yes |
| Pendulum Acceleration > 30ms | >= (-29.0) g | -16.73 g | Yes |
| Total Head D-Plane Rotation | | | |
| Peak | (-64) - (-78) ° | -67.3 ° | Yes |
| Time of Peak | 57 - 64 ms | 59.8 ms | Yes |
| Total Head D-Plane Rotation Decay to 0° | 113 - 128 ms | 120.7 ms | Yes |
| Total Neck Occipital Condyles Moment | | | |
| Peak | 88.1 - 108.4 N·m | 100.08 N·m | Yes |
| Time of Peak | 47 - 58 ms | 52.9 ms | Yes |
| Total Neck Occipital Condyles Moment Decay to 0 N·m | 97 - 107 ms | 102.1 ms | Yes |

**Test meets specifications.**

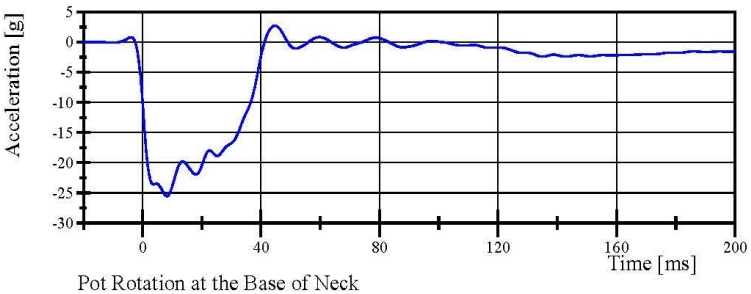
**Condition: Used**

**Comments:**
**Neck S/N: 4728**

# Transportation Research Center Inc.

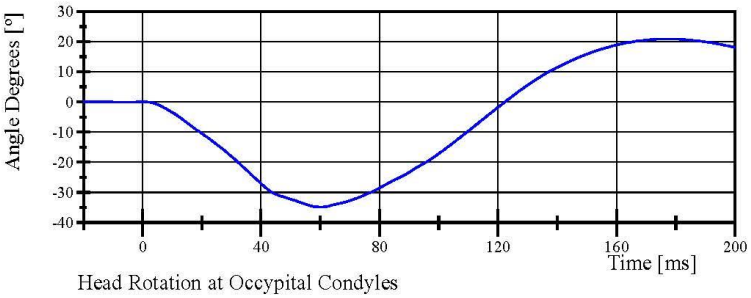
Neck Flexion
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Pendulum Acceleration



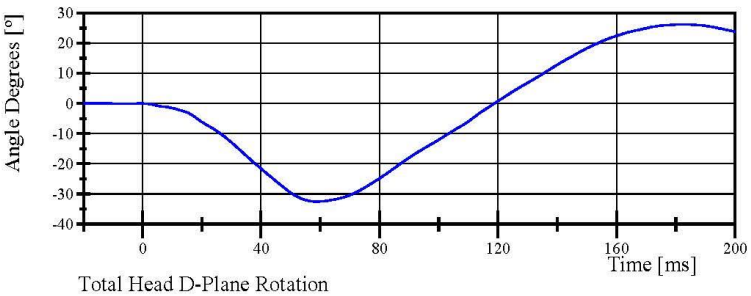

Filter Class: CFC_60
Max: 2.7 g at 44.7 ms
Min: -25.5 g at 8.3 ms

Pot Rotation at the Base of Neck



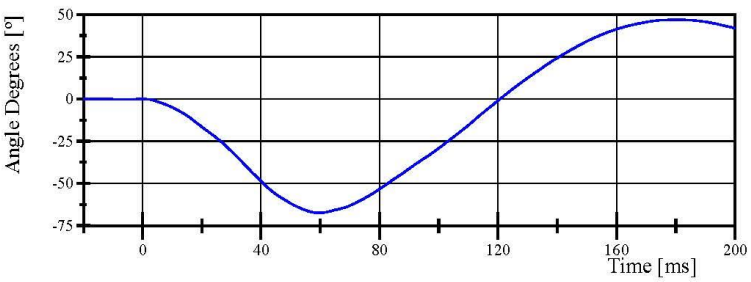

Filter Class: CFC_60
Max: 20.9 ° at 177.2 ms
Min: -34.8 ° at 60.3 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 26.3 ° at 182.6 ms
Min: -32.5 ° at 58.7 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 47.1 ° at 180.4 ms
Min: -67.3 ° at 59.8 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

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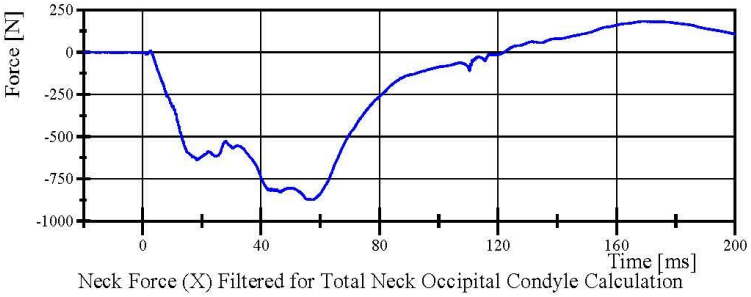
## Transportation Research Center Inc.

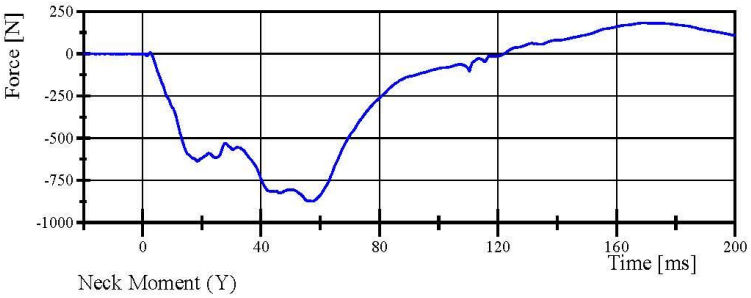
Neck Flexion
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Neck Force (X)



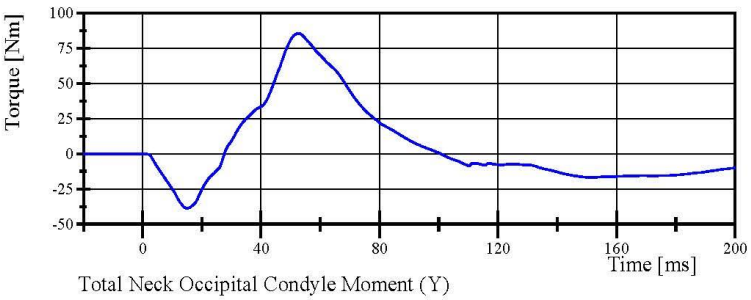

Filter Class: CFC_1000
Max: 183.2 N at 168.6 ms
Min: -873.1 N at 57.2 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



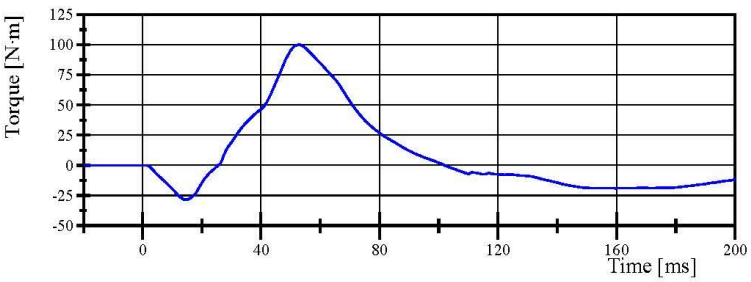

Filter Class: CFC_600
Max: 183.1 N at 169.0 ms
Min: -872.8 N at 57.3 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 85.5 Nm at 52.5 ms
Min: -38.8 Nm at 15.1 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 100.1 N·m at 52.9 ms
Min: -28.5 N·m at 14.7 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

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# Transportation Research Center Inc.

Neck Extension
HIII 50th Serial No. 037 Certification No. 57-3
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 36 % | Yes |
| Pendulum Velocity | (-5.95) - (-6.18) m/s | -5.966 m/s | Yes |
| Pendulum Acceleration Decay Crossing 5g | 38 - 46 ms | 38.3 ms | Yes |
| Pendulum Acceleration at 10ms | 17.2 - 21.2 g | 20.80 g | Yes |
| Pendulum Acceleration at 20ms | 14.0 - 19.0 g | 17.95 g | Yes |
| Pendulum Acceleration at 30ms | 11.0 - 16.0 g | 13.66 g | Yes |
| Pendulum Acceleration > 30ms | <= 22.0 g | 14.52 g | Yes |
| Total Head D-Plane Rotation | | | |
| Peak | 81 - 106 ° | 93.6 ° | Yes |
| Time of Peak | 72 - 82 ms | 76.5 ms | Yes |
| Total Head D-Plane Rotation Decay to 0° | 147 - 174 ms | 158.1 ms | Yes |
| Total Neck Occipital Condyles Moment | | | |
| Peak | (-52.9) - (-80) N·m | -73.84 N·m | Yes |
| Time of Peak | 65 - 79 ms | 72.2 ms | Yes |
| Total Neck Occipital Condyles Moment Decay to 0 N·m | 120 - 148 ms | 147.9 ms | Yes |

**Test meets specifications.**

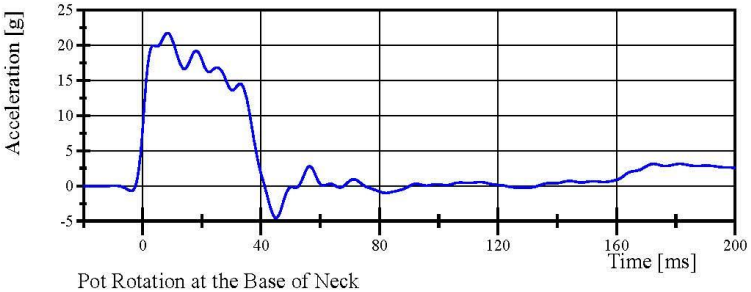
**Condition: Used**

**Comments:**
**Neck S/N: 4278**

# Transportation Research Center Inc.

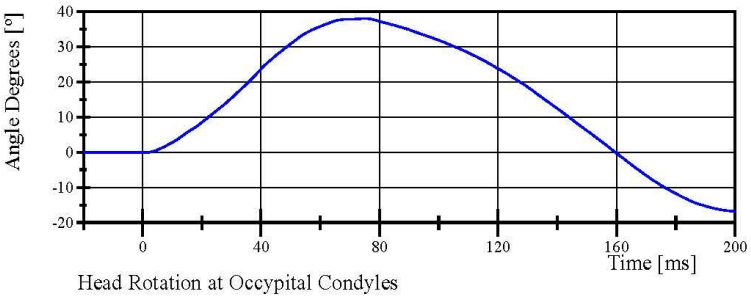
Neck Extension
HIII 50th Serial No. 037 Certification No. 57-3
Test Date: 3/20/2019

Pendulum Acceleration



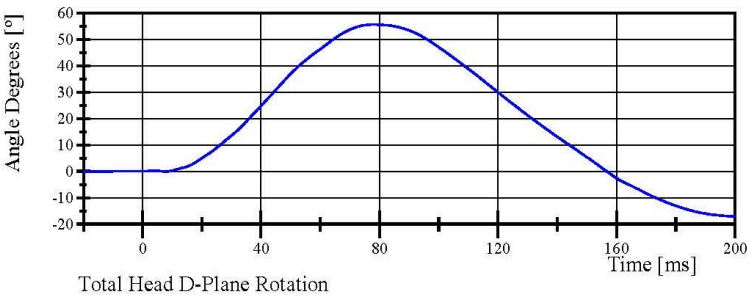

Filter Class: CFC_60
Max: 21.7 g at 8.5 ms
Min: -4.6 g at 45.1 ms

Pot Rotation at the Base of Neck



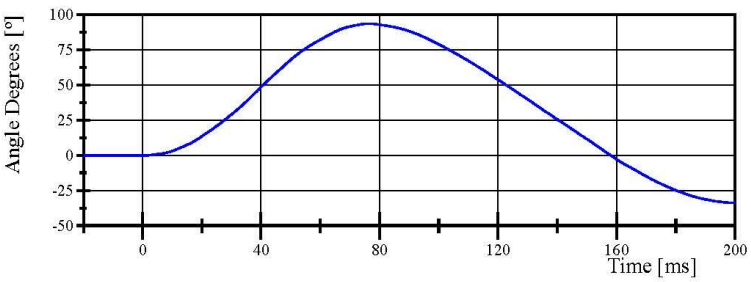

Filter Class: CFC_60
Max: 38.0 ° at 75.2 ms
Min: -16.8 ° at 200.0 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 55.7 ° at 78.1 ms
Min: -17.0 ° at 200.0 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 93.6 ° at 76.5 ms
Min: -33.8 ° at 200.0 ms

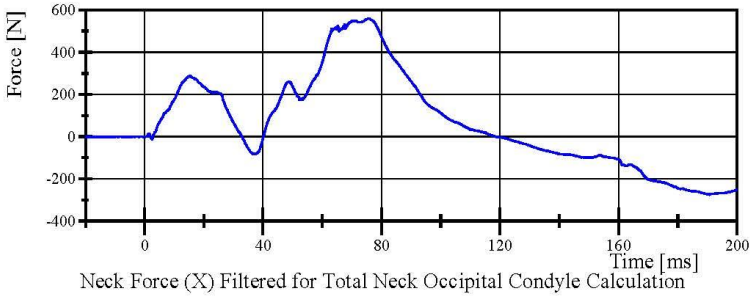
Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

03.20.2019 12:42:10 1985

## Transportation Research Center Inc.

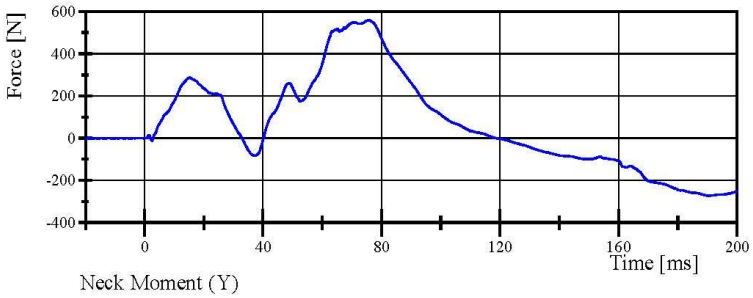
Neck Extension
HIII 50th Serial No. 037 Certification No. 57-3
Test Date: 3/20/2019

Neck Force (X)



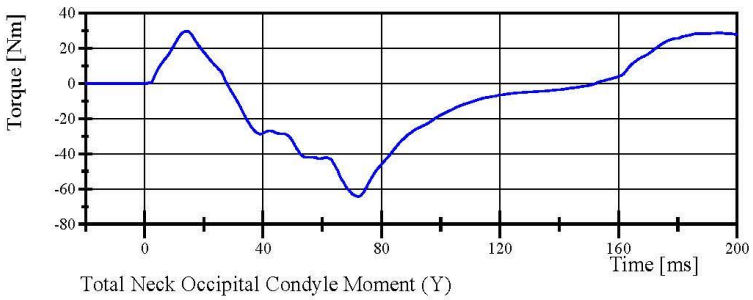

Filter Class: CFC_1000
Max: 559.1 N at 75.9 ms
Min: -274.4 N at 190.7 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



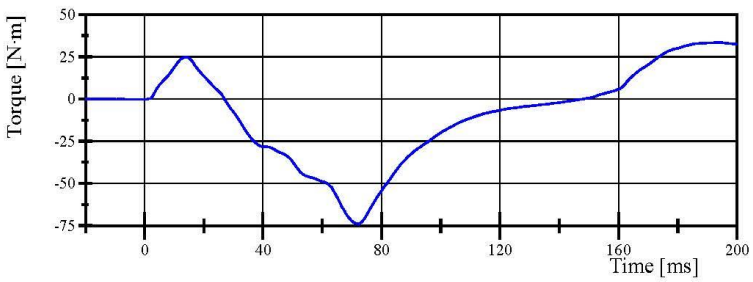

Filter Class: CFC_600
Max: 558.9 N at 75.8 ms
Min: -273.9 N at 190.7 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 29.7 Nm at 14.3 ms
Min: -64.3 Nm at 72.2 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 33.5 N·m at 193.5 ms
Min: -73.8 N·m at 72.2 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

03.20.2019 12:42:10 1985

# Transportation Research Center Inc.

Front Thorax
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.5 °C | Yes |
| Relative Humidity | 10 - 70 % | 37 % | Yes |
| Probe Velocity | 6.59 - 6.83 m/s | 6.810 m/s | Yes |
| Probe Force Peak | (-5,160) - (-5,894) N | -5,763.0 N | Yes |
| Maximum Chest Compression | (-63.5) - (-72.6) mm | -66.68 mm | Yes |
| Internal Hysteresis | 69 - 85 % | 74.7 % | Yes |

**Test meets specifications.**

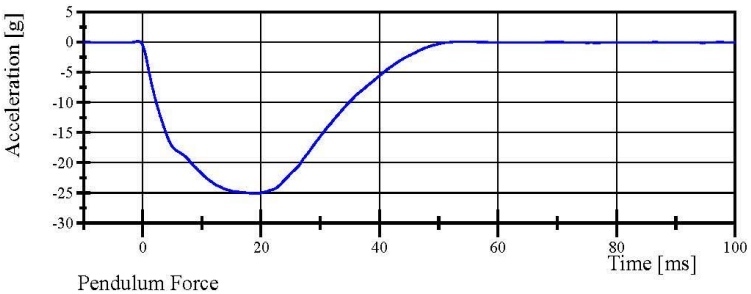
**Condition: Used**

**Comments:**
**Jacket S/N: 2565**
**Rib Set S/N: 02033121A**

# Transportation Research Center Inc.

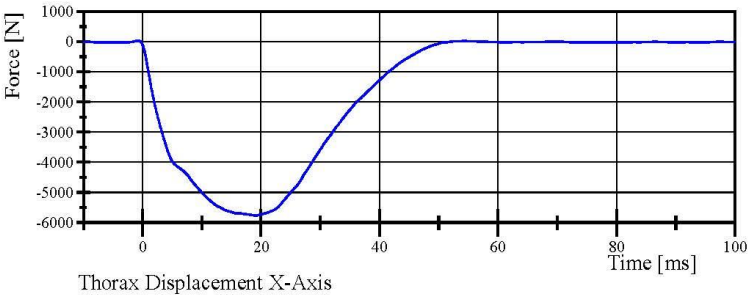
Front Thorax
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Pendulum Acceleration



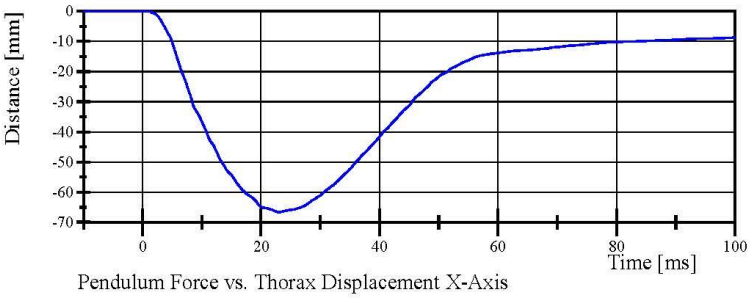

Filter Class: CFC_180
Max: 0.1 g at -0.7 ms
Min: -25.1 g at 19.0 ms

Pendulum Force



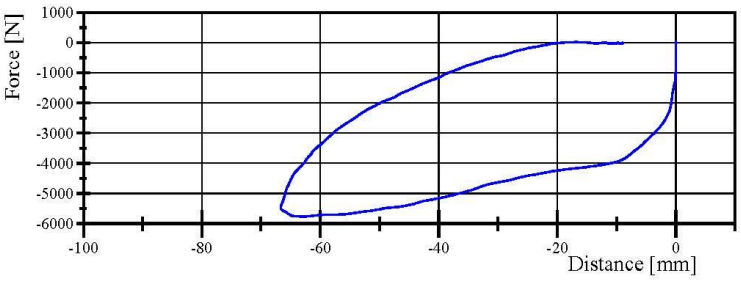

Filter Class: CFC_180
Max: 32.8 N at -0.7 ms
Min: -5,763.0 N at 19.0 ms

Thorax Displacement X-Axis




Filter Class: CFC_600
Max: 0.0 mm at -9.1 ms
Min: -66.7 mm at 23.0 ms

Pendulum Force vs. Thorax Displacement X-Axis




Filter Class: CFC_180
Max: 32.8 N at -0.0 mm
Min: -5,763.0 N at -62.8 mm

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

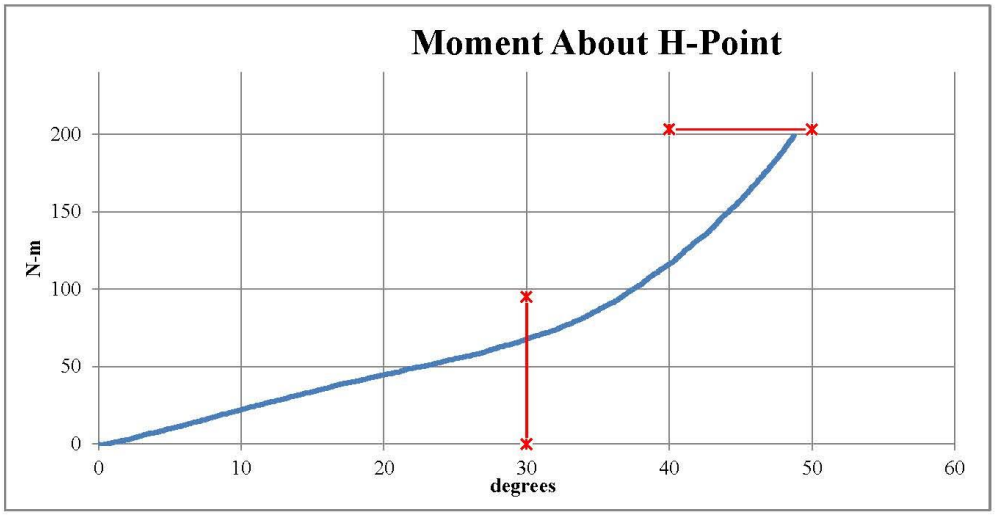
03.20.2019 10:14:12 401

# Transportation Research Center Inc.

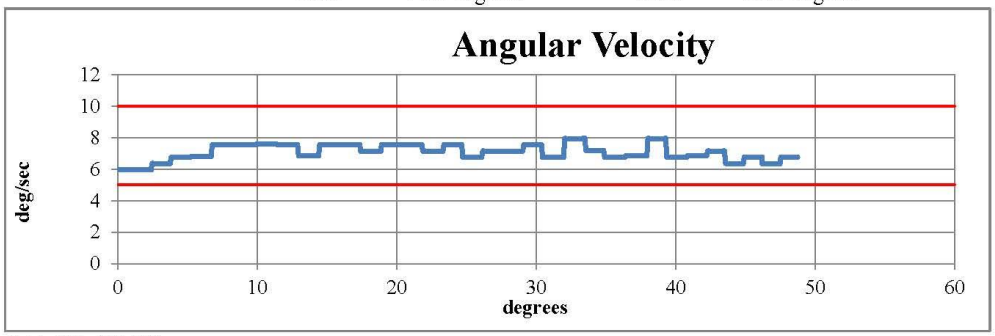
Hybrid III 50th Male Hip Range of Motion

| | | | |
|---|---|---|---|
| Serial Number: | 037 | Date: | 20-Mar-2019 |
| Side Tested: | Left Hip | Time: | 10:42 |
| Test Number: | 1 | | |

| TEST PARAMETER | SPECIFICATION | | | TEST RESULTS | | |
|---|---|---|---|---|---|---|
| Temperature | 18.9 | - | 25.6 | 21.5 | °C | Pass |
| Humidity | 10 | - | 70 | 37 | % | Pass |
| Moment at 30° | 0 | ≤ | 94.9 | 67.82 | N-m | Pass |
| Angle at 203 Nm | 40 | - | 50 | 49.13 | deg | Pass |
| Average Velocity | 5 | - | 10 | 7.05 | deg/sec | Pass |




Max: 7.95 deg/sec Min: 5.96 deg/sec



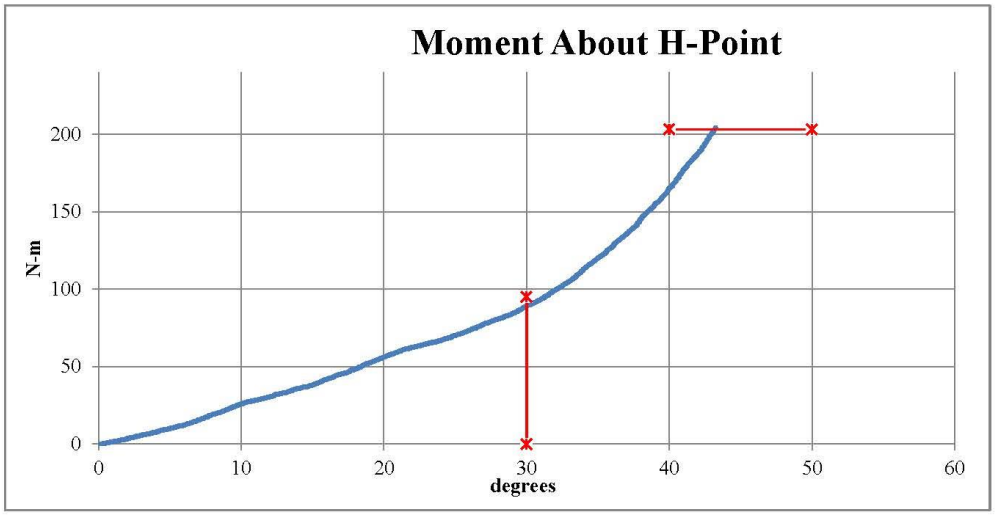

Pelvis Skin S/N: N/A

# Transportation Research Center Inc.

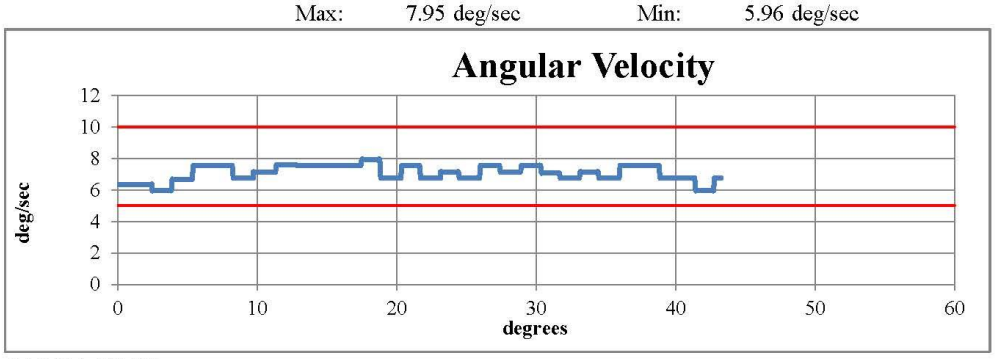
Hybrid III 50th Male Hip Range of Motion

| | | | |
|---|---|---|---|
| Serial Number: | 037 | Date: | 20-Mar-2019 |
| Side Tested: | Right Hip | Time: | 12:01 |
| Test Number: | 1 | | |

| TEST PARAMETER | SPECIFICATION | | | TEST RESULTS | | |
|---|---|---|---|---|---|---|
| Temperature | 18.9 | - | 25.6 | 21.7 | °C | Pass |
| Humidity | 10 | - | 70 | 40 | % | Pass |
| Moment at 30° | 0 | ≤ | 94.9 | 89.44 | N-m | Pass |
| Angle at 203 Nm | 40 | - | 50 | 43.25 | deg | Pass |
| Average Velocity | 5 | - | 10 | 7.06 | deg/sec | Pass |




Max: 7.95 deg/sec Min: 5.96 deg/sec




Pelvis Skin S/N: N/A

# Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.5 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 40 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.122 m/s | Yes |
| Peak Femur Force | (-4,715.2) - (-5,782.6) N | -5,729.57 N | Yes |

**Test meets specifications.**

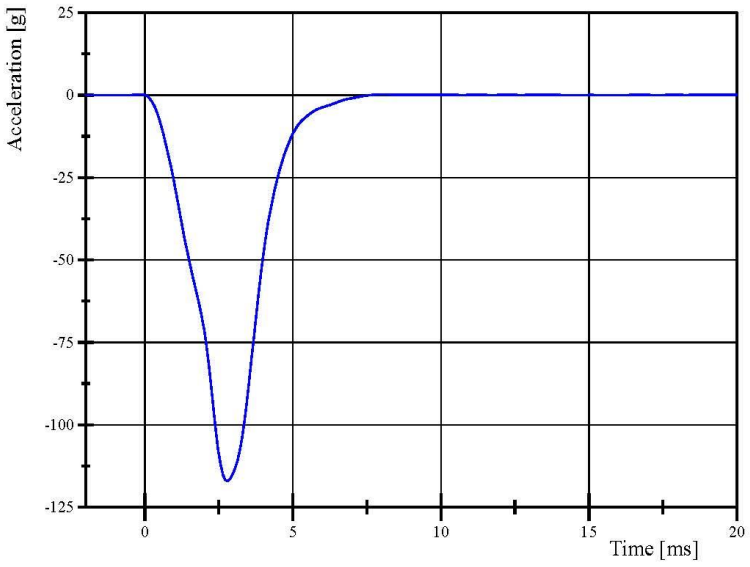
**Condition: Used**

**Comments:**
**Knee Skin S/N: 2672**

# Transportation Research Center Inc.

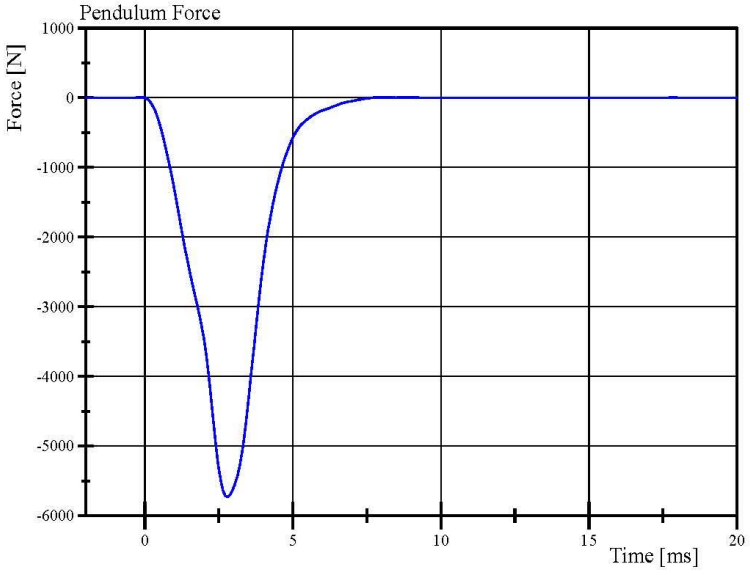
Left Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 0.2 g at -0.2 ms
Min: -117.1 g at 2.8 ms

Pendulum Force




Filter Class: CFC_600
Max: 8.5 N at -0.2 ms
Min: -5,729.6 N at 2.8 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

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# Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.5 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 41 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.127 m/s | Yes |
| Peak Femur Force | (-4,715.2) - (-5,782.6) N | -5,380.31 N | Yes |

**Test meets specifications.**

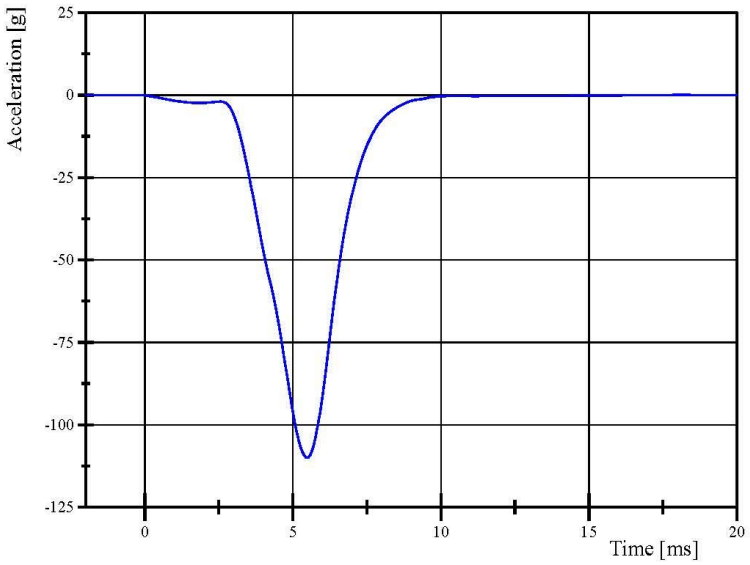
**Condition: Used**

**Comments:**
**Knee Skin S/N: 3131**

# Transportation Research Center Inc.

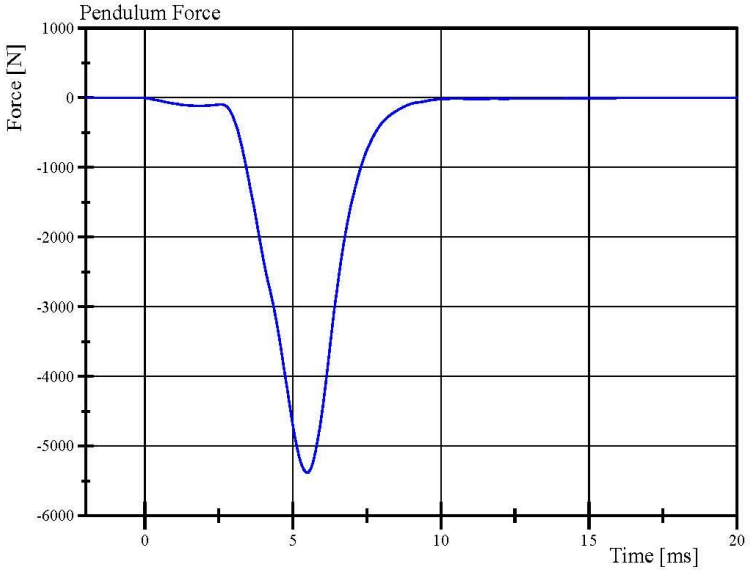
Right Knee Femur Response Test
HIII 50th Serial No. 037 Certification No. 57-1
Test Date: 3/20/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 0.1 g at 18.2 ms
Min: -110.0 g at 5.5 ms

Pendulum Force




Filter Class: CFC_600
Max: 2.9 N at 18.2 ms
Min: -5,380.3 N at 5.5 ms

Specification Source: CFR49 Part 572 Subpart E
with Polarity in accordance with J211

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**Pre-Test Calibration Sheets**

**Front Passenger S/N 070**

**Transportation Research Center Inc.**
**572O HIII 5th Female Dummy**
**External Dimensions**
**Serial No. 070 Calibration No. 36**

| Symbol | Description | Specification | Results | Pass |
|---|---|---|---|---|
| | | mm | mm | |
| A | Total Sitting Height | 774.7 - 800.1 | 779 | Yes |
| B | Shoulder Pivot Height | 431.8 - 457.2 | 444 | Yes |
| C | Hip Pivot Height | 81.3 - 86.3 | 82 | Yes |
| D | Hip Pivot from Backline | 144.8 - 149.8 | 145 | Yes |
| E | Shoulder Pivot from Backline | 68.6 - 83.8 | 81 | Yes |
| F | Thigh Clearance | 119.4 - 134.6 | 128 | Yes |
| G | Back of Elbow to Wrist Pivot | 243.9 - 259.1 | 249 | Yes |
| H | Head Back to Backline | 43.2 - 48.2 | 45 | Yes |
| I | Shoulder to Elbow Length | 276.8 - 297.2 | 281 | Yes |
| J | Elbow Rest Height | 182.8 - 203.2 | 184 | Yes |
| K | Buttock Knee Length | 520.7 - 546.1 | 537 | Yes |
| L | Popliteal Height | 355.6 - 376.0 | 364 | Yes |
| M | Knee Pivot Height | 393.7 - 419.1 | 403 | Yes |
| N | Buttock Popliteal Length | 414.0 - 439.4 | 430 | Yes |
| O | Chest Depth without Jacket | 175.3 - 190.5 | 181 | Yes |
| P | Foot Length | 218.5 - 233.7 | 225 | Yes |
| R | Buttock to Knee Pivot Length | 457.2 - 482.6 | 473 | Yes |
| S | Head Breadth | 137.1 - 147.3 | 138 | Yes |
| T | Head Depth | 177.8 - 188.0 | 180 | Yes |
| U | Hip Breadth | 299.7 - 314.9 | 306 | Yes |
| V | Shoulder Breadth | 350.5 - 365.7 | 360 | Yes |
| W | Foot Breadth | 78.8 - 94.0 | 88 | Yes |
| X | Head Circumference | 528.3 - 548.7 | 538 | Yes |
| Y | Chest Circumference with Jacket | 850.9 - 881.3 | 871 | Yes |
| Z | Waist Circumference | 759.5 - 789.9 | 777 | Yes |
| AA | Reference Location for Chest Circumference | 332.7 - 358.1 | 355 | Yes |
| BB | Reference Location for Waist Circumference | 160.0 - 170.2 | 163 | Yes |

# Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.5 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 41 % | Yes |
| Peak Head Resultant Acceleration | 250 - 300 g | 277.0 g | Yes |
| Peak Head Lateral Acceleration | (-15) - 15 g | 5.3 g | Yes |
| Is Acceleration Curve Unimodal within 10% of Peak? | Yes | Yes | Yes |

**Test meets specifications.**

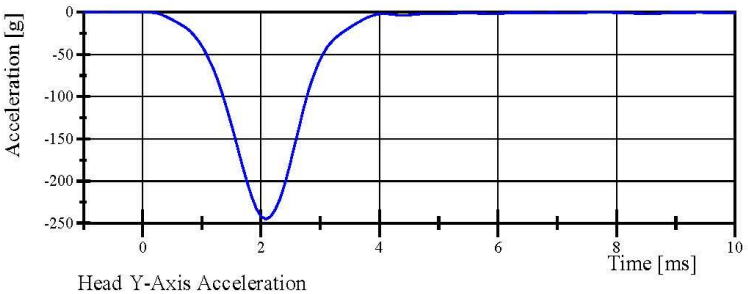
**Condition: Used**

**Comments:**
**Head Skin S/N: 06211**

# Transportation Research Center Inc.

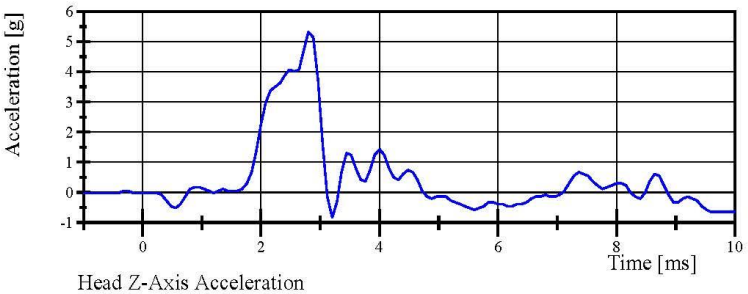
Front Head Drop
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

Head X-Axis Acceleration



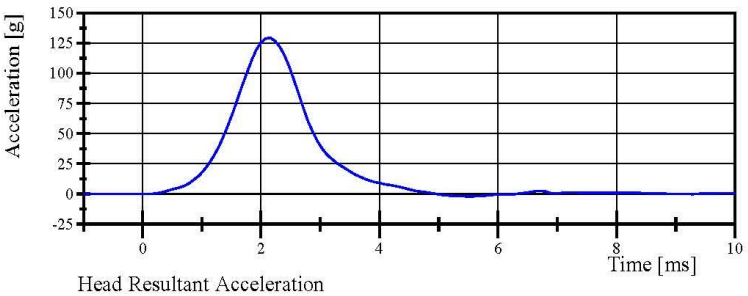

Filter Class: CFC_1000
Max: 0.0 g at -1.0 ms
Min: -245.1 g at 2.1 ms

Head Y-Axis Acceleration



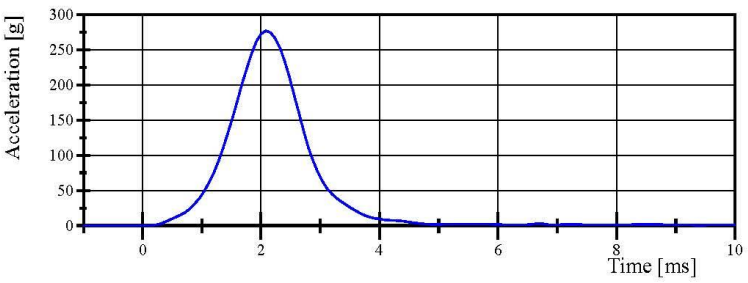

Filter Class: CFC_1000
Max: 5.3 g at 2.8 ms
Min: -0.8 g at 3.2 ms

Head Z-Axis Acceleration




Filter Class: CFC_1000
Max: 129.4 g at 2.2 ms
Min: -2.0 g at 5.5 ms

Head Resultant Acceleration




Filter Class: CFC_1000
Max: 277.0 g at 2.1 ms
Min: 0.0 g at -1.0 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 14:46:10 578

# Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 36 % | Yes |
| Pendulum Velocity | 6.89 - 7.13 m/s | 7.047 m/s | Yes |
| Pendulum Integrated Velocity Change at 10ms | (-2.1) - (-2.5) m/s | -2.26 m/s | Yes |
| Pendulum Integrated Velocity Change at 20ms | (-4.0) - (-5.0) m/s | -4.42 m/s | Yes |
| Pendulum Integrated Velocity Change at 30ms | (-5.8) - (-7.0) m/s | -6.40 m/s | Yes |
| Total Head D-Plane Rotation | (-77) - (-91) ° | -80.9 ° | Yes |
| Total Neck Occipital Condyles Moment Between -77° and -91° Rotation | 69 - 83 N·m | 74.6 N·m | Yes |
| Total Neck Occipital Condyles Moment Decay to 10 N·m | 80 - 100 ms | 87.3 ms | Yes |

**Test meets specifications.**

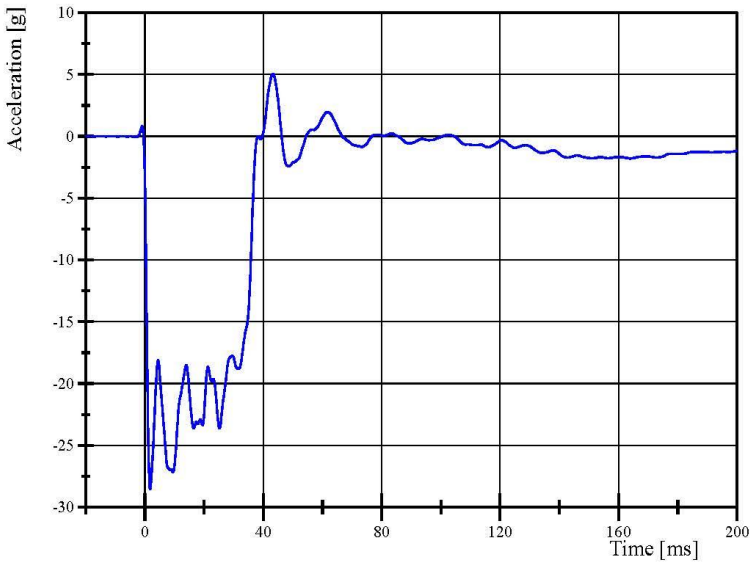
**Condition: Used**

**Comments:**
**Neck S/N: DJ2788**

# Transportation Research Center Inc.

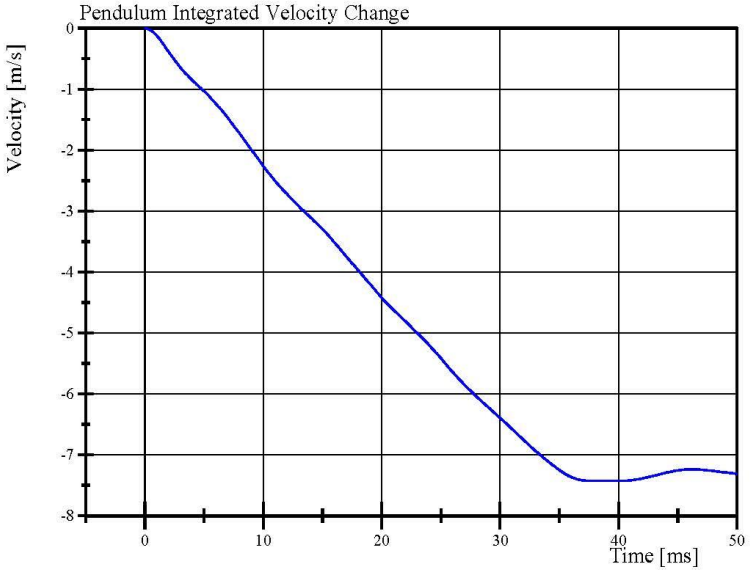
Neck Flexion
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

Pendulum Acceleration




Filter Class: CFC_180
Max: 5.1 g at 43.3 ms
Min: -28.6 g at 1.8 ms

Pendulum Integrated Velocity Change




Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.4 m/s at 39.7 ms

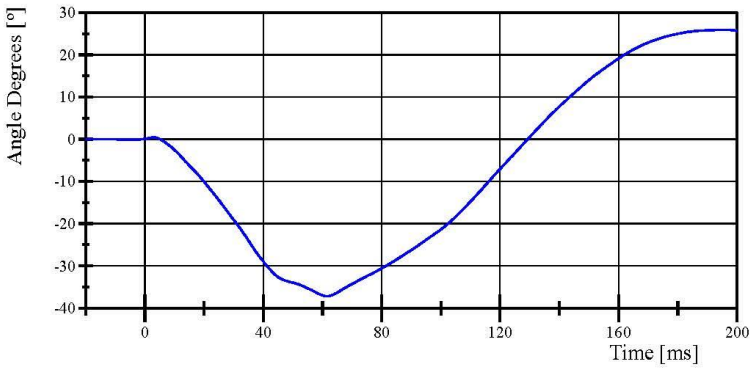
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 12:04:00 1820

# Transportation Research Center Inc.

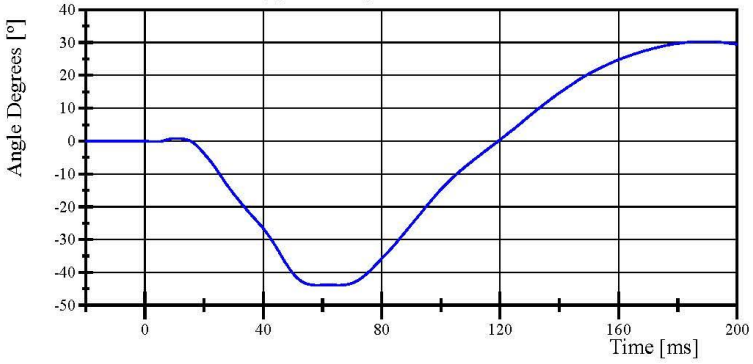
Neck Flexion
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

Pot Rotation at the Base of Neck



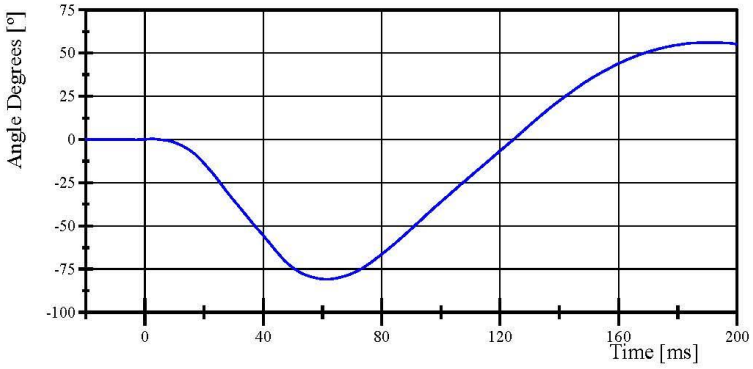

Filter Class: CFC_60
Max: 25.9 ° at 195.5 ms
Min: -37.1 ° at 61.5 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 30.3 ° at 189.1 ms
Min: -43.9 ° at 58.2 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 56.1 ° at 190.3 ms
Min: -80.9 ° at 61.4 ms

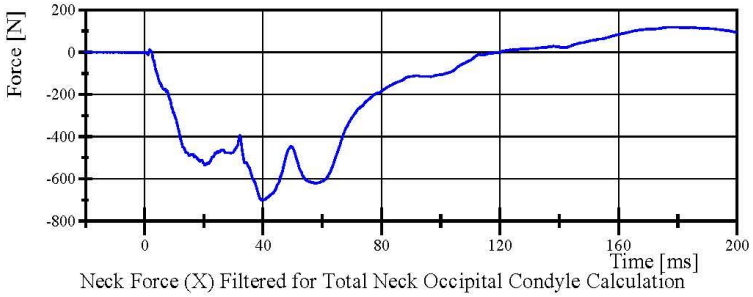
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 12:04:01 1820

# Transportation Research Center Inc.

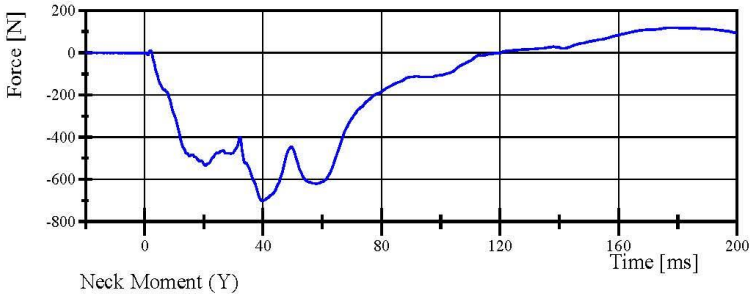
Neck Flexion
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

Neck Force (X)



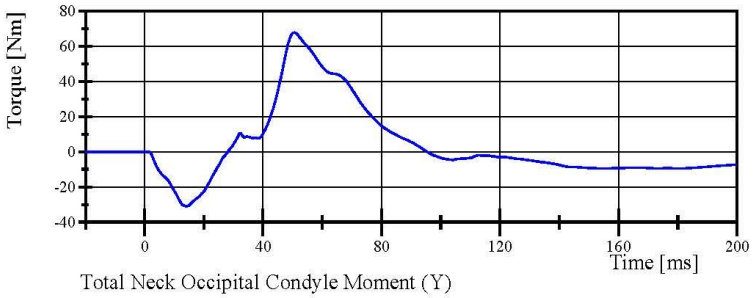

Filter Class: CFC_1000
Max: 118.8 N at 177.9 ms
Min: -701.9 N at 39.7 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



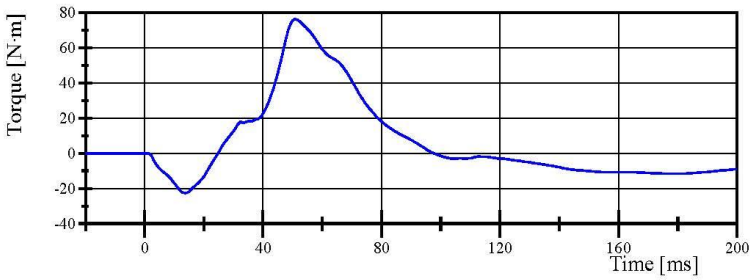

Filter Class: CFC_600
Max: 118.5 N at 176.6 ms
Min: -701.5 N at 39.7 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 67.8 Nm at 50.6 ms
Min: -31.0 Nm at 14.0 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 76.2 N·m at 50.8 ms
Min: -22.5 N·m at 13.8 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 12:04:02 1820

# Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 070 Certification No. 36-2
Test Date: 3/12/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 ºC | 21.3 ºC | Yes |
| Relative Humidity | 10 - 70 % | 39 % | Yes |
| Pendulum Velocity | (-5.95) - (-6.19) m/s | -6.091 m/s | Yes |
| Pendulum Integrated Velocity Change at 10ms | 1.5 - 1.9 m/s | 1.77 m/s | Yes |
| Pendulum Integrated Velocity Change at 20ms | 3.1 - 3.9 m/s | 3.51 m/s | Yes |
| Pendulum Integrated Velocity Change at 30ms | 4.6 - 5.6 m/s | 5.06 m/s | Yes |
| Total Head D-Plane Rotation | 99 - 114 º | 110.5 º | Yes |
| Total Neck Occipital Condyles Moment Between 99º and 114º Rotation | (-53) - (-65) N·m | -53.3 N·m | Yes |
| Total Neck Occipital Condyles Moment Decay to -10 N·m | 94 - 114 ms | 106.0 ms | Yes |

**Test meets specifications.**

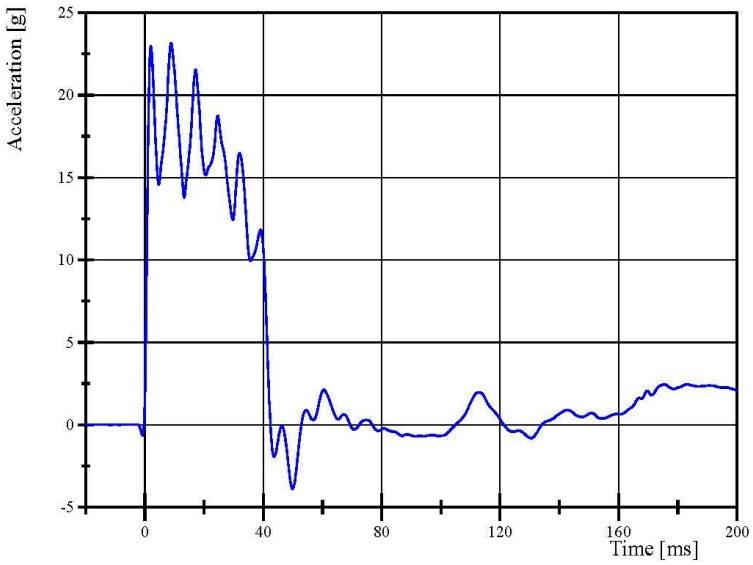
**Condition: Used**

**Comments:**
**Neck S/N: DJ2788**

# Transportation Research Center Inc.

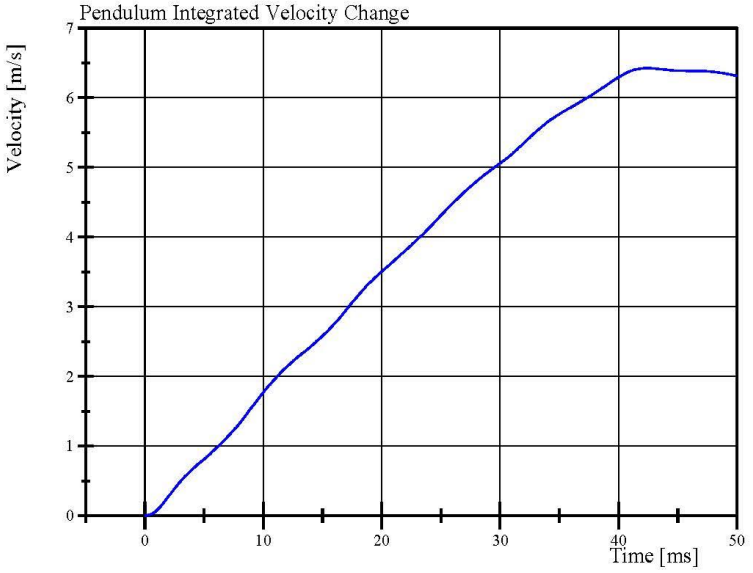
Neck Extension
HIII 5th Serial No. 070 Certification No. 36-2
Test Date: 3/12/2019

Pendulum Acceleration




Filter Class: CFC_180
Max: 23.2 g at 8.9 ms
Min: -3.9 g at 49.9 ms

Pendulum Integrated Velocity Change




Filter Class: CFC_180
Max: 6.4 m/s at 42.4 ms
Min: 0.0 m/s at 0.0 ms

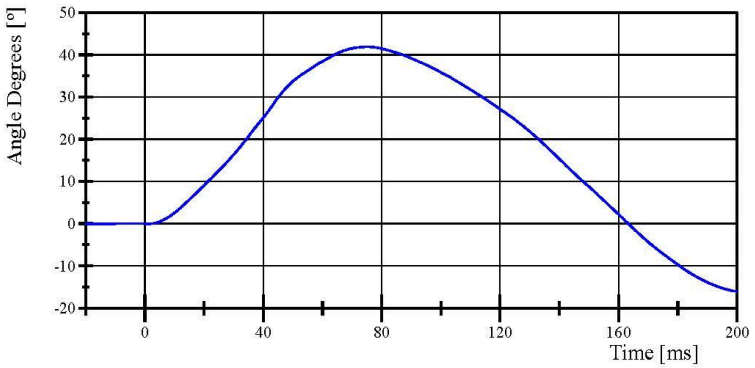
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 13:28:17 1959

# Transportation Research Center Inc.

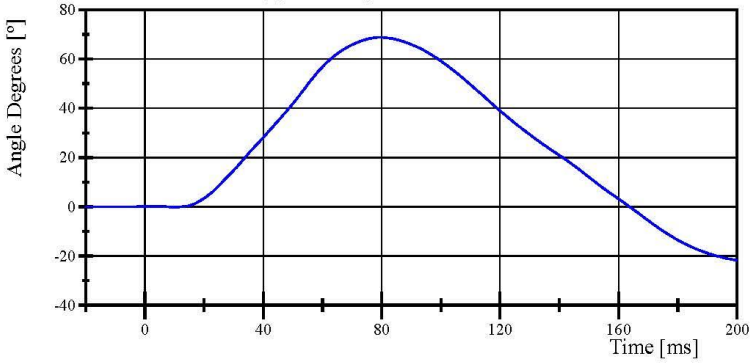
Neck Extension
HIII 5th Serial No. 070 Certification No. 36-2
Test Date: 3/12/2019

Pot Rotation at the Base of Neck



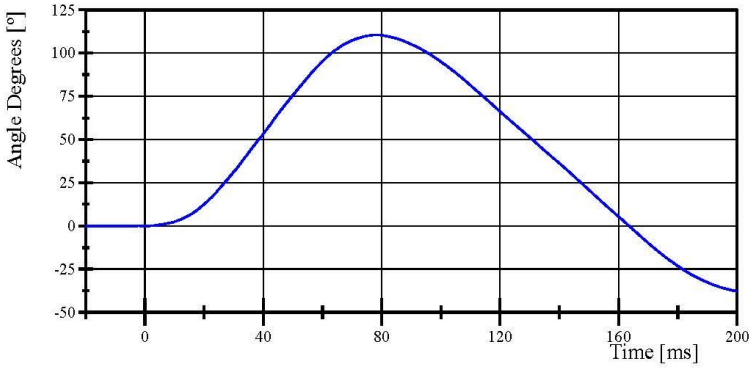

Filter Class: CFC_60
Max: 41.9 ° at 75.2 ms
Min: -16.0 ° at 200.0 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 68.8 ° at 79.5 ms
Min: -21.7 ° at 200.0 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 110.5 ° at 78.2 ms
Min: -37.7 ° at 200.0 ms

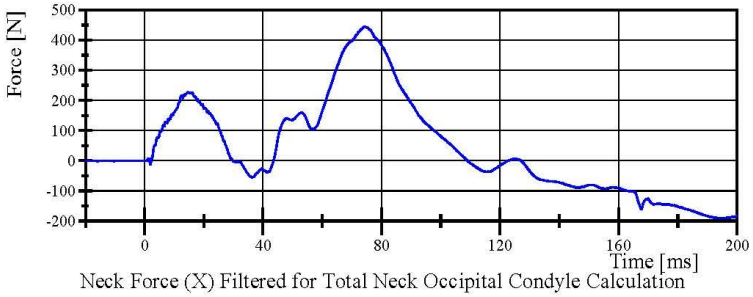
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 13:28:17 1959

# Transportation Research Center Inc.

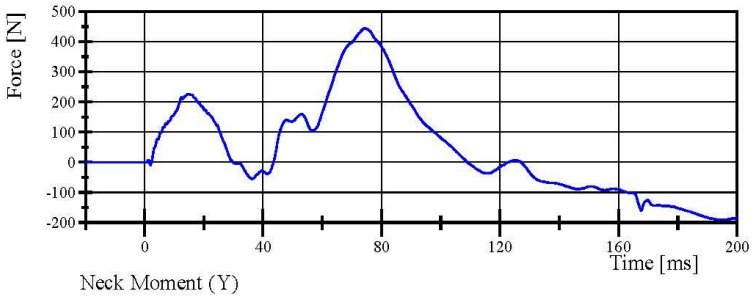
Neck Extension
HIII 5th Serial No. 070 Certification No. 36-2
Test Date: 3/12/2019

Neck Force (X)



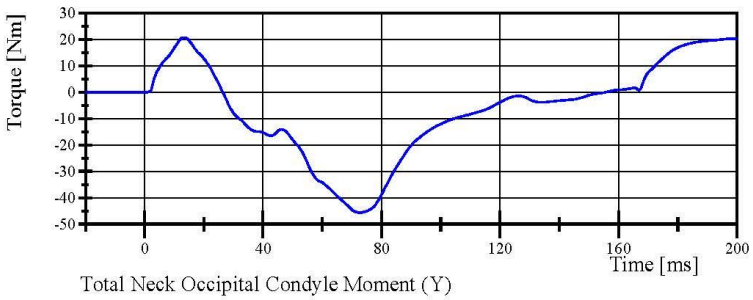

Filter Class: CFC_1000
Max: 444.3 N at 74.3 ms
Min: -189.9 N at 193.2 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



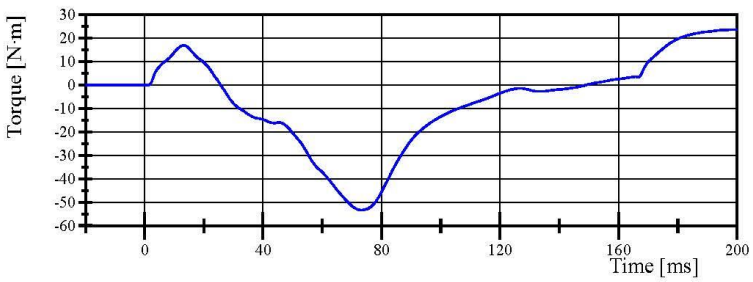

Filter Class: CFC_600
Max: 444.1 N at 74.4 ms
Min: -190.0 N at 195.4 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 20.7 Nm at 13.4 ms
Min: -45.7 Nm at 72.7 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 23.7 N·m at 199.8 ms
Min: -53.3 N·m at 73.2 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 13:28:18 1959

# Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.7 °C | Yes |
| Relative Humidity | 10 - 70 % | 36 % | Yes |
| Probe Velocity | 6.59 - 6.83 m/s | 6.764 m/s | Yes |
| Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection | (-3,900) - (-4,400) N | -3,988.2 N | Yes |
| Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection | >= (-4,600) N | -4,055.6 N | Yes |
| Maximum Chest Compression | (-50) - (-58) mm | -51.2 mm | Yes |
| Internal Hysteresis | 69 - 85 % | 73.1 % | Yes |

**Test meets specifications.**

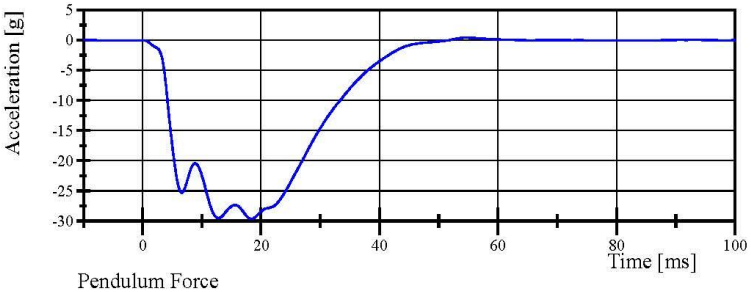
**Condition: Used**

**Comments:**
**Rib Set S/N: 050302468**

# Transportation Research Center Inc.

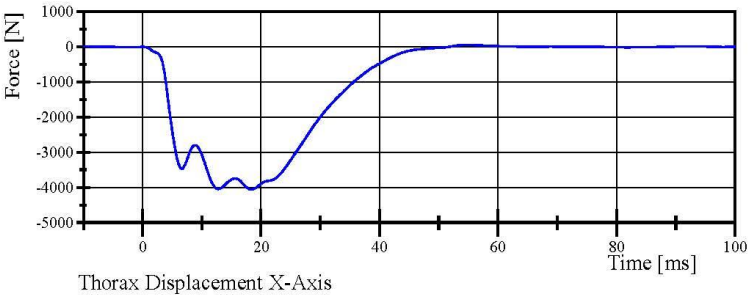
Front Thorax
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

Pendulum Acceleration



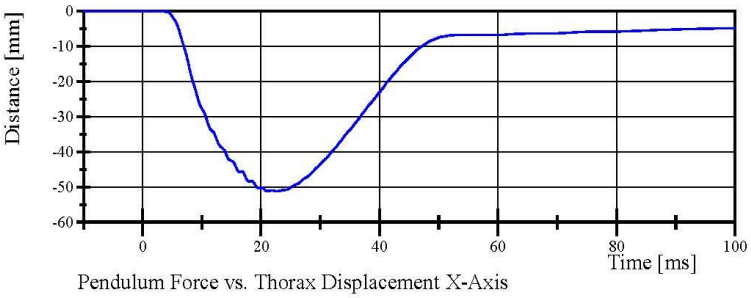

Filter Class: CFC_180
Max: 0.4 g at 54.6 ms
Min: -29.6 g at 18.4 ms

Pendulum Force



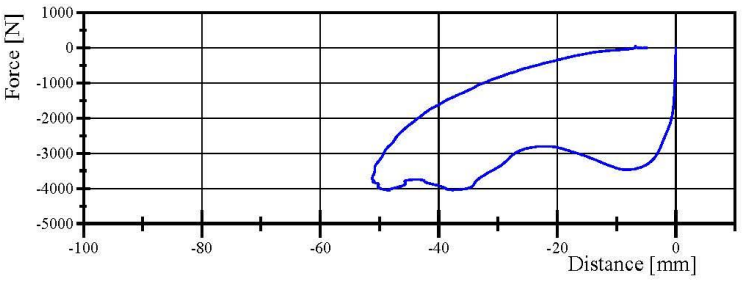

Filter Class: CFC_180
Max: 56.7 N at 54.6 ms
Min: -4,055.6 N at 18.4 ms

Thorax Displacement X-Axis




Filter Class: CFC_600
Max: 0.0 mm at -9.0 ms
Min: -51.2 mm at 22.7 ms

Pendulum Force vs. Thorax Displacement X-Axis




Filter Class: CFC_180
Max: 56.7 N at -6.8 mm
Min: -4,055.6 N at -48.3 mm

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

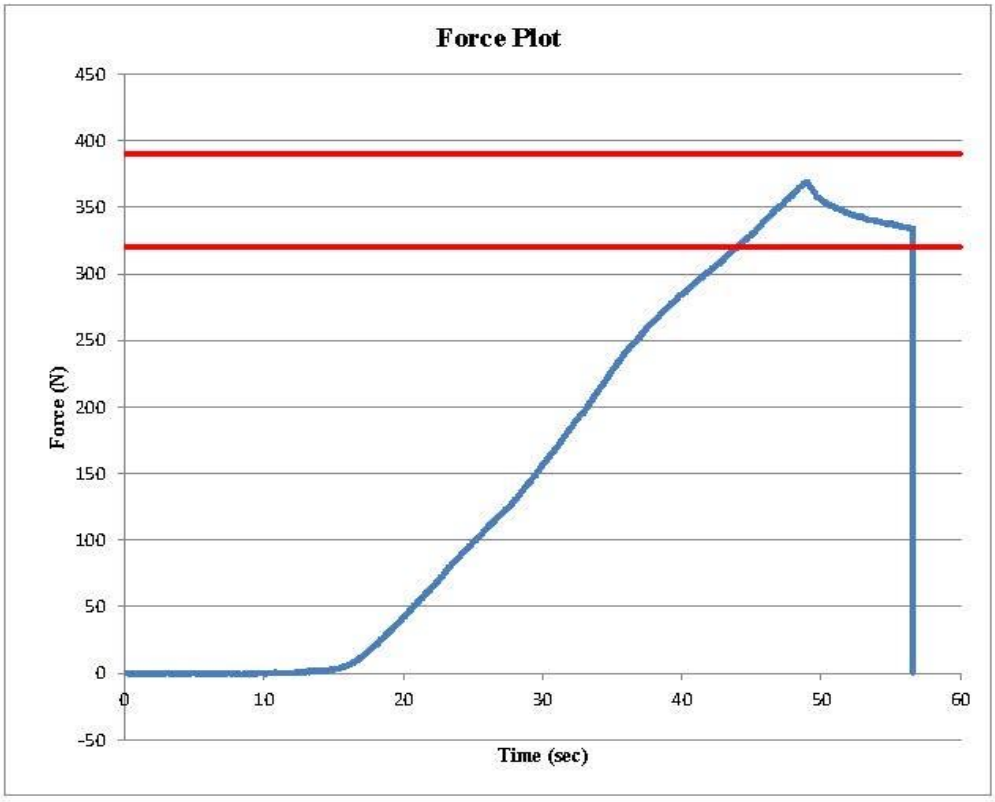
03.12.2019 15:44:59 366

# Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

| | | | |
|---|---|---|---|
| Customer: | NHTSA | | |
| Serial Number: | 070 | Date: | 3/13/2019 |
| Test Number: | 1 | Time: | 5:59 |

| TEST PARAMETER | SPECIFICATION | | | TEST RESULTS | | |
|---|---|---|---|---|---|---|
| Temperature | 18.9 | - | 25.6 | 21.8 | °C | Pass |
| Humidity | 10 | - | 70 | 39 | % | Pass |
| Average Angular Velocity | 0.5 | - | 1.5 | 0.86 | deg/sec | Pass |
| Initial Angle | 0 | - | 20 | 17.29 | deg | Pass |
| Peak Force at 45.26° | 320 | - | 390 | 369.12 | N | Pass |
| Final Angle | -8 | - | 8 | 2.51 | deg | Pass |




Comments:
Jacket S/N: N/A
Abdomen S/N: 0506531
Pelvis Skin S/N: N/A

# Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.6 ºC | 21.3 ºC | Yes |
| Relative Humidity | 10 - 70 % | 35 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.079 m/s | Yes |
| Peak Femur Force | (-3,450) - (-4,060) N | -3,463.2 N | Yes |

**Test meets specifications.**

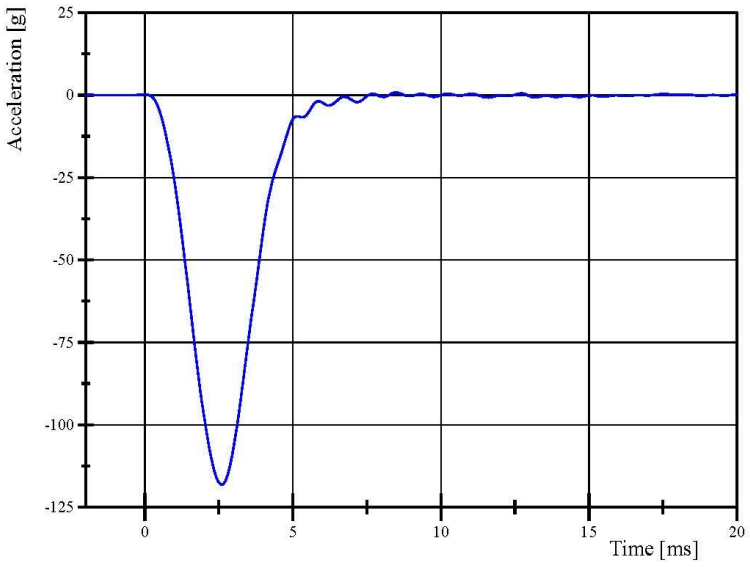
**Condition: Used**

**Comments:**
**Knee Skin S/N: 05856**

# Transportation Research Center Inc.

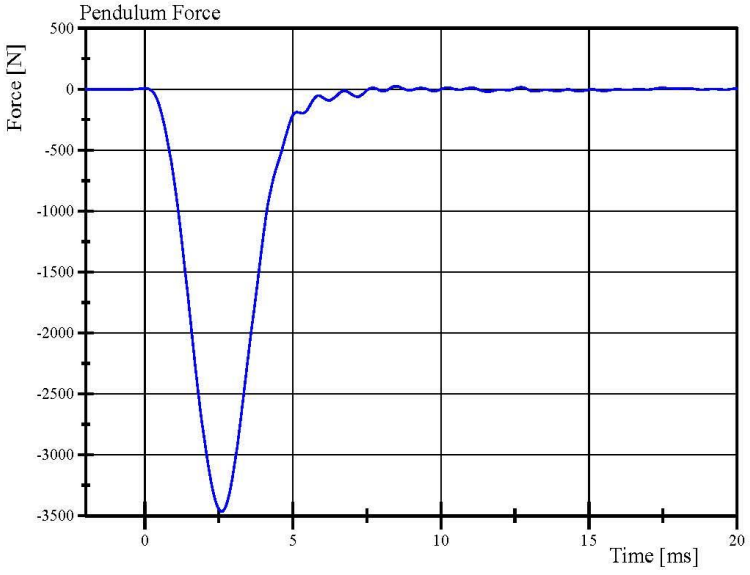
Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 36-1
Test Date: 3/12/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 0.8 g at 8.5 ms
Min: -118.1 g at 2.6 ms

Pendulum Force




Filter Class: CFC_600
Max: 24.3 N at 8.5 ms
Min: -3,463.2 N at 2.6 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 14:39:27 1779

# Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 36-2
Test Date: 3/12/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.6 ºC | 21.3 ºC | Yes |
| Relative Humidity | 10 - 70 % | 40 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.080 m/s | Yes |
| Peak Femur Force | (-3,450) - (-4,060) N | -3,835.8 N | Yes |

**Test meets specifications.**

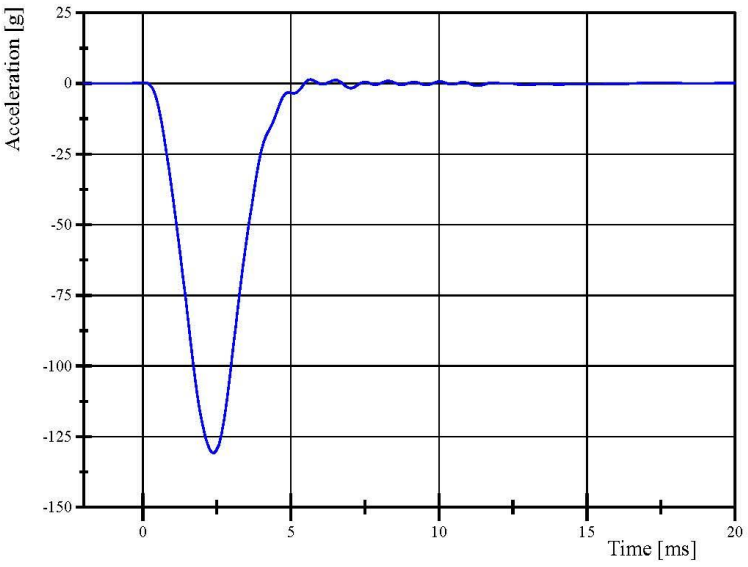
**Condition: Used**

**Comments:**
**Knee Skin S/N: 05269**

# Transportation Research Center Inc.

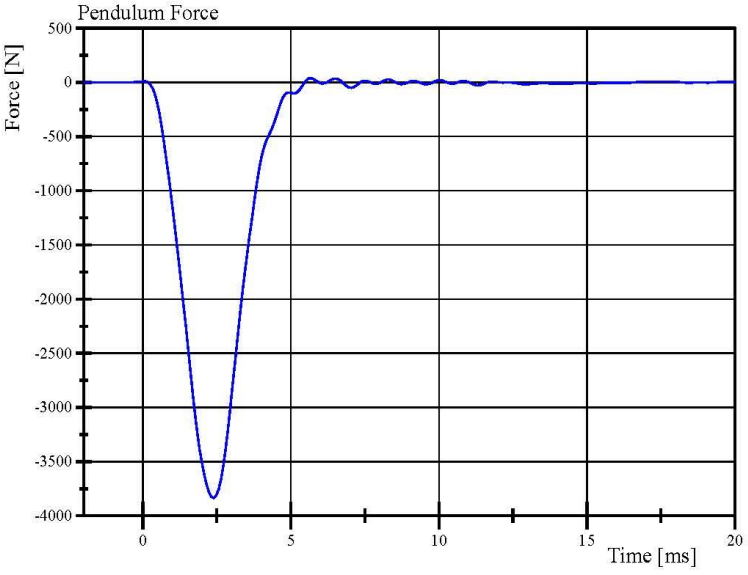
Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 36-2
Test Date: 3/12/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 1.4 g at 5.7 ms
Min: -130.8 g at 2.4 ms

Pendulum Force




Filter Class: CFC_600
Max: 39.6 N at 5.7 ms
Min: -3,835.8 N at 2.4 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.12.2019 15:15:10 1780

**Post-Test Calibration Sheets**

**Front Passenger S/N 070**

**Transportation Research Center Inc.**
**572O HIII 5th Female Dummy**
**External Dimensions**
**Serial No. 070 Calibration No. 37**

| Symbol | Description | Specification | Results | Pass |
|---|---|---|---|---|
| | | mm | mm | |
| A | Total Sitting Height | 774.7 - 800.1 | 779 | Yes |
| B | Shoulder Pivot Height | 431.8 - 457.2 | 444 | Yes |
| C | Hip Pivot Height | 81.3 - 86.3 | 82 | Yes |
| D | Hip Pivot from Backline | 144.8 - 149.8 | 145 | Yes |
| E | Shoulder Pivot from Backline | 68.6 - 83.8 | 81 | Yes |
| F | Thigh Clearance | 119.4 - 134.6 | 128 | Yes |
| G | Back of Elbow to Wrist Pivot | 243.9 - 259.1 | 249 | Yes |
| H | Head Back to Backline | 43.2 - 48.2 | 45 | Yes |
| I | Shoulder to Elbow Length | 276.8 - 297.2 | 281 | Yes |
| J | Elbow Rest Height | 182.8 - 203.2 | 184 | Yes |
| K | Buttock Knee Length | 520.7 - 546.1 | 537 | Yes |
| L | Popliteal Height | 355.6 - 376.0 | 364 | Yes |
| M | Knee Pivot Height | 393.7 - 419.1 | 403 | Yes |
| N | Buttock Popliteal Length | 414.0 - 439.4 | 430 | Yes |
| O | Chest Depth without Jacket | 175.3 - 190.5 | 181 | Yes |
| P | Foot Length | 218.5 - 233.7 | 225 | Yes |
| R | Buttock to Knee Pivot Length | 457.2 - 482.6 | 473 | Yes |
| S | Head Breadth | 137.1 - 147.3 | 138 | Yes |
| T | Head Depth | 177.8 - 188.0 | 180 | Yes |
| U | Hip Breadth | 299.7 - 314.9 | 306 | Yes |
| V | Shoulder Breadth | 350.5 - 365.7 | 360 | Yes |
| W | Foot Breadth | 78.8 - 94.0 | 88 | Yes |
| X | Head Circumference | 528.3 - 548.7 | 538 | Yes |
| Y | Chest Circumference with Jacket | 850.9 - 881.3 | 871 | Yes |
| Z | Waist Circumference | 759.5 - 789.9 | 777 | Yes |
| AA | Reference Location for Chest Circumference | 332.7 - 358.1 | 355 | Yes |
| BB | Reference Location for Waist Circumference | 160.0 - 170.2 | 163 | Yes |

# Transportation Research Center Inc.

Front Head Drop
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.5 °C | 21.5 °C | Yes |
| Relative Humidity | 10 - 70 % | 37 % | Yes |
| Peak Head Resultant Acceleration | 250 - 300 g | 266.5 g | Yes |
| Peak Head Lateral Acceleration | (-15) - 15 g | 8.0 g | Yes |
| Is Acceleration Curve Unimodal within 10% of Peak? | Yes | Yes | Yes |

**Test meets specifications.**

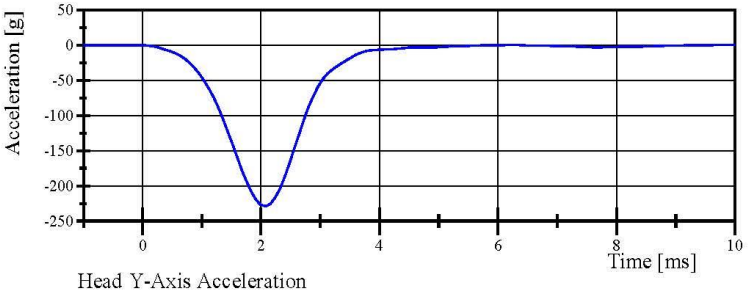
**Condition: Used**

**Comments:**
**Head Skin S/N: 06211**

# Transportation Research Center Inc.

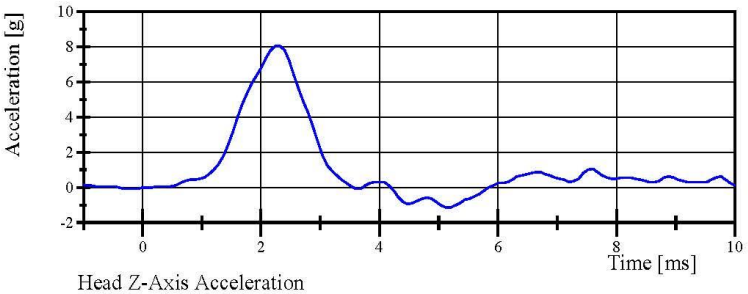
Front Head Drop
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

Head X-Axis Acceleration



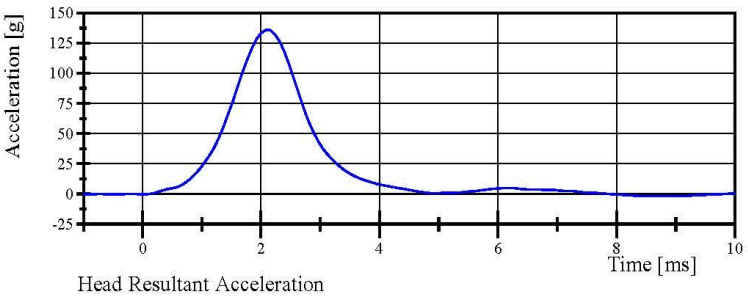

Filter Class: CFC_1000
Max: 0.6 g at 6.2 ms
Min: -229.0 g at 2.1 ms

Head Y-Axis Acceleration



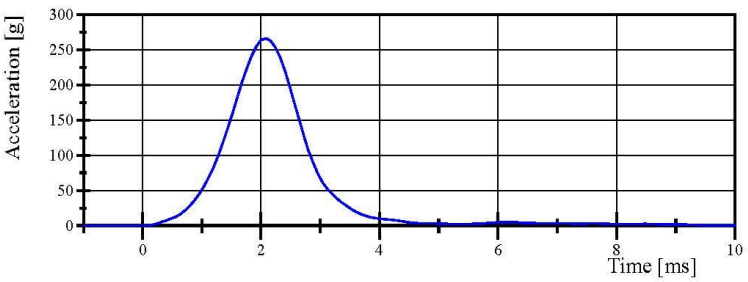

Filter Class: CFC_1000
Max: 8.0 g at 2.2 ms
Min: -1.1 g at 5.1 ms

Head Z-Axis Acceleration




Filter Class: CFC_1000
Max: 136.2 g at 2.1 ms
Min: -1.9 g at 8.6 ms

Head Resultant Acceleration




Filter Class: CFC_1000
Max: 266.5 g at 2.1 ms
Min: 0.1 g at -0.6 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 07:35:59 578

# Transportation Research Center Inc.

Neck Flexion
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 37 % | Yes |
| Pendulum Velocity | 6.89 - 7.13 m/s | 7.043 m/s | Yes |
| Pendulum Integrated Velocity Change at 10ms | (-2.1) - (-2.5) m/s | -2.35 m/s | Yes |
| Pendulum Integrated Velocity Change at 20ms | (-4.0) - (-5.0) m/s | -4.53 m/s | Yes |
| Pendulum Integrated Velocity Change at 30ms | (-5.8) - (-7.0) m/s | -6.37 m/s | Yes |
| Total Head D-Plane Rotation | (-77) - (-91) ° | -77.9 ° | Yes |
| Total Neck Occipital Condyles Moment Between -77° and -91° Rotation | 69 - 83 N·m | 71.4 N·m | Yes |
| Total Neck Occipital Condyles Moment Decay to 10 N·m | 80 - 100 ms | 84.9 ms | Yes |

**Test meets specifications.**

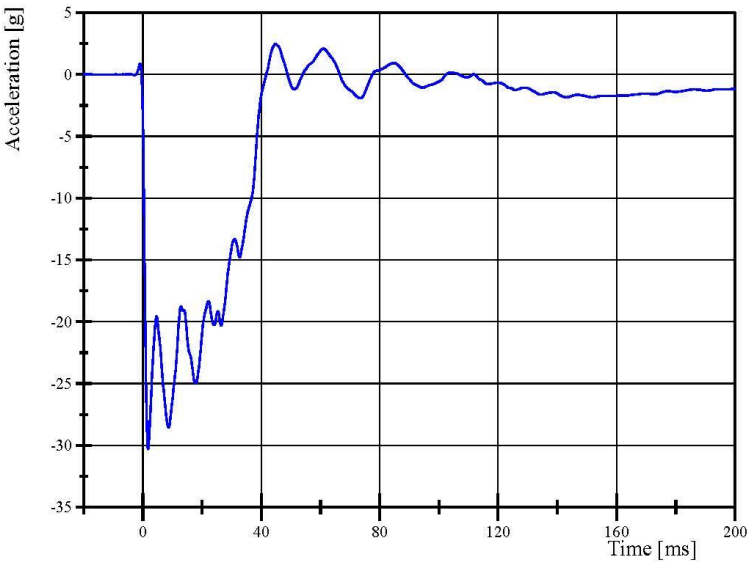
**Condition: Used**

**Comments:**
**Neck S/N: DJ2788**

## Transportation Research Center Inc.

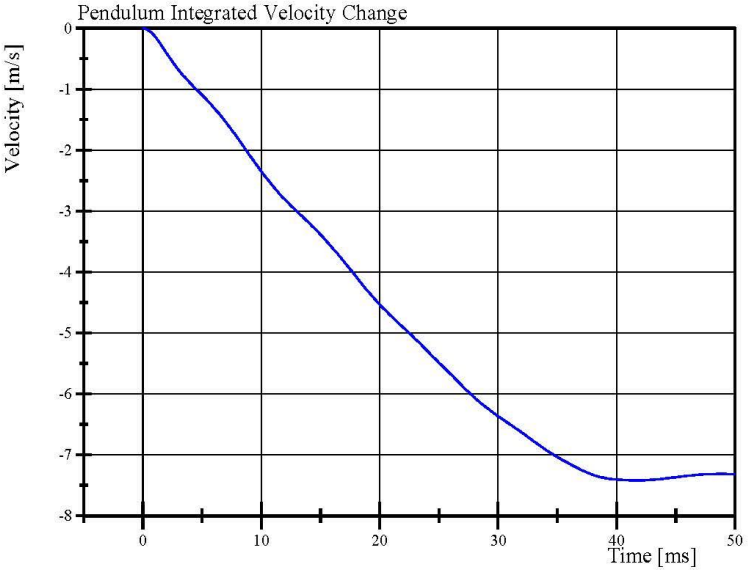
Neck Flexion
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

Pendulum Acceleration




Filter Class: CFC_180
Max: 2.5 g at 44.9 ms
Min: -30.3 g at 1.8 ms

Pendulum Integrated Velocity Change




Filter Class: CFC_180
Max: 0.0 m/s at 0.0 ms
Min: -7.4 m/s at 41.7 ms

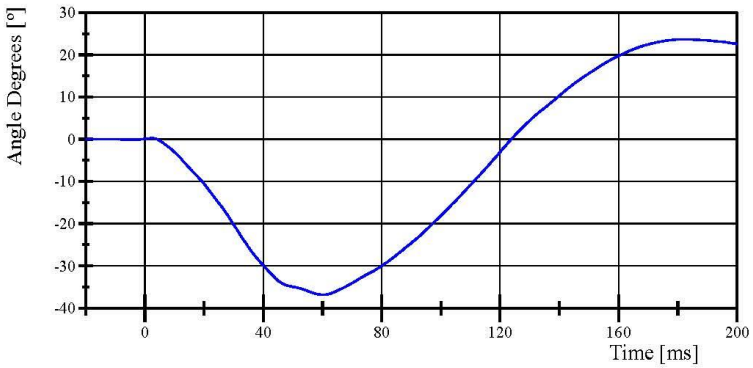
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 08:28:48 1821

# Transportation Research Center Inc.

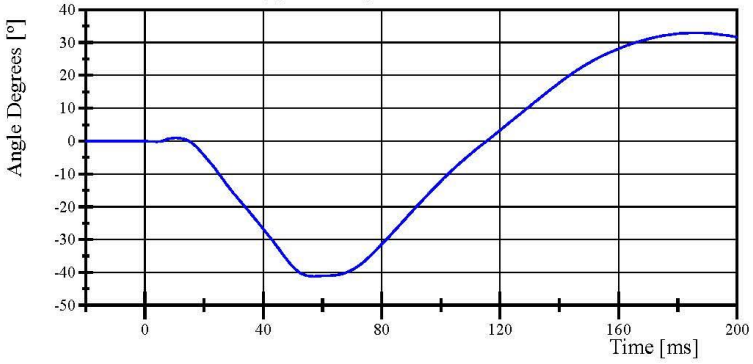
Neck Flexion
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

Pot Rotation at the Base of Neck



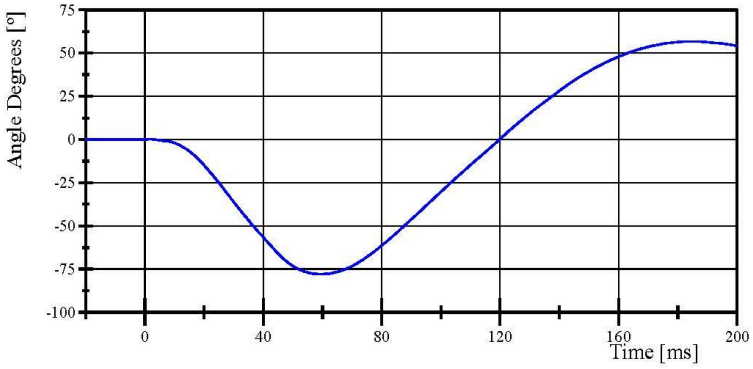

Filter Class: CFC_60
Max: 23.7 ° at 182.2 ms
Min: -36.8 ° at 60.2 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 33.0 ° at 186.3 ms
Min: -41.2 ° at 57.1 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 56.6 ° at 184.5 ms
Min: -77.9 ° at 59.4 ms

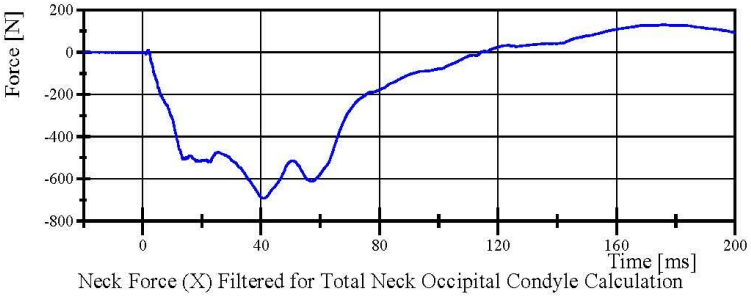
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 08:28:49 1821

# Transportation Research Center Inc.

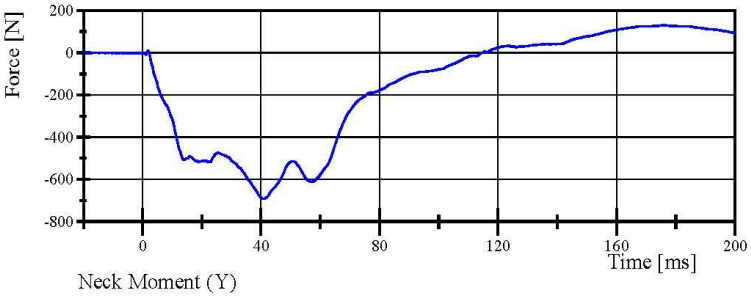
Neck Flexion
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

Neck Force (X)



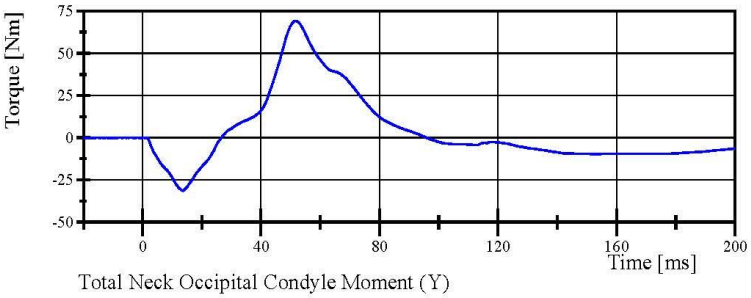

Filter Class: CFC_1000
Max: 130.7 N at 176.0 ms
Min: -692.4 N at 41.0 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



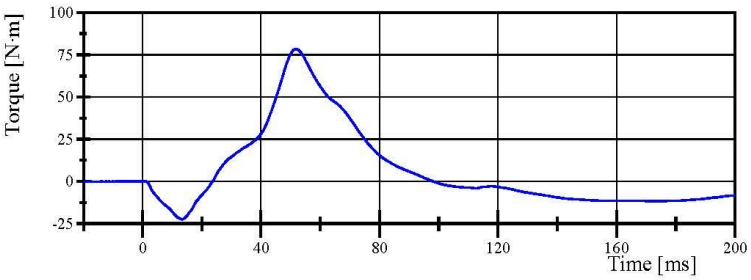

Filter Class: CFC_600
Max: 130.5 N at 176.0 ms
Min: -692.1 N at 40.9 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 69.2 Nm at 51.6 ms
Min: -31.3 Nm at 13.5 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 78.4 N·m at 51.8 ms
Min: -22.4 N·m at 13.3 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 08:28:50 1821

# Transportation Research Center Inc.

Neck Extension
HIII 5th Serial No. 070 Certification No. 37-2
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 37 % | Yes |
| Pendulum Velocity | (-5.95) - (-6.19) m/s | -6.090 m/s | Yes |
| Pendulum Integrated Velocity Change at 10ms | 1.5 - 1.9 m/s | 1.89 m/s | Yes |
| Pendulum Integrated Velocity Change at 20ms | 3.1 - 3.9 m/s | 3.61 m/s | Yes |
| Pendulum Integrated Velocity Change at 30ms | 4.6 - 5.6 m/s | 5.19 m/s | Yes |
| Total Head D-Plane Rotation | 99 - 114 ° | 107.6 ° | Yes |
| Total Neck Occipital Condyles Moment Between 99° and 114° Rotation | (-53) - (-65) N·m | -54.4 N·m | Yes |
| Total Neck Occipital Condyles Moment Decay to -10 N·m | 94 - 114 ms | 103.9 ms | Yes |

**Test meets specifications.**

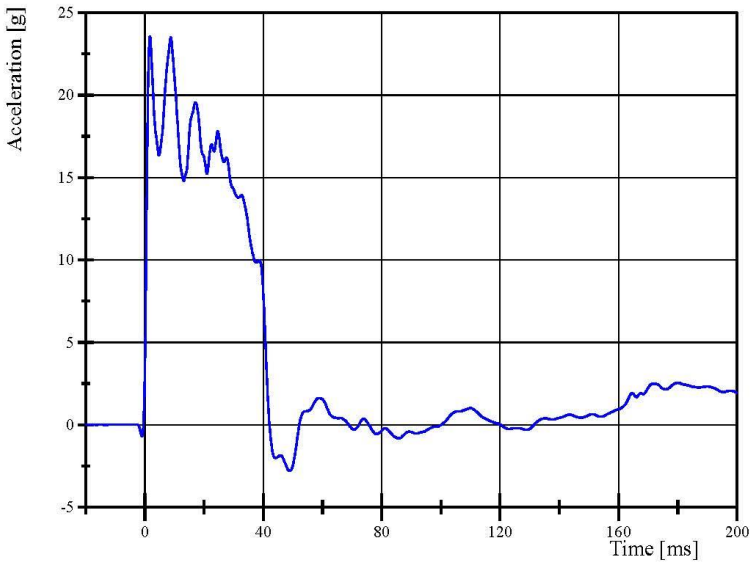
**Condition: Used**

**Comments:**
**Neck S/N: DJ2788**

# Transportation Research Center Inc.

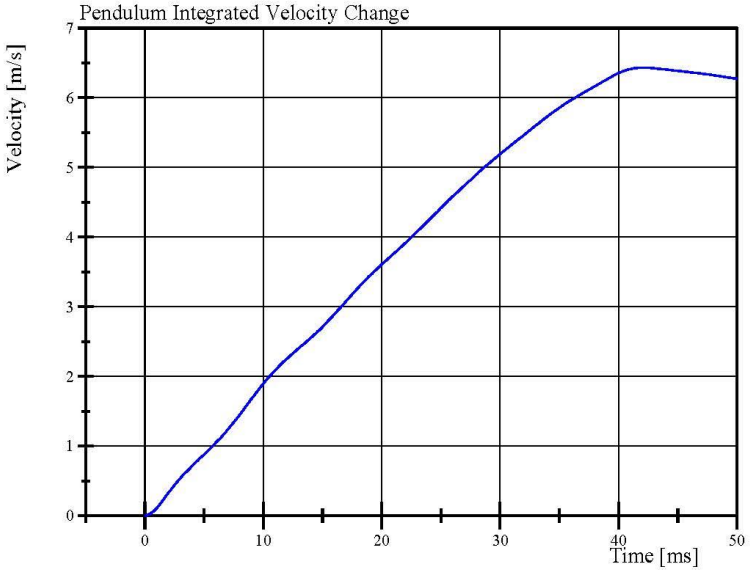
Neck Extension
HIII 5th Serial No. 070 Certification No. 37-2
Test Date: 3/20/2019

Pendulum Acceleration




Filter Class: CFC_180
Max: 23.6 g at 1.8 ms
Min: -2.8 g at 48.9 ms

Pendulum Integrated Velocity Change




Filter Class: CFC_180
Max: 6.4 m/s at 42.1 ms
Min: 0.0 m/s at 0.0 ms

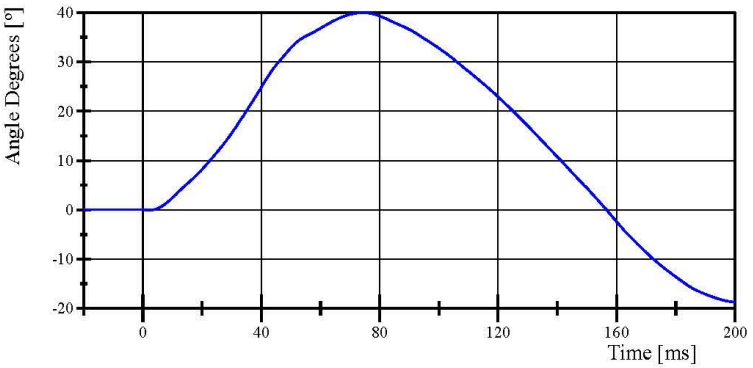
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 10:06:21 1966

# Transportation Research Center Inc.

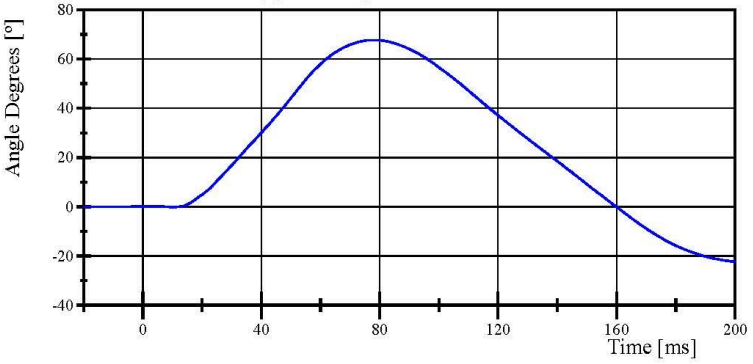
Neck Extension
HIII 5th Serial No. 070 Certification No. 37-2
Test Date: 3/20/2019

Pot Rotation at the Base of Neck



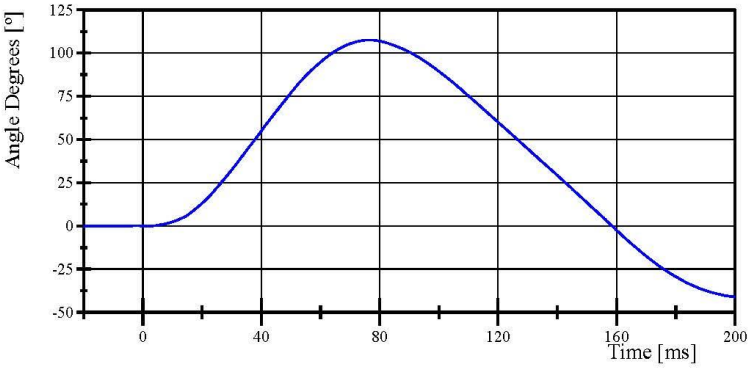

Filter Class: CFC_60
Max: 40.0 ° at 74.5 ms
Min: -18.8 ° at 200.0 ms

Head Rotation at Occypital Condyles




Filter Class: CFC_60
Max: 67.7 ° at 78.0 ms
Min: -22.3 ° at 200.0 ms

Total Head D-Plane Rotation




Filter Class: CFC_60
Max: 107.6 ° at 76.6 ms
Min: -41.0 ° at 200.0 ms

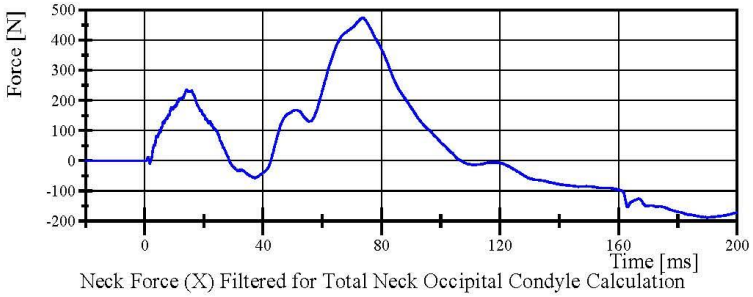
Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 10:06:21 1966

# Transportation Research Center Inc.

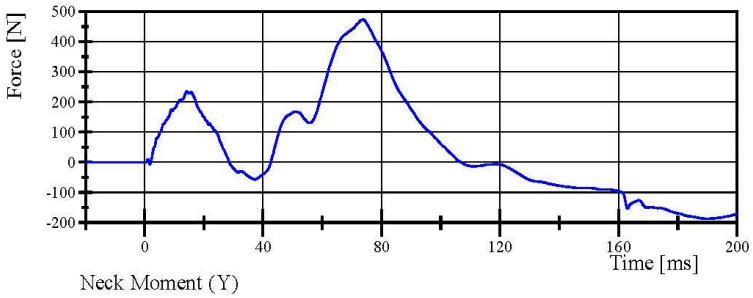
Neck Extension
HIII 5th Serial No. 070 Certification No. 37-2
Test Date: 3/20/2019

Neck Force (X)



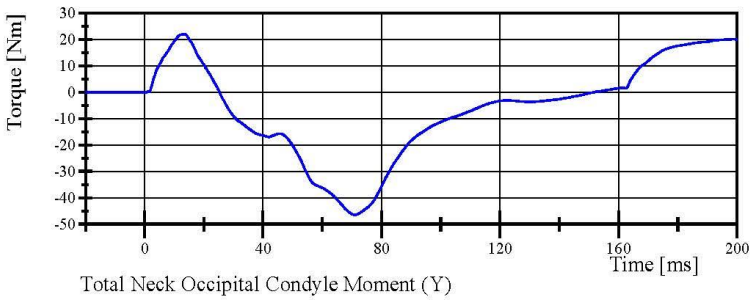

Filter Class: CFC_1000
Max: 473.8 N at 73.9 ms
Min: -188.1 N at 189.8 ms

Neck Force (X) Filtered for Total Neck Occipital Condyle Calculation



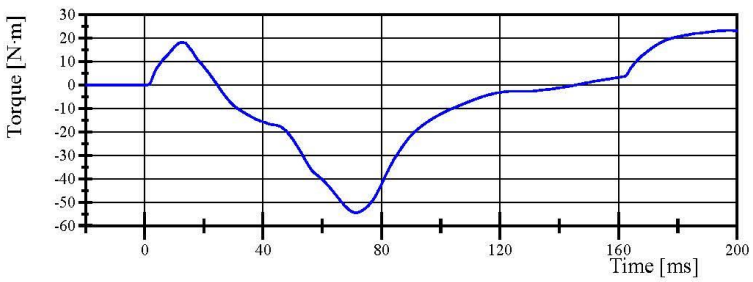

Filter Class: CFC_600
Max: 473.4 N at 73.8 ms
Min: -188.0 N at 189.8 ms

Neck Moment (Y)




Filter Class: CFC_600
Max: 22.0 Nm at 13.7 ms
Min: -46.4 Nm at 70.8 ms

Total Neck Occipital Condyle Moment (Y)




Filter Class: Without_(Constar
Max: 23.2 N·m at 196.6 ms
Min: -54.4 N·m at 71.5 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 10:06:23 1966

# Transportation Research Center Inc.

Front Thorax
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 36 % | Yes |
| Probe Velocity | 6.59 - 6.83 m/s | 6.763 m/s | Yes |
| Probe Force Peak Between 50.0 mm and 58.0 mm Chest Deflection | (-3,900) - (-4,400) N | -4,101.5 N | Yes |
| Probe Force Peak Between 18.0 mm and 50.0 mm Chest Deflection | >= (-4,600) N | -4,072.6 N | Yes |
| Maximum Chest Compression | (-50) - (-58) mm | -54.6 mm | Yes |
| Internal Hysteresis | 69 - 85 % | 70.7 % | Yes |

**Test meets specifications.**

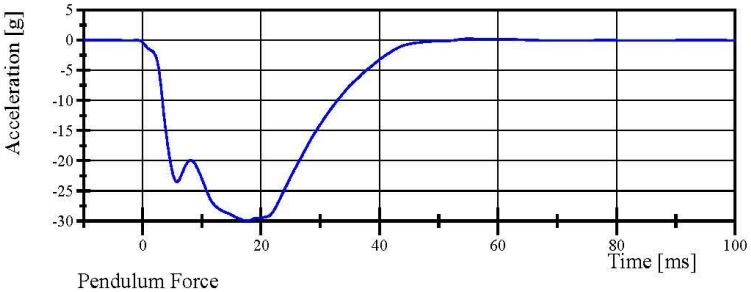
**Condition: Used**

**Comments:**
**Rib Set S/N: 050302468**

# Transportation Research Center Inc.

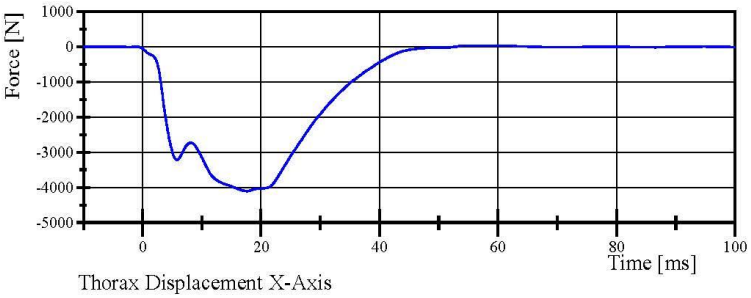
Front Thorax
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

Pendulum Acceleration



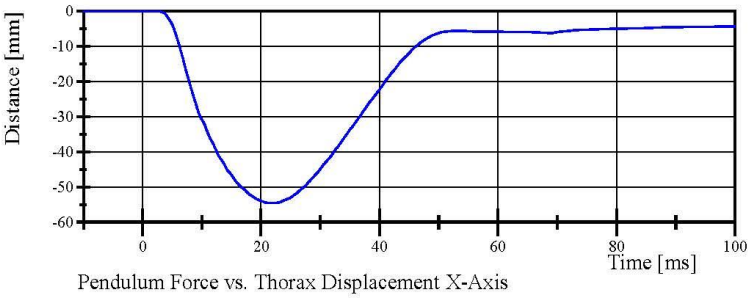

Filter Class: CFC_180
Max: 0.3 g at 55.0 ms
Min: -29.9 g at 17.6 ms

Pendulum Force



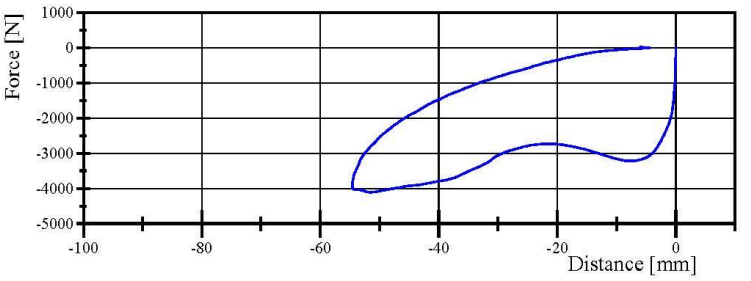

Filter Class: CFC_180
Max: 36.8 N at 55.0 ms
Min: -4,101.5 N at 17.6 ms

Thorax Displacement X-Axis




Filter Class: CFC_600
Max: 0.0 mm at -10.0 ms
Min: -54.6 mm at 21.8 ms

Pendulum Force vs. Thorax Displacement X-Axis




Filter Class: CFC_180
Max: 36.8 N at -5.7 mm
Min: -4,101.5 N at -51.4 mm

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

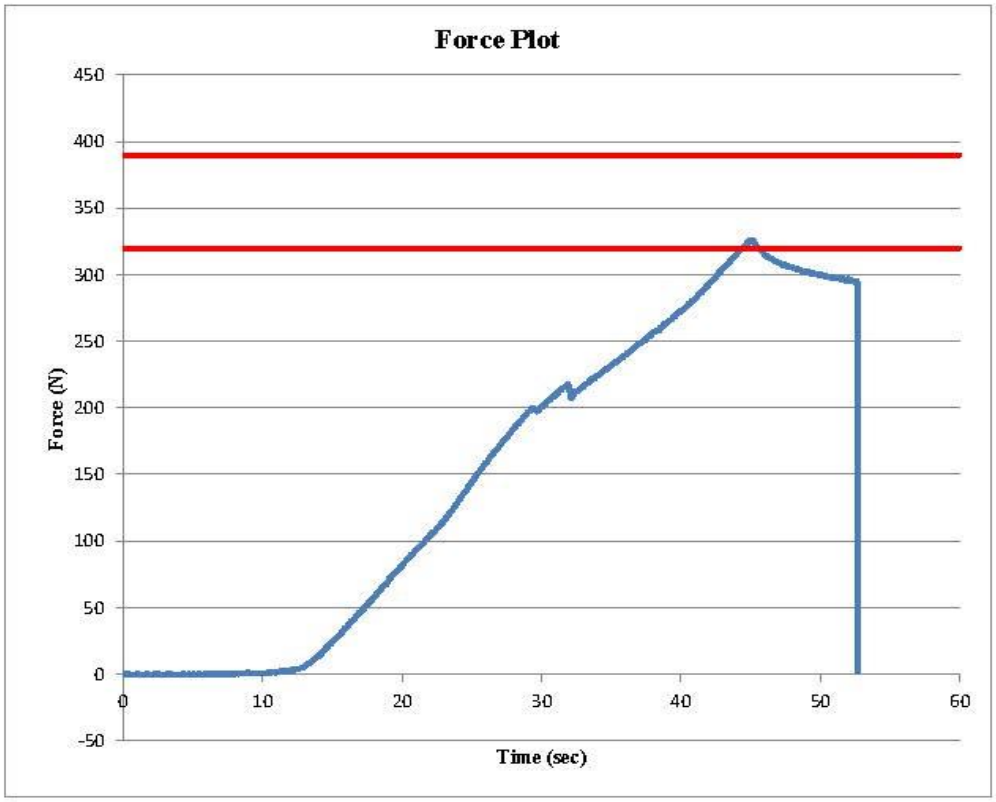
03.20.2019 13:00:25 374

# Transportation Research Center Inc.

Hybrid III Small Female Torso Flexion

| | | | |
|---|---|---|---|
| Customer: | NHTSA | | |
| Serial Number: | 070 | Date: | 3/20/2019 |
| Test Number: | 1 | Time: | 11:08 |

| TEST PARAMETER | SPECIFICATION | | | TEST RESULTS | | |
|---|---|---|---|---|---|---|
| Temperature | 18.9 | - | 25.6 | 21.5 | °C | Pass |
| Humidity | 10 | - | 70 | 38 | % | Pass |
| Average Angular Velocity | 0.5 | - | 1.5 | 0.89 | deg/sec | Pass |
| Initial Angle | 0 | - | 20 | 16.45 | deg | Pass |
| Peak Force at 45.15° | 320 | - | 390 | 326.26 | N | Pass |
| Final Angle | -8 | - | 8 | 2.51 | deg | Pass |




Comments:
Jacket S/N: N/A
Abdomen S/N: 0506531
Pelvis Skin S/N: N/A

# Transportation Research Center Inc.

Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.6 ºC | 21.5 ºC | Yes |
| Relative Humidity | 10 - 70 % | 37 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.076 m/s | Yes |
| Peak Femur Force | (-3,450) - (-4,060) N | -3,569.5 N | Yes |

**Test meets specifications.**

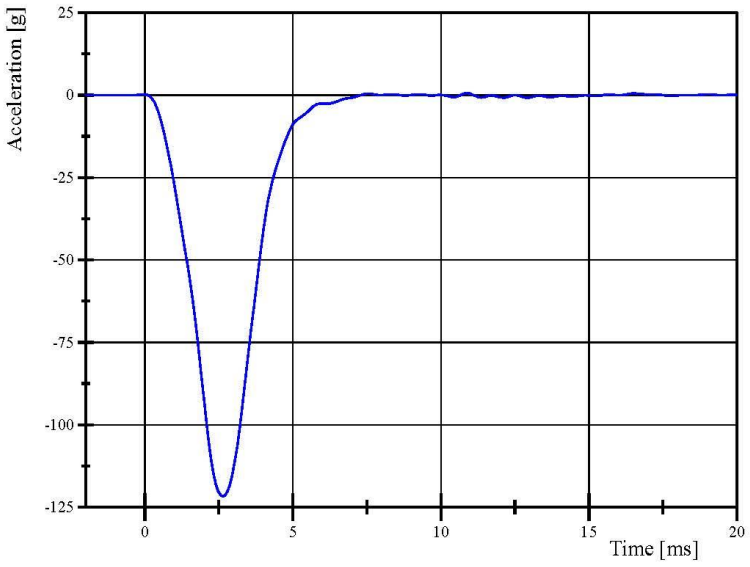
**Condition: Used**

**Comments:**
**Knee Skin S/N: 05856**

# Transportation Research Center Inc.

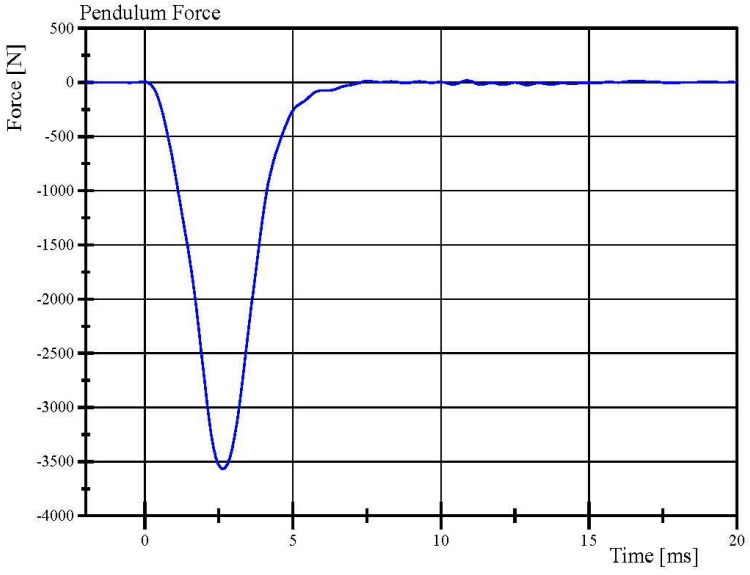
Left Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 0.6 g at 10.9 ms
Min: -121.7 g at 2.6 ms

Pendulum Force




Filter Class: CFC_600
Max: 17.9 N at 10.9 ms
Min: -3,569.5 N at 2.6 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

03.20.2019 09:12:16 1692

# Transportation Research Center Inc.

Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.6 ºC | 21.5 ºC | Yes |
| Relative Humidity | 10 - 70 % | 37 % | Yes |
| Probe Velocity | 2.07 - 2.13 m/s | 2.075 m/s | Yes |
| Peak Femur Force | (-3,450) - (-4,060) N | -3,515.1 N | Yes |

**Test meets specifications.**

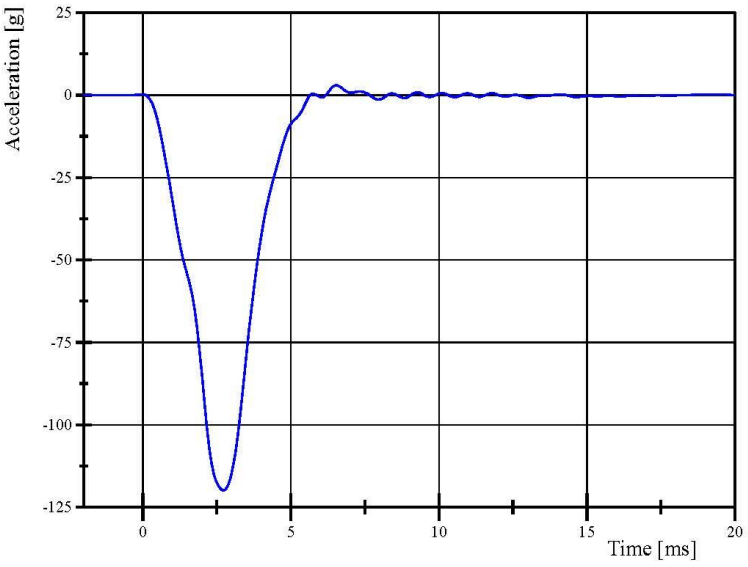
**Condition: Used**

**Comments:**
**Knee Skin S/N: 05269**

# Transportation Research Center Inc.

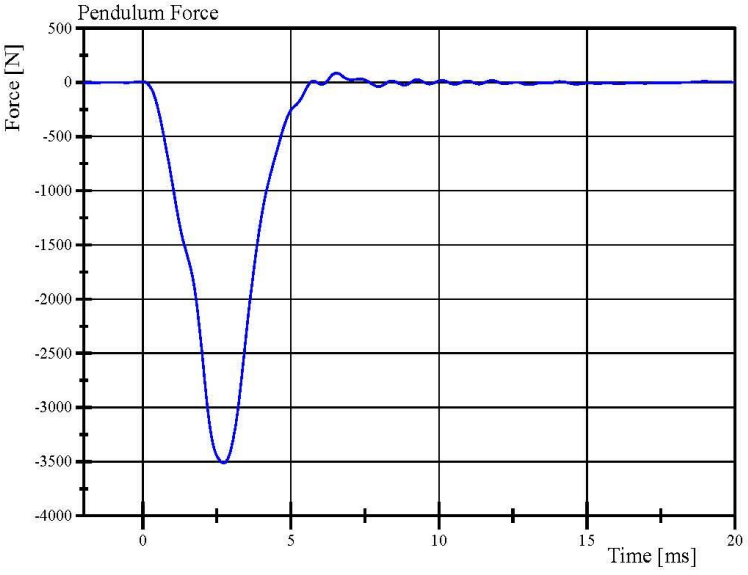
Right Knee Femur Response Test
HIII 5th Serial No. 070 Certification No. 37-1
Test Date: 3/20/2019

Pendulum Acceleration




Filter Class: CFC_600
Max: 3.0 g at 6.6 ms
Min: -119.9 g at 2.7 ms

Pendulum Force




Filter Class: CFC_600
Max: 87.0 N at 6.6 ms
Min: -3,515.1 N at 2.7 ms

Specification Source: CFR49 Part 572 Subpart O
with Polarity in accordance with J211

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# APPENDIX D
# TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION

**TABLE 1 – Driver Dummy Instrumentation**

| Instrumentation | | | Axis/Location | Hybrid III 50th S/N 037 | | |
|---|---|---|---|---|---|---|
| | | | | Serial Number | Manufacturer | Calibration Date |
| Head Accelerometers | | Primary | X | T10650 | Endevco | 5-Mar-2019 |
| | | | Y | P94650 | Endevco | 4-Mar-2019 |
| | | | Z | P94622 | Endevco | 4-Mar-2019 |
| | | Redundant | X | P94431 | Endevco | 4-Mar-2019 |
| | | | Y | P94487 | Endevco | 4-Mar-2019 |
| | | | Z | P94645 | Endevco | 4-Mar-2019 |
| Head Angular Rate Sensors | | | X | ARS14945 | DTS | 15-Oct-2018 |
| | | | Y | ARS14946 | DTS | 15-Oct-2018 |
| | | | Z | ARS14947 | DTS | 15-Oct-2018 |
| Upper Neck Load Cell | | | FX, FY, FZ, MX, MY, MZ | 2021 | Humanetics | 1-Mar-2019 |
| Chest Accelerometers | | Primary | X | P87834 | Endevco | 4-Mar-2019 |
| | | | Y | P61255 | Endevco | 4-Mar-2019 |
| | | | Z | P45008 | Endevco | 4-Mar-2019 |
| | | Redundant | X | P91177 | Endevco | 4-Mar-2019 |
| | | | Y | P94570 | Endevco | 4-Mar-2019 |
| | | | Z | P91172 | Endevco | 4-Mar-2019 |
| Chest Potentiometer | | | X | CST037 | Servo | 5-Mar-2019 |
| Pelvis Accelerometers | | | X | P91185 | Endevco | 4-Mar-2019 |
| | | | Y | P91876 | Endevco | 4-Mar-2019 |
| | | | Z | T10338 | Endevco | 4-Mar-2019 |
| Femur Load Cells | Left | Primary | Z | DI4215-FZ1 | Denton | 1-Mar-2019 |
| | | Redundant | Z | DI4215-FZ2 | Denton | 1-Mar-2019 |
| | Right | Primary | Z | DI4216-FZ1 | Denton | 1-Mar-2019 |
| | | Redundant | Z | DI4216-FZ2 | Denton | 1-Mar-2019 |
| Tibia Load Cells | Left | Upper | MX, MY, FZ | 3643-94 | Denton | 1-Mar-2019 |
| | | Lower | MX, MY, FZ | 3644-370 | Denton | 1-Mar-2019 |
| | Right | Upper | MX, MY, FZ | 3643-413 | Denton | 1-Mar-2019 |
| | | Lower | MX, MY, FZ | 3644-401 | Denton | 1-Mar-2019 |
| Foot Accelerometers | Left | Rear | X | P90848 | Endevco | 19-Sep-2018 |
| | | | Z | P91498 | Endevco | 19-Sep-2018 |
| | | Front | Z | P90841 | Endevco | 19-Sep-2018 |
| | Right | Rear | X | P93467 | Endevco | 19-Sep-2018 |
| | | | Z | P97619 | Endevco | 19-Sep-2018 |
| | | Front | Z | P94523 | Endevco | 19-Sep-2018 |
| Seat Belt Load Cells | | Lap | N/A | N/A | N/A | N/A |
| | | Shoulder | N/A | N/A | N/A | N/A |

**TABLE 2 – Front Passenger Dummy Instrumentation**

| Instrumentation | | | Axis/Location | Hybrid III 5th S/N 070 | | |
|---|---|---|---|---|---|---|
| | | | | Serial Number | Manufacturer | Calibration Date |
| Head Accelerometers | | Primary | X | P58838 | Endevco | 5-Mar-2019 |
| | | | Y | P94569 | Endevco | 6-Mar-2019 |
| | | | Z | P51920 | Endevco | 5-Mar-2019 |
| | | Redundant | X | P58722 | Endevco | 5-Mar-2019 |
| | | | Y | P51918 | Endevco | 5-Mar-2019 |
| | | | Z | P52046 | Endevco | 5-Mar-2019 |
| Head Angular Rate Sensors | | | X | ARS14953 | DTS | 15-Oct-2018 |
| | | | Y | ARS14964 | DTS | 15-Oct-2018 |
| | | | Z | ARS15009 | DTS | 15-Oct-2018 |
| Upper Neck Load Cell | | | FX, FY, FZ, MX, MY, MZ | 1647 | Denton | 11-Mar-2019 |
| Chest Accelerometers | | Primary | X | P63842 | Endevco | 5-Mar-2019 |
| | | | Y | P82743 | Endevco | 5-Mar-2019 |
| | | | Z | P52125 | Endevco | 5-Mar-2019 |
| | | Redundant | X | P52126 | Endevco | 5-Mar-2019 |
| | | | Y | P82326 | Endevco | 5-Mar-2019 |
| | | | Z | P97725 | Endevco | 5-Mar-2019 |
| Chest Potentiometer | | | X | 2573 | Servo | 5-Mar-2019 |
| Pelvis Accelerometers | | | X | P52071 | Endevco | 5-Mar-2019 |
| | | | Y | P80927 | Endevco | 5-Mar-2019 |
| | | | Z | P64130 | Endevco | 5-Mar-2019 |
| Femur Load Cells | Left | Primary | Z | DS9755-FZ1 | Humanetics | 5-Mar-2019 |
| | | Redundant | Z | DS9755-FZ2 | Humanetics | 5-Mar-2019 |
| | Right | Primary | Z | 103-FZ1 | Denton | 5-Mar-2019 |
| | | Redundant | Z | 103-FZ2 | Denton | 5-Mar-2019 |
| Tibia Load Cells | Left | Upper | MX, MY, FZ | 3643-654 | Denton | 6-Mar-2019 |
| | | Lower | MX, MY, FZ | 3644-400 | Denton | 6-Mar-2019 |
| | Right | Upper | MX, MY, FZ | 3643-114 | Denton | 6-Mar-2019 |
| | | Lower | MX, MY, FZ | 3644-675 | Denton | 6-Mar-2019 |
| Foot Accelerometers | Left | Rear | X | P83387 | Endevco | 5-Mar-2019 |
| | | | Z | P91953 | Endevco | 5-Mar-2019 |
| | | Front | Z | P83361 | Endevco | 5-Mar-2019 |
| | Right | Rear | X | P52045 | Endevco | 5-Mar-2019 |
| | | | Z | P58735 | Endevco | 5-Mar-2019 |
| | | Front | Z | P79406 | Endevco | 5-Mar-2019 |
| Seat Belt Load Cells | | Lap | N/A | N/A | N/A | N/A |
| | | Shoulder | N/A | N/A | N/A | N/A |

**TABLE 3 – Vehicle Instrumentation**

| Instrumentation | | | Axis | Serial Number | Manufacturer | Calibration Date |
|---|---|---|---|---|---|---|
| Crossmember/Rear Seat Accelerometers | Left | Primary | X | T11844 | Endevco | 8-Jan-2019 |
| | | | Z | T11864 | Endevco | 7-Jan-2019 |
| | | Redundant | X | P88453 | Endevco | 21-Dec-2018 |
| | Right | Primary | X | P88455 | Endevco | 3-Jan-2019 |
| | | | Z | T11839 | Endevco | 8-Jan-2019 |
| | | Redundant | X | T11452 | Endevco | 7-Jan-2019 |
| Engine Accelerometers | Top | | X | T11835 | Endevco | 8-Jan-2019 |
| | Bottom | | X | T11820 | Endevco | 7-Jan-2019 |