**FINAL REPORT NUMBER: SPNCAP-TRC-21-002**

# NEW CAR ASSESSMENT PROGRAM (NCAP)
# SIDE IMPACT POLE TEST

**FORD MOTOR CO.**
**2021 Ford Bronco Sport**
**NHTSA NUMBER: M20210202**

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


**Report Date: September 14, 2021**

**FINAL REPORT**

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

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Report Prepared By: ILO Project Operations Group

Report Approved By: 

John Shultz

Approval Date: September 14, 2021

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

FINAL REPORT ACCEPTANCE BY OCWS:

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

Date: _____

Technical Report Documentation Page

| | | |
|---|---|---|
| 1. Report No.<br>SPNCAP-TRC-21-002 | 2. Government Accession No. | 3. Recipient's Catalog No. |
| 4. Title and Subtitle<br>Final Report of New Car Assessment Program<br>Side Impact Pole Testing of<br>2021 Ford Bronco Sport<br>NHTSA No.: M20210202 | | 5. Report Date<br>September 14, 2021<br>6. Performing Organization Code<br>TRC Inc. |
| 7. Author(s)<br>John Shultz, Project Manager | | 8. Performing Organization Report No.<br>210218 |
| 9. Performing Organization Name and Address<br>Transportation Research Center Inc.<br>10820 State Route 347<br>East Liberty, OH 43319 | | 10. Work Unit No.<br>11. Contract or Grant No.<br>DTNH22-14-D-00354 |
| 12. Sponsoring Agency Name and Address<br>U.S. Department of Transportation<br>National Highway Traffic Safety Administration<br>Office of Crashworthiness Standards<br>Mail Code NRM-110<br>1200 New Jersey Ave, SE, Room W43-410<br>Washington, DC 20590 | | 13. Type of Report and Period Covered<br>Final Test Report<br>February 18, 2021 –<br>September 14, 2021<br>14. Sponsoring Agency Code<br>NRM-110 |
| 15. Supplemental Notes | | |

16. Abstract

A 32.2 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject vehicle, a 2021 Ford Bronco Sport, in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted by Transportation Research Center Inc. in East Liberty, Ohio, on February 18, 2021.

The impact velocity was 32.20 km/h, and the ambient temperature at the struck (left) side of the target vehicle at the time of impact was 20.6° C. The test vehicle's post-test maximum crush was 323 mm at Level 3.

The test or target vehicle's performance is given below:

| | Unit | Threshold | Front SID-IIs |
|---|---|---|---|
| Head Injury Criteria ($HIC_{36}$): | NA | 1000 | 255 |
| Resultant Lower Spine Acceleration: | g's | 82 | 34.8 |
| Total Pelvic Force:<br>(sum of acetabular and iliac forces) | N | 5525 | 2276.4 |
| Maximum Thoracic Rib Deflection | mm | 38* | 24.4 |
| Maximum Abdomen Rib Deflection | mm | 45* | 19.0 |

* Proposed IARV

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

| | |
|---|---|
| 17. Key Words<br>New Car Assessment Program (NCAP)<br>Side Impact<br>Pole<br>Part 572V<br>SID-IIs | 18. Distribution Statement<br>Copies of this report are available from:<br>National Highway Traffic Safety Administration<br>Technical Information Services Division<br>1200 New Jersey Ave<br>Washington, DC 20590 |

| | | | |
|---|---|---|---|
| 19. Security Classification (of this report)<br>Unclassified | 20. Security Classification (of this page)<br>Unclassified | 21. Number of Pages<br>125 | 22. Price |

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# SECTION 1
# TEST PURPOSE AND PROCEDURE

## TEST PURPOSE AND PROCEDURE

This side impact test was conducted as part of the MY21 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00354. The purpose of this test is to generate comparative side impact performance in a 2021 Ford Bronco Sport manufactured by FORD MOTOR CO.. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated March 2020.

**SECTION 2**

## SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a model year 2021 Ford Bronco Sport. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.20 km/h. The side impact test was conducted by Transportation Research Center Inc. in East Liberty, OH, on February 18, 2021. Pre-test and post-test photographs of the test vehicle and the side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated March 2020. Camera locations and other pertinent camera information are included in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Primary and Redundant Head CG Triaxial Accelerometers
Thorax Upper, Middle, and Lower Rib Displacement Potentiometers
Abdomen Upper and Lower Rib Displacement Potentiometers
Lower Spine (T12) Triaxial Accelerometers
Iliac Load Cell
Acetabulum Load Cell

Appendix B contains the vehicle and dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D contains the test equipment and instrumentation calibration data.

Injury readings for the SID-IIs dummy were recorded as follows:

| Measurement Description | Driver ATD (SID-IIs) | | |
|---|---|---|---|
| | Units | IARV | Result |
| Head Injury Criteria ($HIC_{36}$) | NA | 1000 | 255 |
| Lower Spine Acceleration Resultant | G | 82 | 34.8 |
| Total Pelvic Force (sum of acetabular and iliac forces) | N | 5525 | 2276.4 |
| Maximum Thoracic Rib Deflection | mm | 38* | 24.4 |
| Maximum Abdominal Rib Deflection | mm | 45* | 19.0 |

* Proposed IARV

Supplemental restraint information is given below:

| Restraint Type | Left Front (Driver) Occupant Location 1 | | Left Rear (Passenger) Occupant Location 4 | |
|---|---|---|---|---|
| | Mounted | Deployed | Mounted | Deployed |
| Frontal Airbag | Yes | No | | |
| Knee Airbag | Yes | No | | |
| Side Curtain Airbag | Yes | Yes | Yes | Yes |
| Side Torso/Pelvis Airbag | Yes | Yes | Yes | Yes |
| Side Torso Airbag | No | N/A | No | N/A |
| Seat Belt Pretensioner | Yes | Yes | Yes | Yes |
| Seat Belt Load Limiter | Yes | No | Yes | No |
| Other Safety Restraint | No | N/A | No | N/A |

## GENERAL COMMENTS

LEFT A-POST @ SILL AY – Channel failed after 31.0 ms

LEFT B-POST @ SILL AY – Channel failed after 17.0 ms

DRIVER SEAT TRACK AY – Channel failed

The photo placards say Bronco and should say Bronco Sport instead

## SECTION 3
## OCCUPANT AND VEHICLE INFORMATION

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

### TEST VEHICLE INFORMATION AND OPTIONS

| | |
|---|---|
| NHTSA No. | M20210202 |
| Model Year | 2021 |
| Make | Ford |
| Model | Bronco Sport |
| Body Style | MPV |
| VIN | 3FMCR9A66MRA21477 |
| Body Color | Carbonized Gray Metallic |
| Odometer Reading (km/mi) | 82.2 mi |
| Engine Displacement (L) | 1.5 |
| Type/No. Cylinders | Straight/3 |
| Engine Placement | Transverse |
| Transmission Type | Automatic |
| Transmission Speeds | 8 |
| Overdrive | Yes |
| Final Drive | 4WD |
| Roof Rack | Yes |
| Sunroof/T-Top | No |
| Running Boards | No |
| Tilt Steering Wheel | Yes |
| Power Seats | No |
| Anti-Lock Brakes (ABS) | Yes |

| | |
|---|---|
| Traction Control System (TCS) | Yes |
| Auto-Leveling System | No |
| Automatic Door Locks (ADL) | Yes |
| Power Window Auto-Reverse | Yes |
| Other Optional Feature | No |
| Driver Front 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 |
| Rear Pass. Curtain Airbag | Yes |
| Rear Pass. Head/Torso Airbag | No |
| Rear Pass. Torso Airbag | No |
| Rear Pass. Torso/Pelvis Airbag | Yes |
| Rear Pass. Pelvis Airbag | No |
| Driver Seat Belt Pretensioner | Yes |
| Rear Pass. Seat Belt Pretensioner | Yes |
| Driver Load Limiter | Yes |
| Rear Pass. Load Limiter | Yes |
| Other Safety Restraint | No |

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

### DATA FROM CERTIFICATION LABEL

| | |
|---|---|
| Manufactured By | FORD MOTOR CO. |
| Date of Manufacturer | 11/20 |
| Vehicle Type | MPV |

| | |
|---|---|
| GVWR (kg) | 2100 |
| GAWR Front (kg) | 1089 |
| GAWR Rear (kg) | 1066 |

### VEHICLE SEATING AND WEIGHT CAPACITY DATA

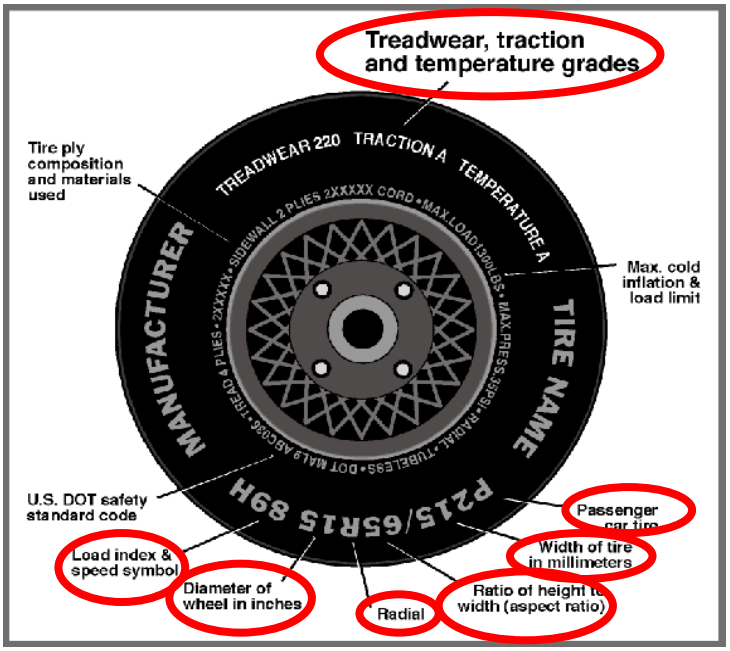
| | Front | Rear | Third | Total |
|---|---|---|---|---|
| Designated Seating Capacity (DSC) | 2 | 3 | N/A | 5 |
| Vehicle Capacity Weight (VCW) (kg) | | | | 521.0 |
| DSC X 68.04 kg | | | | 340.2 |
| Rated Cargo and Luggage Weight (RCLW) (kg) | | | | 180.8 |

### VEHICLE SEAT TYPE

| Seating Location | Type of Seat Pan | | | | Type of Seat Back | | |
|---|---|---|---|---|---|---|---|
| | Bucket | Bench | Split Bench | Contoured | Fixed | Adjustable | |
| | | | | | | W/ Lever | W/ Knob |
| Front Seat | Yes | N/A | N/A | | N/A | Yes | N/A |
| Rear or Second Row Seat | N/A | N/A | Yes | N/A | Yes | N/A | N/A |
| Third row seat | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021




**DATA FROM TIRE PLACARD**

| Measured Parameter | Front | Rear |
|---|---|---|
| Maximum Tire Pressure (kPa) | 350 | 350 |
| Cold Pressure (kPa) | 230 | 230 |
| Recommended Tire Size | 225/65R17 102H | 225/65R17 102H |
| Tire Size on Vehicle | 225/65R17 | 225/65R17 |
| Tire Manufacturer | Continental | Continental |
| Tire Model | ProContact | ProContact |
| Treadwear | 500 | 500 |
| Traction | A | A |
| Temperature Grades | A | A |
| Tire Plies Sidewall | 1 | 1 |
| Tire Plies Body | 4 | 4 |
| Load Index/Speed Symbol | 102H | 102H |
| Tire Material | Polyester/Steel/Polyamide | Polyester/Steel/Polyamide |
| DOT Safety Code Left | 1P5 0FBC3X 4620 | 1P5 0FBC3X 4620 |
| DOT Safety Code Right | 1P5 0FBC3X 4620 | 1P5 0FBC3X 4620 |

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

### TIRE PRESSURES

| | Units | LF | RF | LR | RR |
|---|---|---|---|---|---|
| As Delivered | kPa | 303 | 303 | 296 | 296 |
| Tire Placard | kPa | 230 | 230 | 230 | 230 |
| Owner's Manual | kPa | 230 | 230 | 230 | 230 |
| As Tested | kPa | 230 | 230 | 230 | 230 |

### TEST VEHICLE AXLE WEIGHTS

| | Units | As Delivered (UVW) | | | As Tested (ATW) | | | Fully Loaded | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Front Axle | Rear Axle | Total | Front Axle | Rear Axle | Total | Front Axle | Rear Axle | Total |
| Left | kg | 451.4 | 352.6 | | 473.6 | 441.8 | | 469.6 | 443.6 | |
| Right | kg | 450.4 | 319.2 | | 437.2 | 397.2 | | 450.4 | 395.0 | |
| Ratio | % | 57.3 | 42.7 | | 52.1 | 47.9 | | 52.3 | 47.7 | |
| Totals | kg | 901.8 | 671.8 | 1573.6 | 910.8 | 839.0 | 1749.8 | 920.0 | 838.6 | 1758.6 |

### TARGET TEST WEIGHT CALCULATION

| Measured Parameter | Units | Value | |
|---|---|---|---|
| Total As Delivered Weight (UVW) | kg | 1573.6 | (A) |
| Actual Weight of 1 P572V ATD (SID-IIs) Dummy Used | kg | 49.0 | (B) |
| Rated Cargo/Luggage Weight (RCLW)[1] | kg | 136.0 | (C) |
| Calculated Vehicle Target Weight (TVTW) | kg | 1758.6 | (A+B+C) |

**Does the measured As Tested Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to 9 kg)?** ☒ YES ☐ NO

### TEST VEHICLE ATTITUDES AND CG

| | Units | As Delivered | As Tested | Fully Loaded | Meets Requirement*** |
|---|---|---|---|---|---|
| Driver Door Sill Angle (front-to-rear)* | Deg. | -0.4 | -0.3 | +0.2 | Yes |
| Front Passenger Sill Angle (front-to-rear)* | Deg. | -0.3 | -0.2 | 0.0 | Yes |
| Front Bumper-Line Angle (left-to-right)** | Deg. | -0.5 | -0.5 | -0.7 | Yes |
| Rear Bumper-Line Angle (left-to-right)** | Deg. | -0.4 | -0.4 | -0.4 | Yes |
| Vehicle CG (Aft of Front Axle) | mm | 1140 | 1280 | 1273 | |
| Vehicle CG (Left (+) / Right (-) from longitudinal Centerline) | mm | +18 | +37 | +31 | |

*ND=Nose Down (-), NU=Nose Up (+) **LD=Left Down (-), LU=Left Up (+)
*** The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for "Meets Requirements".

[1]Rated cargo and luggage weight limited to 136.0 kg or 300.0 lbs.

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

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

| Component Description | Weight (kg) |
|---|---|
| Ballast: Steel plate mounted in cargo area | 95.8 |
| Components Removed: None | 0.0 |

Test height adjustable suspension setting, if applicable: N/A

**TEST SURFACE MARKINGS**

| | Distance from 75° Impact Location Line (mm) |
|---|---|
| Fore 25 mm target | N/A |
| Aft 25 mm target | N/A |

**DATA SHEET NO. 2**

**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202

Test Program: SPNCAP Side Impact Test Date: 2/18/2021

**SEAT POSITIONING**

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

**SCRL ANGLE RANGE**

| Seat | SCRL(°) | | |
|---|---|---|---|
| | Max. | Min. | Mid |
| Driver Seat | 16.7 | 11.5 | 14.1 |
| Front Passenger Seat | N/A | N/A | 12.9 |
| Front Center Seat* | N/A | N/A | N/A |
| Struck Side Rear Seat | N/A | N/A | 12.4 |
| Non-Struck Side Rear Seat | N/A | N/A | 13.5 |
| Rear Center Seat* | N/A | N/A | 15.1 |

* If applicable.

**SEAT HEIGHT AND ANGLE**

| Seat | As Tested SCRL Angle (Mid) (°) | As Tested SCRP Height (mm) | SCRP Height Position | SCRP Height (mm) | | |
|---|---|---|---|---|---|---|
| | | | | Rearmost | Mid-Fore/Aft | Forward-Most |
| Driver Seat | 14.1 | 221 | Max | 200 | 203 | 205 |
| | | | Mid | 207 | 214 | 221 |
| | | | Min | 237 | 492 | 255 |
| Front Passenger Seat | 12.9 | 237 | Max | N/A | N/A | N/A |
| | | | Mid | 209 | 223 | 237 |
| | | | Min | N/A | N/A | N/A |
| Front Center Seat* | N/A | N/A | Max | N/A | N/A | N/A |
| | | | Mid | N/A | N/A | N/A |
| | | | Min | N/A | N/A | N/A |
| Struck Side Rear Seat | 12.4 | 264 | Max | N/A | N/A | N/A |
| | | | Mid | N/A | 264 | N/A |
| | | | Min | N/A | N/A | N/A |
| Non-Struck Side Rear Seat | 13.5 | 231 | Max | N/A | N/A | N/A |
| | | | Mid | N/A | 231 | N/A |
| | | | Min | N/A | N/A | N/A |
| Rear Center Seat* | 15.1 | 240 | Max | N/A | N/A | N/A |
| | | | Mid | N/A | 240 | N/A |
| | | | Min | N/A | N/A | N/A |

* If applicable.

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

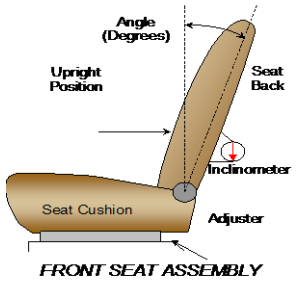
**SEAT FORE/AFT POSITION**

| Seat | Total Fore/Aft Travel | | Test Position from Forward most Position | |
|---|---|---|---|---|
| | mm | Detents* | mm | Detent* |
| Driver Seat | 244 | 36 | Fixed | 0 |
| Front Passenger Seat | 254 | 38 | Fixed | 0 |
| Front Center Seat* | N/A | N/A | N/A | N/A |
| Struck Side Rear Seat | Fixed | 0 | Fixed | 0 |
| Non-Struck Side Rear Seat | Fixed | 0 | Fixed | 0 |
| Rear Center Seat* | Fixed | 0 | Fixed | 0 |

* If applicable.

**SEAT BACK ANGLE ADJUSTMENT**

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1. For the 5th percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back is set to match the struck-side rear seat back.




| Seat | Total Seat Back Angle Range | | Test Position from Most Upright | |
|---|---|---|---|---|
| | Degrees | Detents* | Degrees | Detent* |
| Driver Seat w/ Seated Dummy | 50.0 | 26 | 4.0 | 0 |
| Front Passenger Seat | 49.8 | 26 | 4.0 | 0 |
| Front Center Seat* | N/A | N/A | N/A | N/A |
| Struck Side Rear Seat | 11.4 | Fixed | 11.4 | Fixed |
| Non-Struck Side Rear Seat | 11.5 | Fixed | 11.5 | Fixed |
| Rear Center Seat* | 7.2 | Fixed | 7.2 | Fixed |

* If applicable.

**SEAT BELT ANCHORAGE ADJUSTMENT**

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

| | Total # of Positions | Placed in Position # |
|---|---|---|
| Driver Seat | 4 | 0, Uppermost |

**HEAD RESTRAINT ADJUSTMENT**

Head restraints are adjusted to the lowest and most full forward in-use position.

| | Total # of Positions | Placed in Position # |
|---|---|---|
| Driver Seat | 3 | 3, Lowermost |

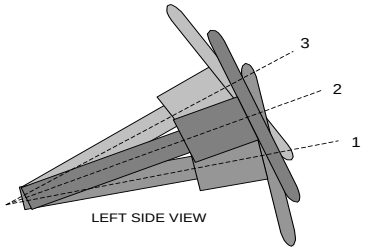
**DATA SHEET NO. 2 (CONTINUED)**
**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

## STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel geometric locus it describes when moved through its full range of motion.

| | Degrees | Fore/Aft Position, mm |
|---|---|---|
| Lowermost, Position No. 1 | 22.6 | 0 |
| Geometric Center, Position No. 2 | 25.3 | 28.5 |
| Uppermost, Position No. 3 | 28.0 | 57 |
| Telescoping Steering Wheel Travel | | 57 |
| Test Position | 25.3 | 28.5 |

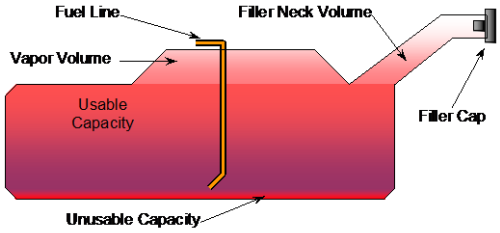


*STEERING COLUMN ASSEMBLY*

## FUEL PUMP

Describe the fuel pump type, details about how it operates and the location of the fuel filler neck:

Fuel pump cycles for a brief period when key is moved to on position, but does not pump fuel unless engine is running.



*VEHICLE FUEL TANK ASSEMBLY*

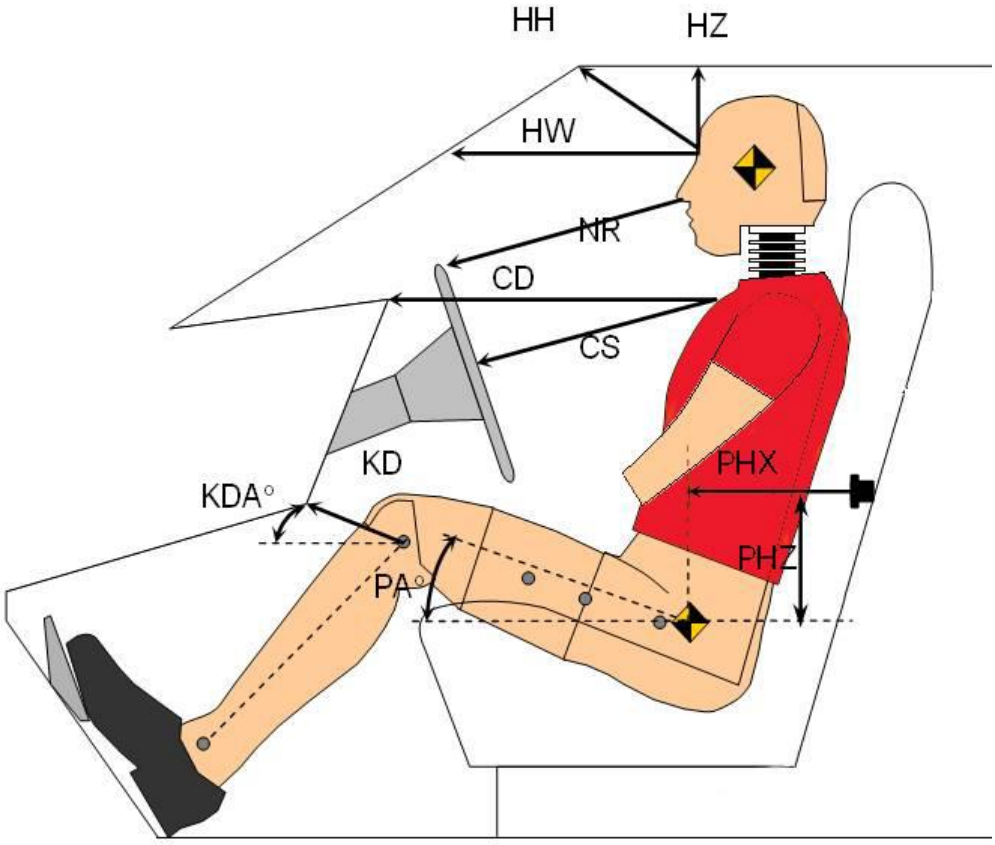
## FUEL TANK CAPACITY

| | Liters |
|---|---|
| Usable Capacity of “Standard Tank” (see Form No. 1) | 63.2 |
| Usable Capacity of “Optional” Tank (see Form No. 1) | N/A |
| Usable Capacity of Standard Tank (see Owner’s Manual) | 63.2 |
| Usable Capacity of Optional Tank (see Owner’s Manual) | N/A |
| 93% of Usable Capacity | 58.8 |
| Actual Amount of Solvent Used in Test | 58.8 |
| 1/3 of Usable Capacity | 21.1 |

**Is the Actual Amount of Solvent Used in the test equal to 93% ± 1% of the Usable Capacity stated in on Form No. 1?** ☒ YES ☐ NO

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

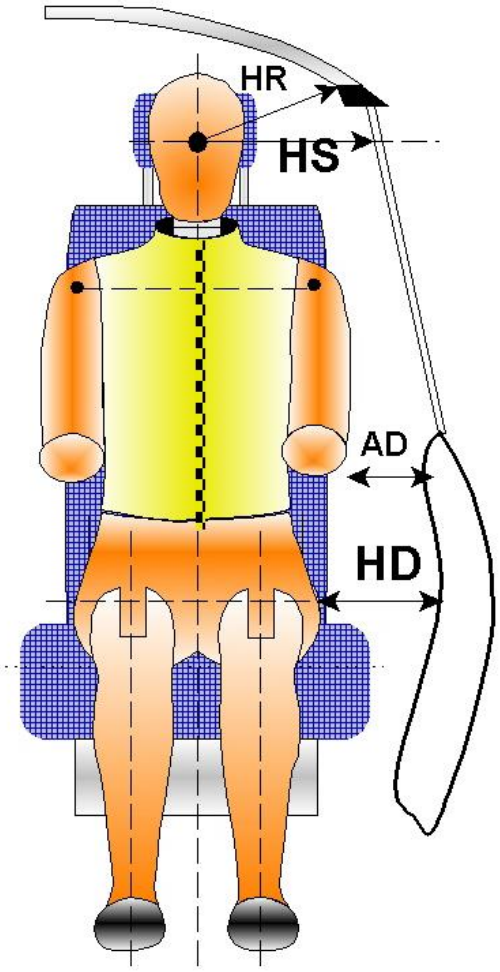
Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021




| Code | Measurement Description | Driver | |
|---|---|---|---|
| | | Length (mm) | Angle (°) |
| HH | Head to Header | 335 | |
| HW | Head to Windshield | 558 | |
| HZ | Head to Visor | 281 | |
| NR | Nose to Rim | 243 | |
| CD | Chest to Dashboard | 408 | |
| CS | Chest to Steering Wheel | 173 | |
| KDL/KDLA° | Left Knee to Dash | 141 | 16.7 |
| KDR/KDRA° | Right Knee to Dash | 137 | 16.9 |
| PAX° | Pelvic Tilt Angle (X-axis) | | 0.3 |
| PAY° | Pelvic Tilt Angle (Y-axis) | | 19.1 |
| PHX | Hip Point to Striker (X-Axis) | 330 | |
| PHZ | Hip Point to Striker (Z-Axis) | 105 | |

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

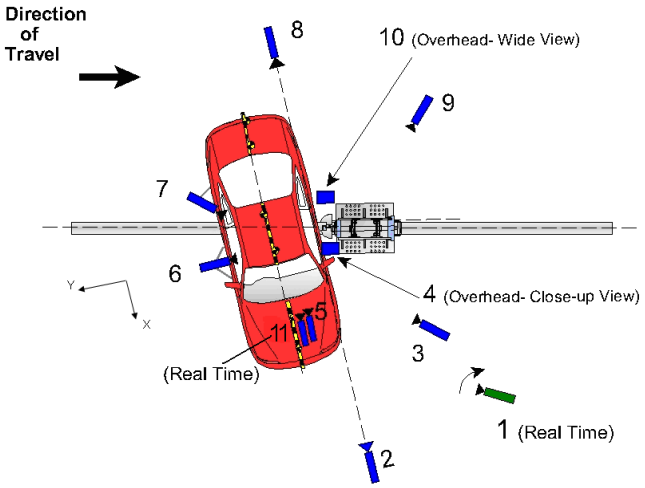
Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021




| Code | Measurement Description | Length (mm) |
|---|---|---|
| HR | Head to Side Header | 302 |
| HS | Head to Side Window | 388 |
| AD | Arm to Door | 138 |
| HD | Hip Point to Door | 162 |

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021




REFERENCE: (from point of impact for X and Y; from ground for Z)
+ X = Forward of vehicle, + Y = Right of vehicle, + Z = Down

| Camera No. | View | Coordinates (mm) | | | Lens Length (mm) | Operating Frame Rate (fps) |
|---|---|---|---|---|---|---|
| | | X | Y | Z | | |
| 1 | Real time (24-30 fps) pan view of impact | | | | Zoom | 30 |
| 2 | Front ground level – impact view | 4825 | 0 | -1782 | 20 | 1000 |
| 3 | Impact side 45° – forward pole view | 2821 | -1607 | -1125 | 20 | 1000 |
| 4 | Overhead Close-up view of impact | 0 | 0 | -5260 | 28 | 1000 |
| 5 | Onboard – dummy front view | | | | 25 | 1000 |
| 6 | Onboard – dummy side view | | | | 12.5 | 1000 |
| 7 | Onboard – dummy rear oblique view | | | | 12.5 | 1000 |
| 8 | Rear ground level – impact view | -5542 | 827 | -1789 | 20 | 1000 |
| 9 | Impact side 45° – rearward pole view | 2936 | 2628 | -1705 | 20 | 1000 |
| 10 | Overhead wide view of impact | 384 | 250 | -5259 | 18.5 | 1000 |
| 11 | Real time dummy front view | | | | Zoom | 30 |

All measurements accurate to +/- 6 mm.

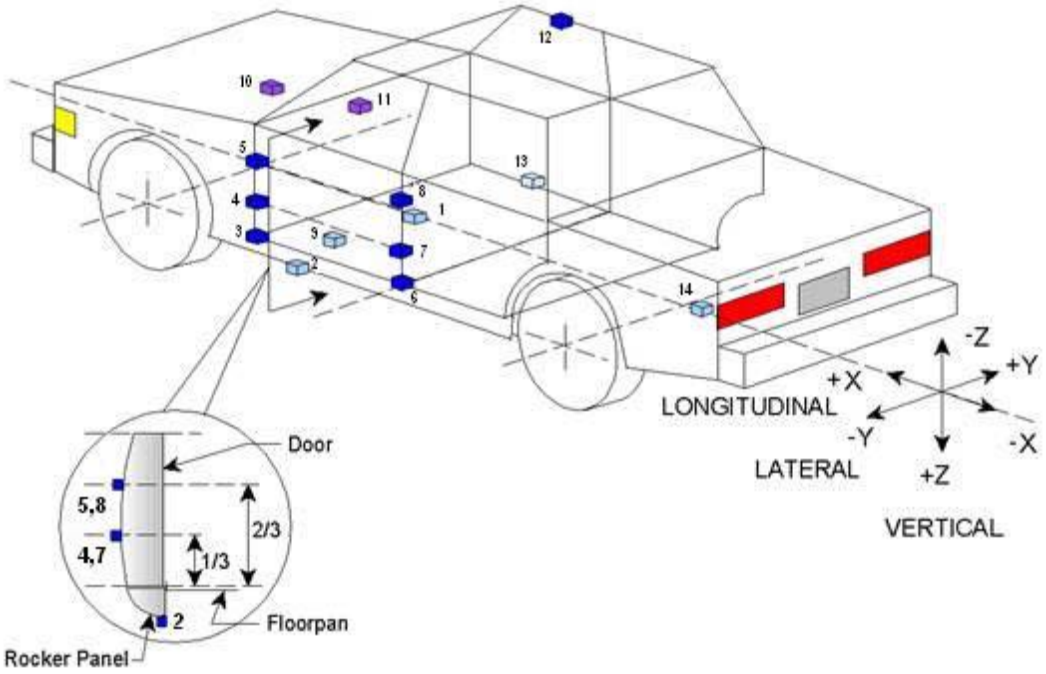
**NOTE**: Vehicle was at a 75° angle to the rigid pole.
If applicable, explain why camera(s) did not run: N/A

**INSTRUMENTATION**

| | Number of Channels |
|---|---|
| Driver Dummy | 16 |
| Vehicle Structure | 18 |
| Pole Load Cells | 8 |
| **TOTAL** | 42 |

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021



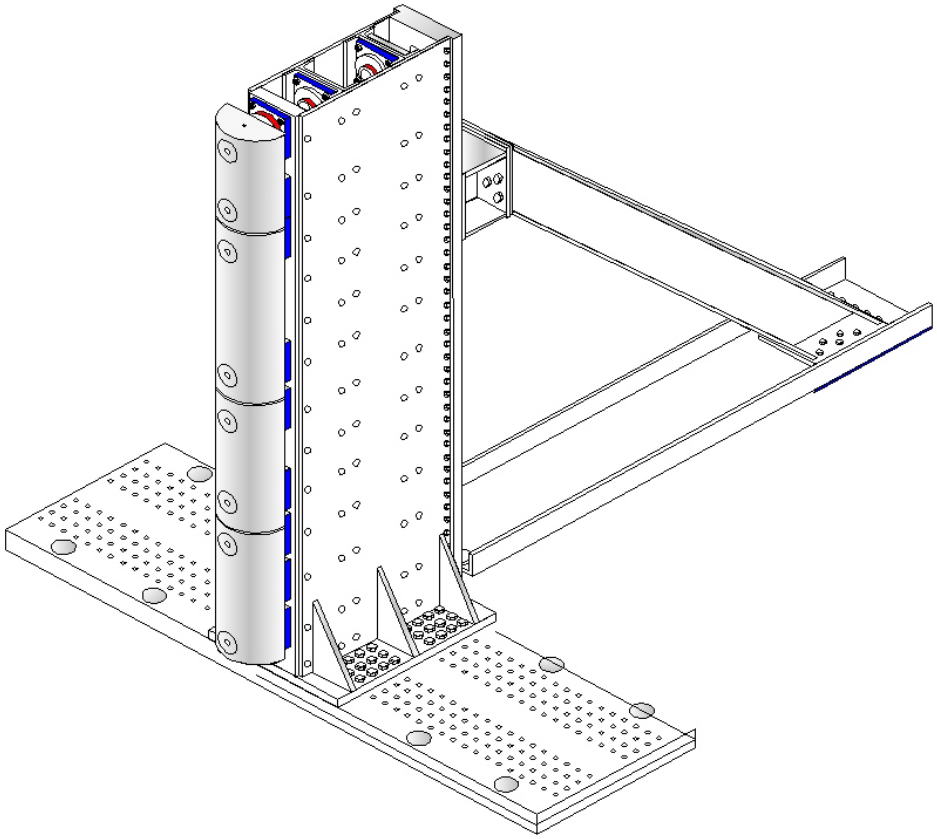

| | Accelerometer/Sensor Location | | | |
|---|---|---|---|---|
| | ID | Coordinates (mm) | | |
| | | X | Y | Z |
| 1 | Vehicle CG | 2595 | 105 | -421 |
| 2 | Left Floor Sill | 2675 | -679 | -410 |
| 3 | A-Pillar Sill | 2935 | -696 | -491 |
| 4 | A-Pillar Low | 2970 | -838 | -581 |
| 5 | A-Pillar Mid | 2980 | -820 | -982 |
| 6 | B-Pillar Sill | 1910 | -760 | -478 |
| 7 | B-Pillar Low | 1955 | -830 | -618 |
| 8 | B-Pillar Mid | 1915 | -795 | -1073 |
| 9 | Driver Seat Track | 2250 | -550 | -444 |
| 10 | Engine Top | 3560 | 80 | -899 |
| 11 | Firewall | 3355 | 0 | -944 |
| 12 | Right Roof | 1985 | 673 | -1625 |
| 13 | Right Floor Sill | 2690 | 679 | -403 |
| 14 | Rear Floorpan | 520 | 0 | -503 |

*Reference:* *X - Test Vehicle Rear Bumper (+ forward)*
*Y - Test Vehicle Centerline (+ to right)*
*Z - Ground Plane (+ down)*

**DATA SHEET NO. 7**
**RIGID POLE LOAD CELL DATA**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

FOIL 300K RIGID POLE



| Load Cell Locations | |
|---|---|
| **ID** | **Height From Top of Carrier (mm)** |
| 1 | 87 |
| 2 | 468 |
| 3 | 648 |
| 4 | 978 |
| 5 | 1168 |
| 6 | 1651 |
| 7 | 1816 |
| 8 | 2057 |

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

### TEST DUMMY INFORMATION AND CONTACT POINTS

| Dummy Body Part | Driver SID-IIs Dummy |
|---|---|
| Face | SCAB |
| Top of Head | SCAB |
| Left Side of Head | SCAB |
| Back of Head | Head restraint |
| Left Shoulder | SAB |
| Upper Torso | Seat back bolster |
| Lower Torso | Seat back bolster |
| Left Hip | SAB |
| Left Knee | Door panel |

### POST-TEST DOOR PERFORMANCE

| Description | Struck Side | | Non-Struck Side | | Rear Hatch/ Other Door |
|---|---|---|---|---|---|
| | Front | Rear | Front | Rear | |
| Remained Closed and Operational | No | No | Yes | Yes | Yes |
| Total Separation from Vehicle at Hinges or Latches | No | No | No | No | No |
| Latch or Hinge Systems Pulled Out of Their Anchorages | No | No | No | No | No |
| Disengaged from Latched Position | No | No | No | No | No |
| Latch Separated from Striker | No | No | No | No | No |
| Jammed Shut | Yes | Yes | No | No | No |
| If Door Opened at Striker, Record Width of Opening at Striker (mm) | N/A | N/A | N/A | N/A | N/A |

### POST-TEST SEAT PERFORMANCE

| Description | Struck Side | | Non-Struck Side | |
|---|---|---|---|---|
| | Front | Rear | Front | Rear |
| Seat Movement Along Seat Track | No | No | No | No |
| Seat Disengagement from Floor pan | No | No | No | No |
| Seat Back Movement from Initial Position | No | No | No | No |
| Seat Back Collapse | No | No | No | No |

### POST-TEST STRUCTURAL OBSERVATIONS

| Critical Areas of Performance | Observations and Conclusions |
|---|---|
| Pillar Performance | Good |
| Sill Separation | None |
| Windshield Damage | Cracking across entire windshield; cracking most dense in the driver top corner |
| Side Window Damage | Driver and passenger window broken out |
| Other Notable Effects | None |

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

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

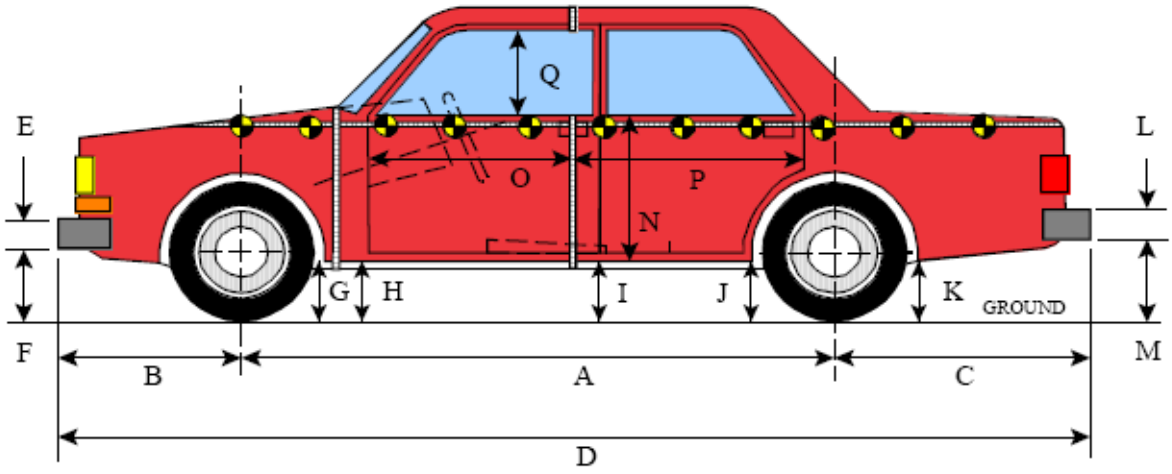
| Restraint Type | Struck Side (Driver) | | Struck Side (Rear Passenger) | |
|---|---|---|---|---|
| | Mounted | Deployed | Mounted | Deployed |
| Front Airbag | Yes | No | | |
| Knee Airbag | Yes | No | | |
| Side Curtain Airbag | Yes | Yes | Yes | Yes |
| Side Torso/Pelvis Airbag | Yes | Yes | Yes | Yes |
| Side Torso Airbag | No | N/A | No | N/A |
| Seat Belt Pretensioner | Yes | Yes | Yes | No |
| Seat Belt Load Limiter | Yes | No | Yes | No |
| Other | No | N/A | No | N/A |

**VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA**

| Measured Parameter | Units | Tolerance | Value |
|---|---|---|---|
| Vertical Impact Reference Line (Aft of Front Axle) (Intended Impact Point) | mm | | 1111 |
| Actual Impact Point (Aft of Front Axle) | mm | | 1105 |
| Horizontal Offset ( + forward / - rearward) | mm | +/- 38 of Intended Impact point | -6 |
| Angle Between Vehicle's Longitudinal Centerline and Line of Motion | degrees | 75 +/- 3 | 75 |
| Trap No. 1 Velocity (Primary) | km/h | 31.4 to 33.0 | 32.20 |
| Trap No. 2 Velocity (Redundant) | km/h | 31.4 to 33.0 | 32.15 |

**DATA SHEET NO. 9**
**VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021



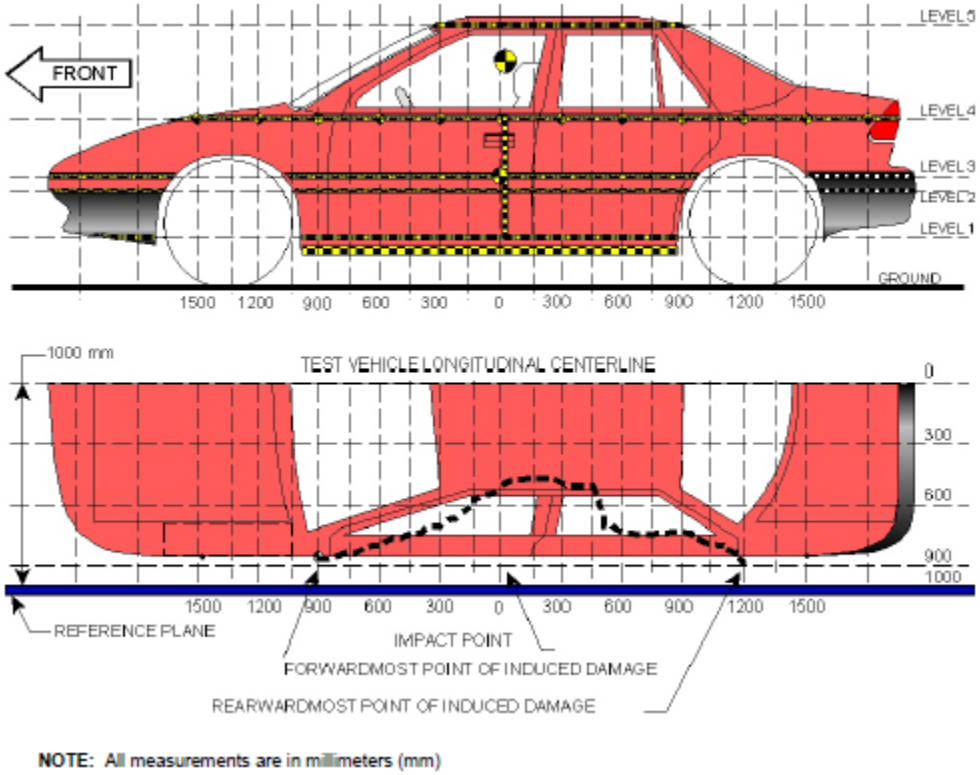

**LEFT SIDE VIEW**
All MEASUREMENTS IN (mm) WITH TOLERANCE OF ± 3mm

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

| Code | Measurement Description | Pre-Test | Post-Test | Difference |
|---|---|---|---|---|
| A | Wheelbase | 2670 | 2610 | 60 |
| B | Front Axle to Front Surface of Vehicle | 850 | 850 | 0 |
| C | Rear Axle to Rear Surface of Vehicle | 860 | 860 | 0 |
| D | Total Length at Centerline | 4380 | 4360 | 20 |
| E | Front Bumper Thickness | 160 | 160 | 0 |
| F | Front Bumper Bottom to Ground | 468 | 475 | -7 |
| G | Sill Height at Front Wheel Well | 440 | 435 | 5 |
| H | Sill Height at Front Door Leading Edge | 445 | 440 | 5 |
| I | Sill Height at B-Pillar | 450 | 495 | -45 |
| J1 | Sill Height at Rear Wheel Well | 455 | 515 | -60 |
| J2 | Pinch Weld Height at Rear Wheel Well | 245 | 282 | -37 |
| K | Sill Height Aft of Rear Wheel Well | 440 | 483 | -43 |
| L | Rear Bumper Thickness | 120 | 120 | 0 |
| M | Rear Bumper Bottom to Ground | 520 | 558 | -38 |
| N | Sill Height to Bottom of Front Window Sill | 900 | 890 | 10 |
| O | Front Door Leading Edge to Impact CL | 603 | 460 | 143 |
| P | Rear Door Trailing Edge to Impact CL | 1432 | 1355 | 77 |
| Q | Front Window Opening | 435 | 417 | 18 |
| R | Right Side Length | 4300 | 4300 | 0 |
| S | Left Side Length | 4300 | 4265 | 35 |
| T | Vehicle Width at B-Pillars | 1830 | 1740 | 90 |
| U | Front Wheel Track Width | 1615 | 1615 | 0 |
| V | Rear Wheel Track Width | 1605 | 1605 | 0 |

**DATA SHEET NO. 10**
**VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021




**NOTE:** All measurements are in millimeters (mm)

**MAXIMUM EXTERIOR CRUSH MEASUREMENTS**

| Level | Measurement Description | Height Above Ground | Maximum Exterior Static Crush | Distance from Impact |
|---|---|---|---|---|
| 1 | Sill Top | 437 | 259 | 0 |
| 2 | Occupant H-Point | 712 | 320 | 0 |
| 3 | Mid-Door | 740 | 323 | 0 |
| 4 | Window Sill | 1099 | 292 | 0 |
| 5 | Window Top | 1608 | 136 | 0 |

**NOTE:** The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

**DATA SHEET NO. 10 (CONTINUED)**
**VEHICLE EXTERIOR CRUSH MEASUREMENTS**

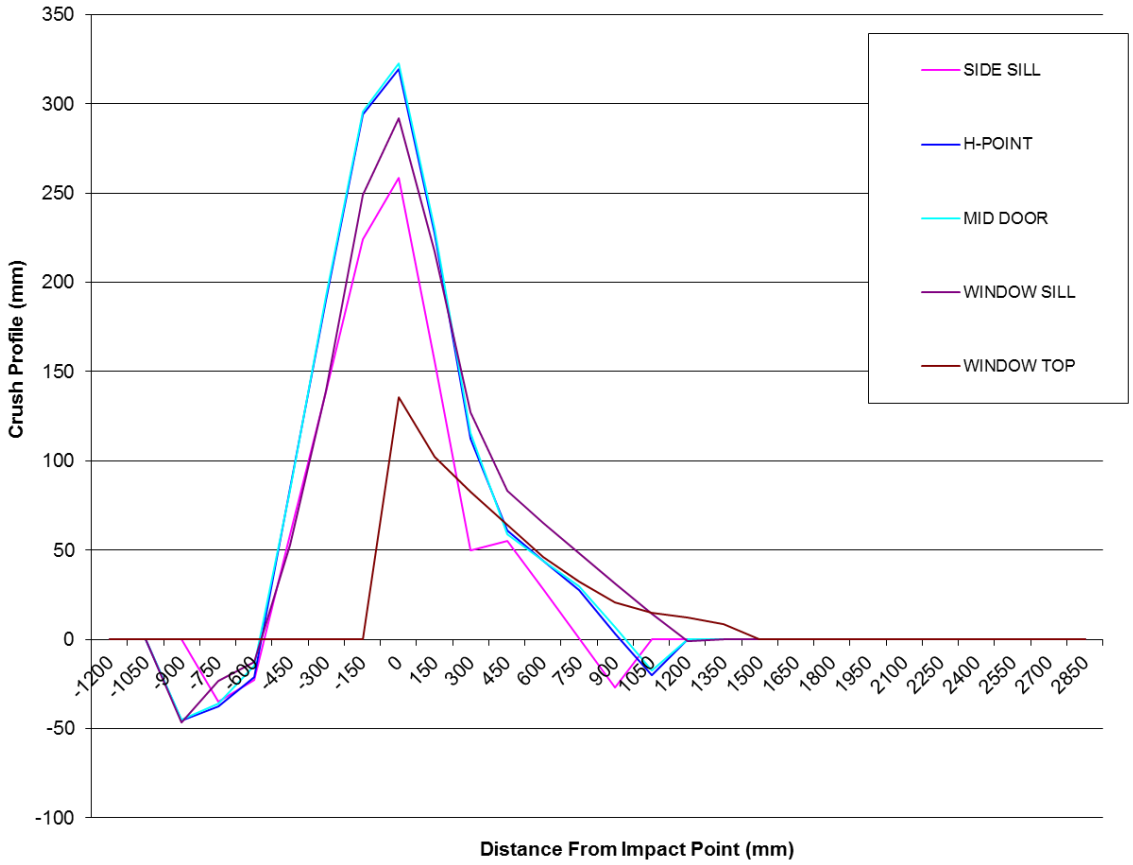
Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

| | Pre-Test | | | | | Post-Test | | | | | Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** | **1** | **2** | **3** | **4** | **5** |
| -900 | 0 | 929 | 932 | 843 | 0 | 0 | 974 | 978 | 889 | 0 | 0 | -45 | -46 | -46 | 0 |
| -750 | 886 | 927 | 926 | 852 | 0 | 921 | 965 | 962 | 876 | 0 | -35 | -38 | -36 | -24 | 0 |
| -600 | 876 | 918 | 919 | 860 | 0 | 899 | 939 | 934 | 872 | 0 | -23 | -21 | -15 | -12 | 0 |
| -450 | 882 | 921 | 922 | 867 | 0 | 823 | 836 | 839 | 814 | 0 | 59 | 85 | 83 | 53 | 0 |
| -300 | 887 | 924 | 926 | 874 | 0 | 748 | 734 | 733 | 734 | 0 | 139 | 190 | 193 | 140 | 0 |
| -150 | 891 | 927 | 928 | 879 | 0 | 666 | 633 | 632 | 630 | 0 | 225 | 294 | 296 | 249 | 0 |
| 0 | 894 | 928 | 929 | 884 | 671 | 635 | 608 | 606 | 592 | 535 | 259 | 320 | 323 | 292 | 136 |
| 150 | 897 | 927 | 929 | 886 | 676 | 741 | 700 | 699 | 668 | 573 | 156 | 227 | 230 | 218 | 103 |
| 300 | 899 | 926 | 927 | 887 | 678 | 849 | 814 | 812 | 760 | 595 | 50 | 112 | 115 | 127 | 83 |
| 450 | 897 | 923 | 925 | 886 | 679 | 842 | 862 | 866 | 803 | 615 | 55 | 61 | 59 | 83 | 64 |
| 600 | 897 | 919 | 923 | 885 | 679 | 869 | 875 | 879 | 820 | 633 | 28 | 44 | 44 | 65 | 46 |
| 750 | 895 | 915 | 919 | 884 | 677 | 894 | 888 | 890 | 835 | 645 | 1 | 27 | 29 | 49 | 32 |
| 900 | 894 | 919 | 920 | 881 | 673 | 921 | 916 | 912 | 849 | 652 | -27 | 3 | 8 | 32 | 21 |
| 1050 | 0 | 928 | 925 | 876 | 667 | 0 | 948 | 943 | 861 | 653 | 0 | -20 | -18 | 15 | 14 |
| 1200 | 0 | 0 | 0 | 871 | 663 | 0 | 0 | 0 | 872 | 651 | 0 | 0 | 0 | -1 | 12 |
| 1350 | 0 | 0 | 0 | 0 | 656 | 0 | 0 | 0 | 0 | 647 | 0 | 0 | 0 | 0 | 9 |

**NOTE**: Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy’s head.

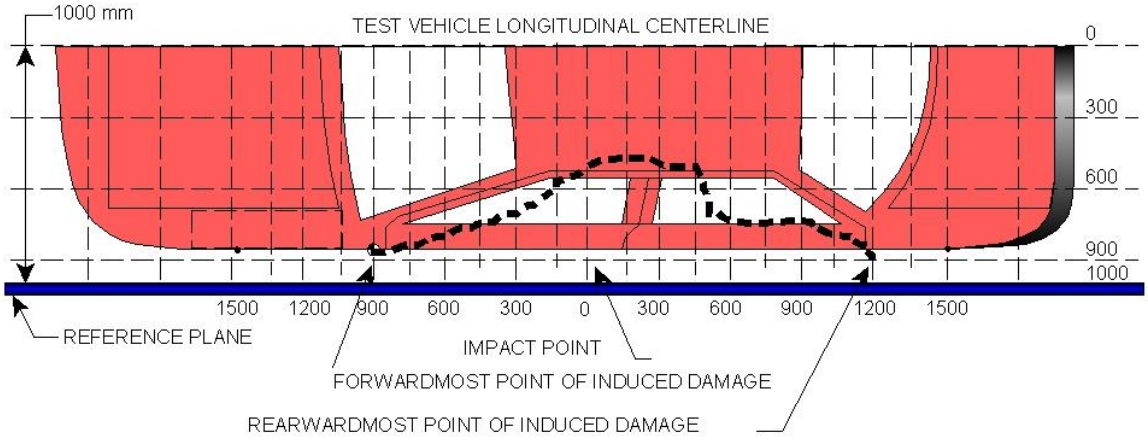
**DATA SHEET NO. 10 (CONTINUED)**
**VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021



**DATA SHEET NO. 11**
**VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021




**VEHICLE DAMAGE PROFILE DISTANCES**

| DPD | Distance From Impact Point (mm) | Level | Post-Test (mm) | Pre-Test (mm) | Crush (mm) |
|---|---|---|---|---|---|
| 1 | 1350 | 5 | 647 | 656 | 9 |
| 2 | 1050 | 4 | 861 | 876 | 15 |
| 3 | 600 | 4 | 820 | 885 | 65 |
| 4 | 300 | 4 | 760 | 887 | 127 |
| 5 | 0 | 3 | 606 | 929 | 323 |
| 6[1] | -450 | 2 | 836 | 921 | 0 |

[1] DPD 6 is defined as zero crush since the crush does not extend to the end of the vehicle.

**DATA SHEET NO. 12**

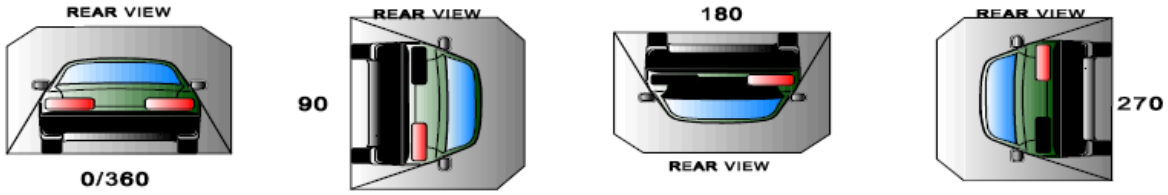
**FMVSS NO. 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA**

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021

**Test Time:** 16:30 **Temperature:** 20.6ºC

A. From impact until vehicle motion ceases: 0 oz.
(Maximum allowable is 1 ounce)
B. For the 5 minute period after motion ceases: 0 oz.
(Maximum allowable is 5 ounces)
C. For the following 25 minutes: 0 oz.
(Maximum allowable is 1 ounce/minute)
D. Spillage Details: None

**FMVSS 301 STATIC ROLLOVER DATA**




**ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS**

| Test Phase | Rotation Time | Hold Time | Total Time |
|---|---|---|---|
| 0 to 90 | 90 | 330 | 420 |
| 90 to 180 | 90 | 330 | 840 |
| 180 to 270 | 90 | 330 | 1260 |
| 270 to 360 | 90 | 330 | 1680 |

**FMVSS NO. 301 ROLLOVER SPILLAGE TABLE**

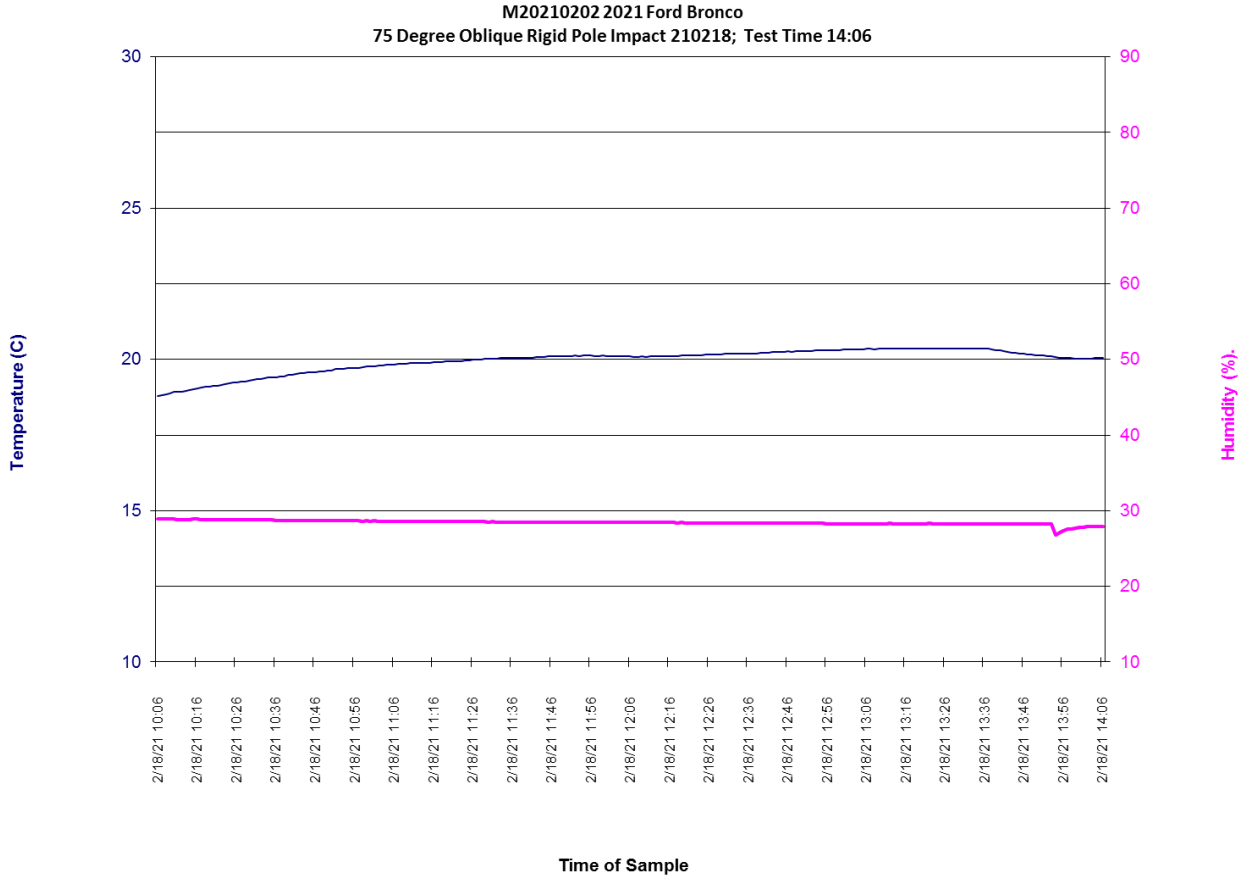
| Test Phase | First 5 Minutes | Sixth Minute | Seventh Minute | Eighth Minute |
|---|---|---|---|---|
| 0 to 90 | 0 | 0 | 0 | 0 |
| 90 to 180 | 0 | 0 | 0 | 0 |
| 180 to 270 | 0 | 0 | 0 | 0 |
| 270 to 360 | 0 | 0 | 0 | 0 |

**ROLLOVER SOLVENT SPILLAGE LOCATION TABLE**

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

## DATA SHEET NO. 13
## DUMMY/VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA

Test Vehicle: 2021 Ford Bronco Sport NHTSA No.: M20210202
Test Program: SPNCAP Side Impact Test Date: 2/18/2021



**APPENDIX A**

**PHOTOGRAPHS**

## TABLE OF PHOTOGRAPHS

## TABLE OF PHOTOGRAPHS (CONTINUED)


**No. 001 As Delivered Right Front ¾ View of Test Vehicle**

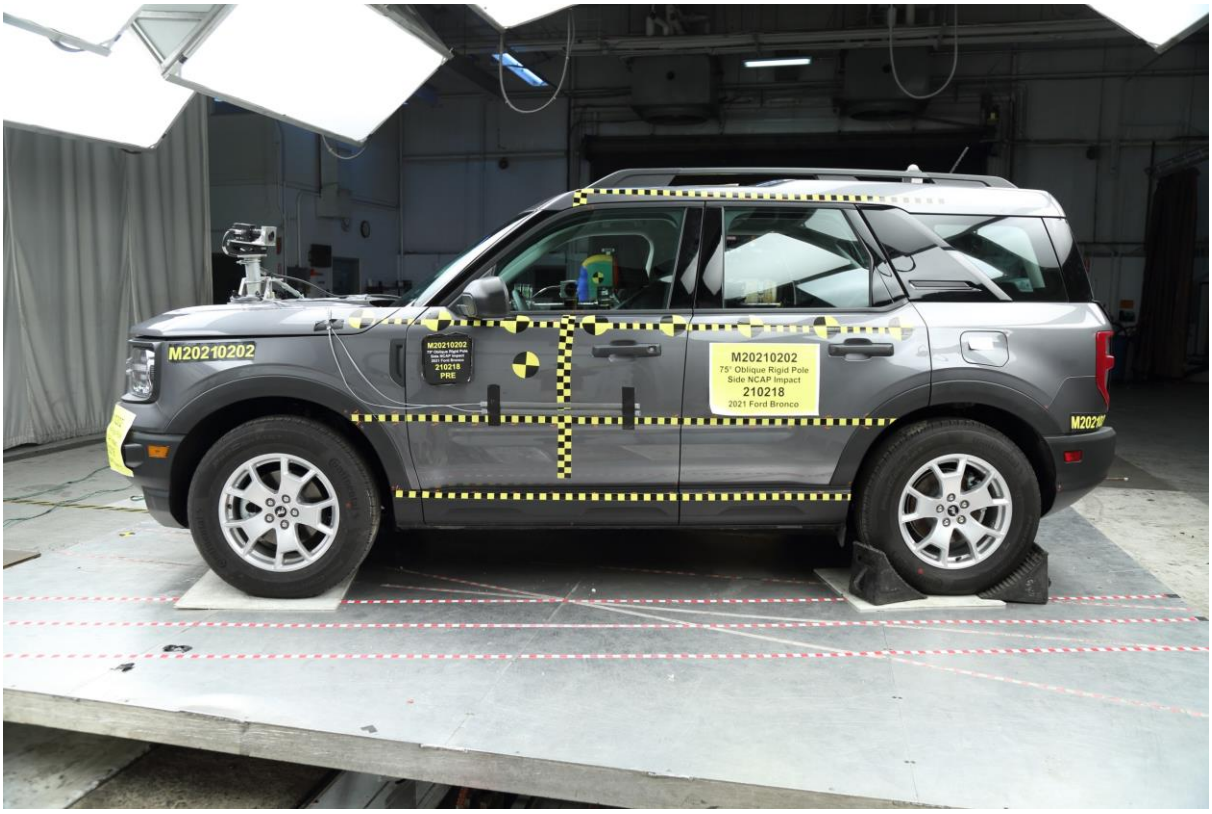

**No. 002 As Delivered Left Rear ¾ View of Test Vehicle**


**No. 003 Pre-Test Frontal View of Test Vehicle**


**No. 004 Post-Test Frontal View of Test Vehicle**


**No. 005 Pre-Test Left Front ¾ View of Test Vehicle**


**No. 006 Post-Test Left Front ¾ View of Test Vehicle**




**No. 007 Pre-Test Left Side View of Test Vehicle**


**No. 008 Post-Test Left Side View of Test Vehicle**


**No. 009 Pre-Test Left Rear ¾ View of Test Vehicle**


**No. 010 Post-Test Left Rear ¾ View of Test Vehicle**


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


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

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

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


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


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


**No. 017 Pre-Test Left Side View of Pole Positioned Against Side of Vehicle**


**No. 018 Pre-Test Right Side View of Pole Positioned Against Side of Vehicle**


**No. 019 Pre-Test Close-Up View of Impact Point Target**


**No. 020 Post-Test Close-Up View of Impact Point Target Showing Impact Location**


**No. 021 Pre-Test Front Close-Up View of Dummy Head and Chest**


**No. 022 Post-Test Front Close-Up View of Dummy**

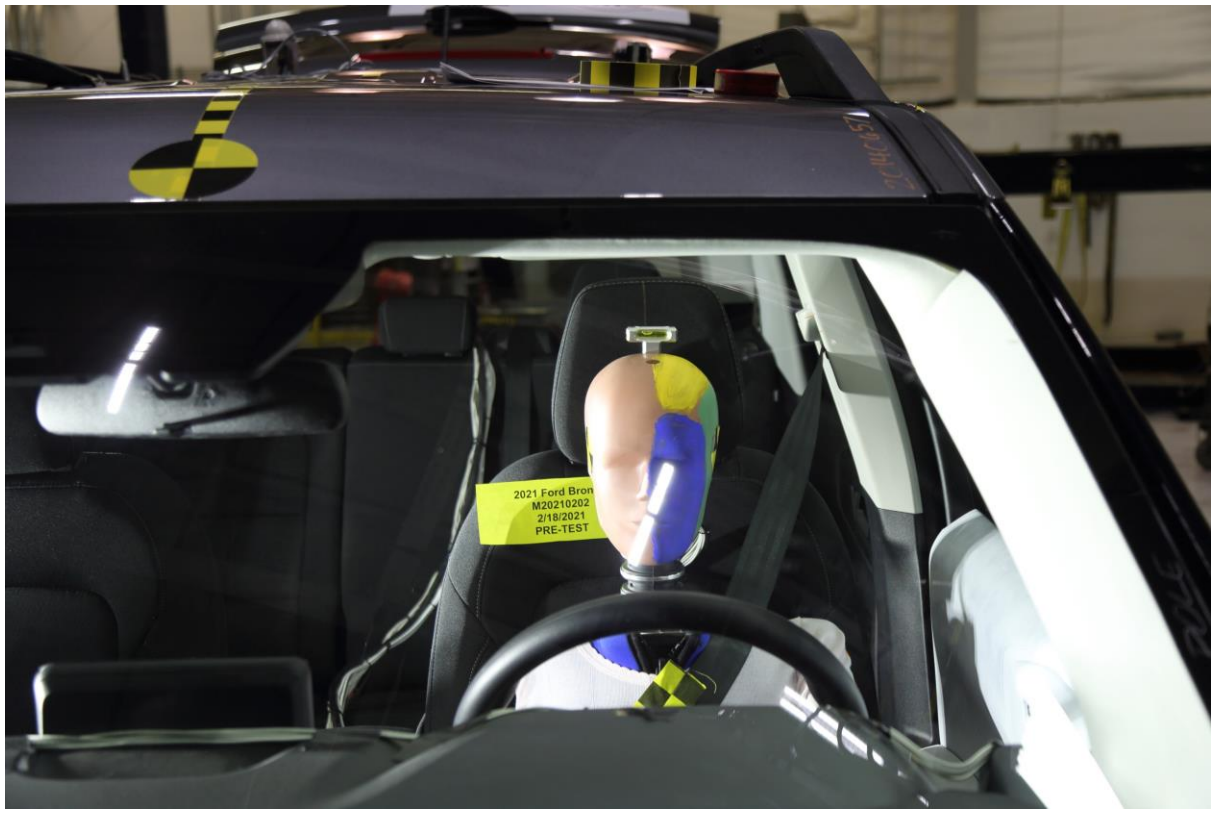

**No. 023 Pre-Test Left Side View of Dummy Showing Belt and Chalking**

**Intentionally Left Blank**


**No. 024 Pre-Test Left Side View of Dummy Shoulder and Door Top View**


**No. 025 Post-Test Left Side View of Dummy Shoulder and Door Top View**


**No. 026 Pre-Test Front View of Seat Back Prior to Dummy Positioning**




**No. 027 Pre-Test Front Close-Up View of Dummy Head and Shoulders in Relation to Head Restraint**

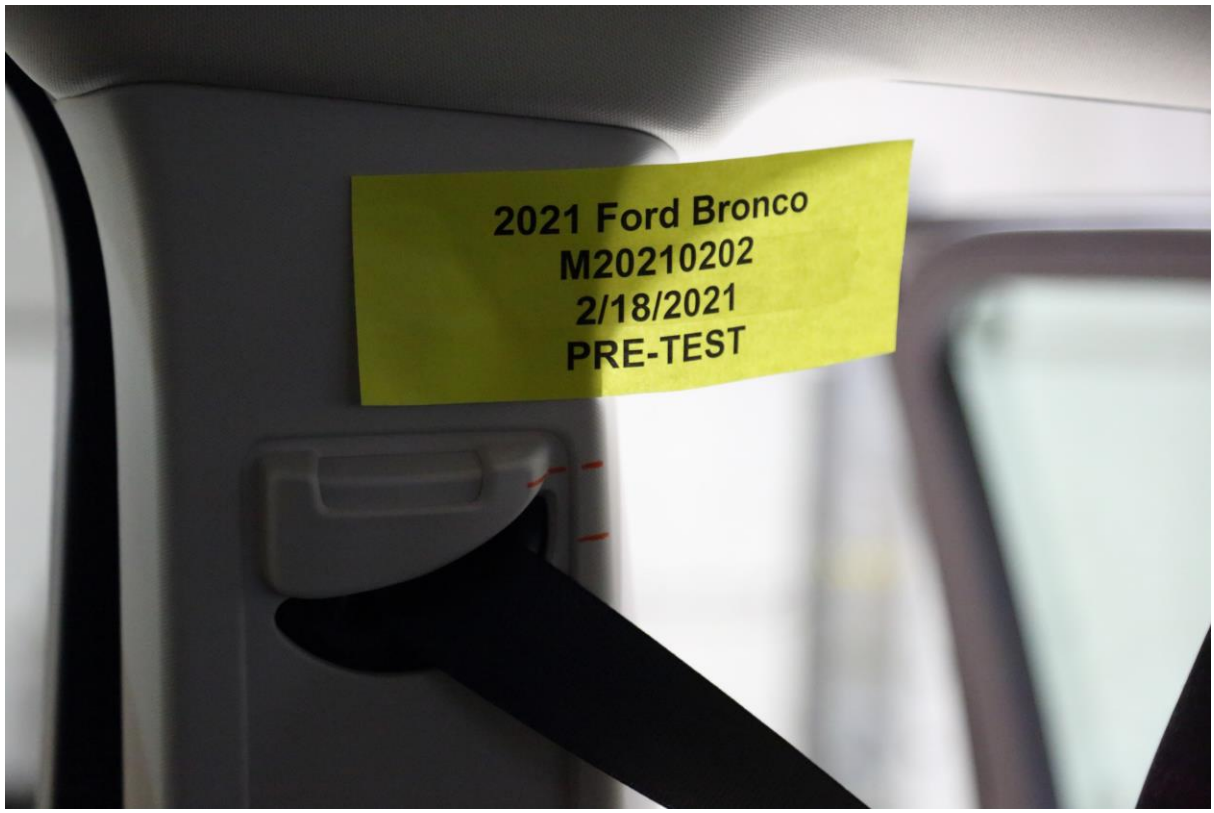

**No. 028 Pre-Test Front View of Seat Pan Prior to Dummy Positioning**


**No. 029 Pre-Test Overhead View of Dummy Thighs on Seat Pan**


**No. 030 Pre-Test Left Side View of Dummy Neck Showing Position of Adjustable Neck Bracket**

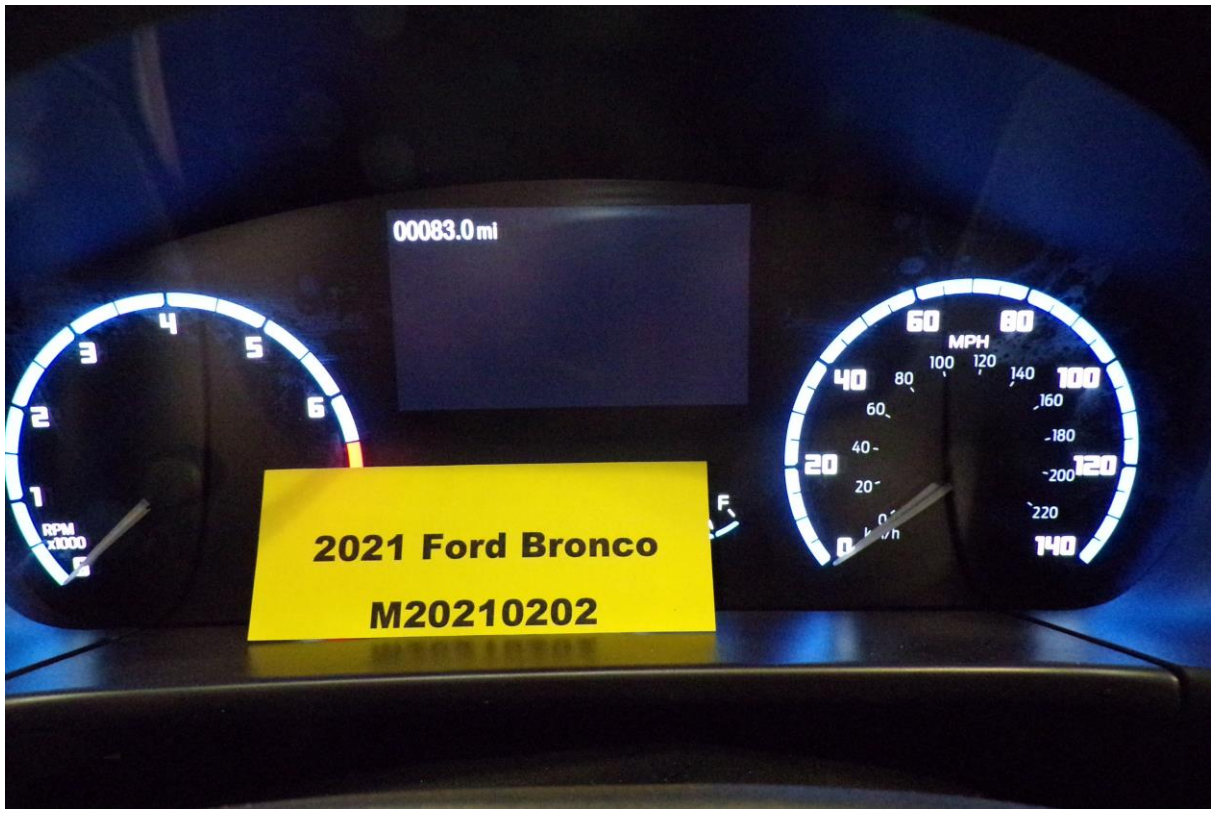

**No. 031 Pre-Test Left Side View of Dummy Head Showing Dummy Head is Level**


**No. 032 Pre-Test Placement of Dummy Feet**

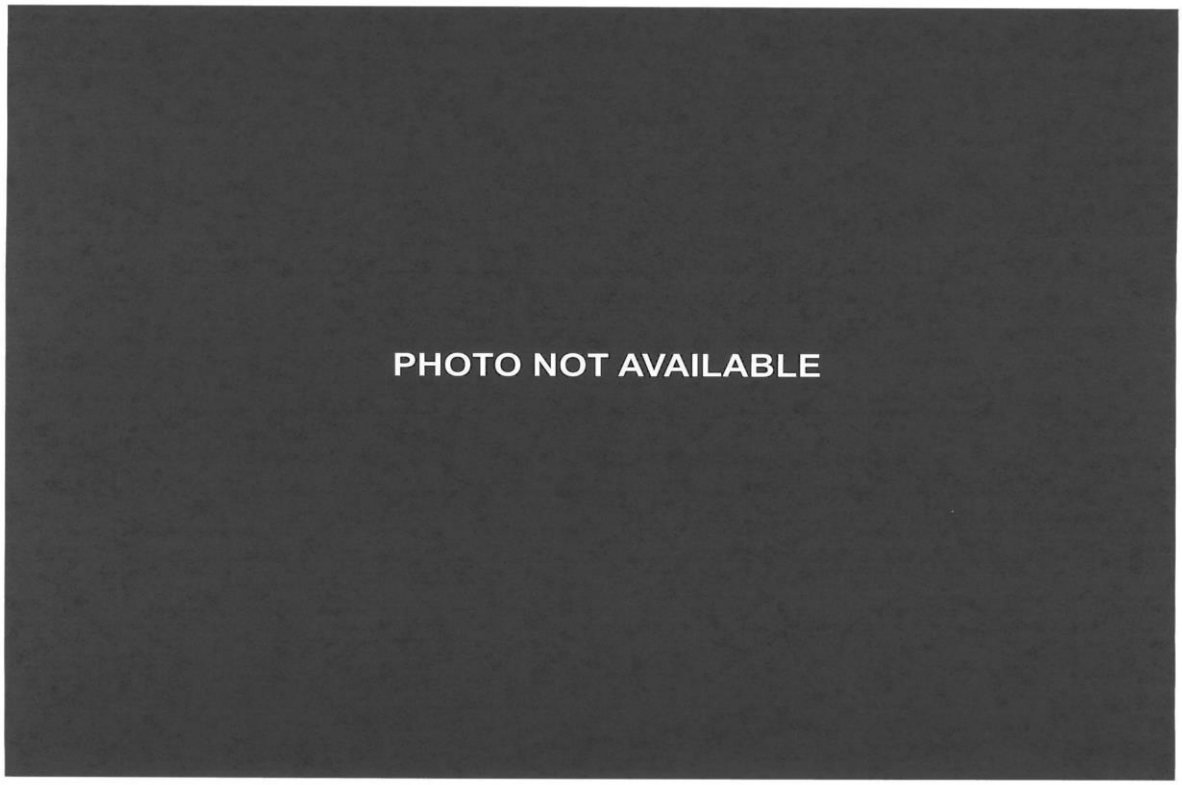



**No. 033 Pre-Test View of Belt Anchorage for Dummy**

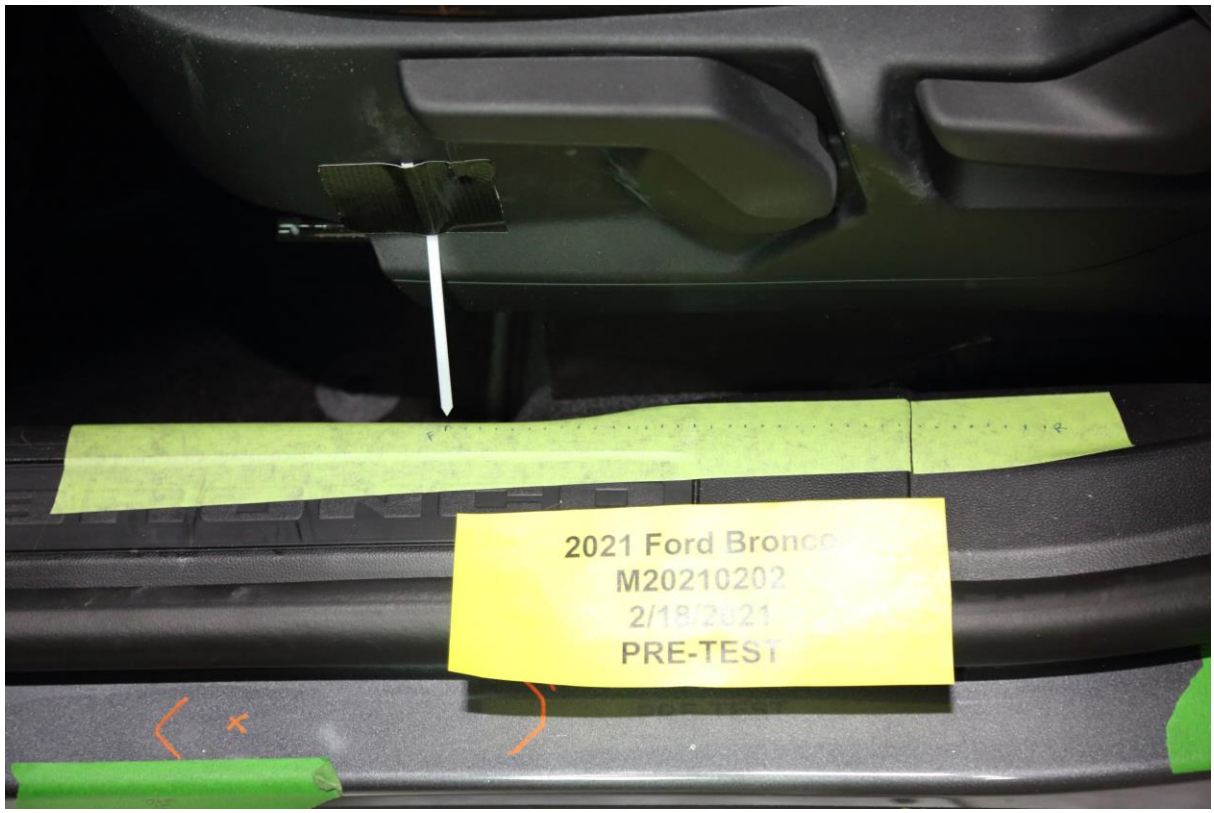

**No. 034 Pre-Test Left Side View of Steering Wheel**




**No. 035 Pre-Test View of Disengaged Parking Brake**




**No. 036  Pre-Test View of Parking Brake**



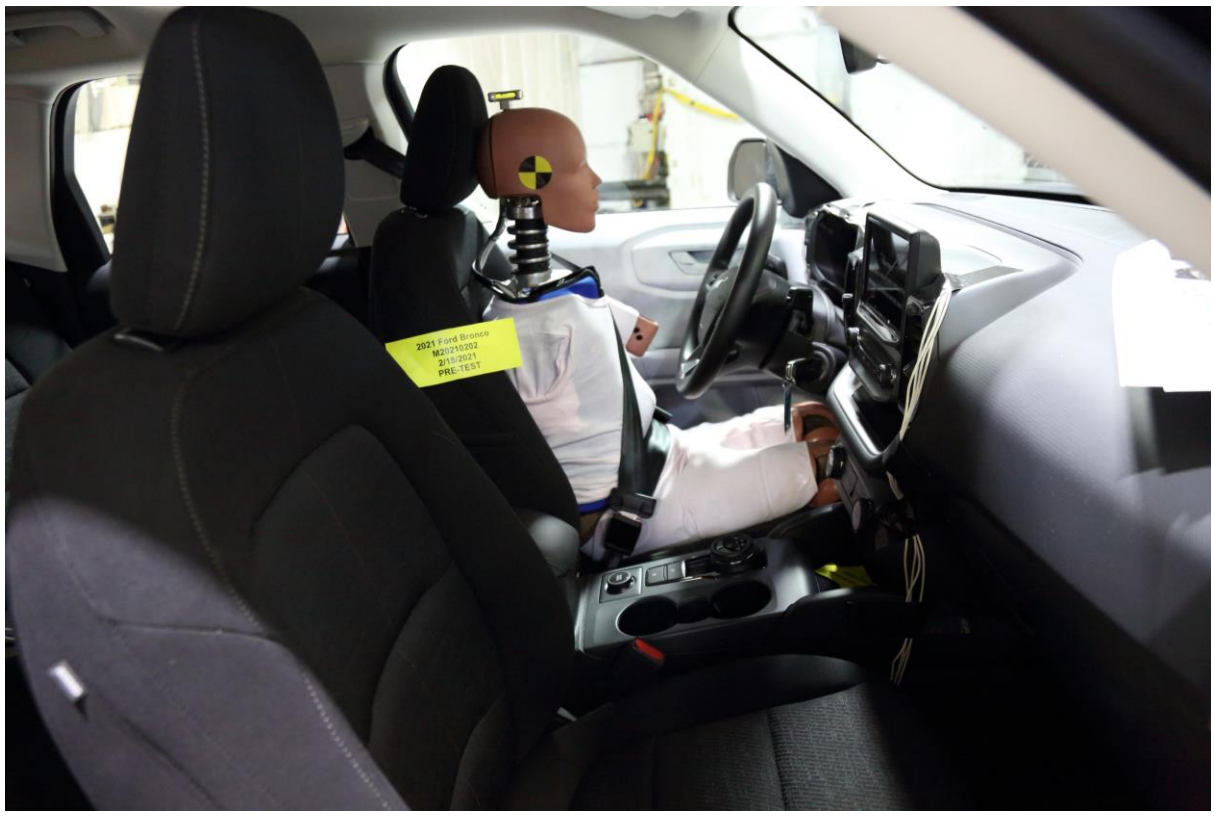

**No. 037  Pre-Test Close-Up Left Side View of Driver Seat Track**

**No. 038 Pre-Test Close-Up Left Side View of Driver Seat Back**


**No. 039 Pre-Test Close-Up View of Driver Seat Back or Head Restraint**


**No. 040 Pre-Test Dummy and Door Clearance View**

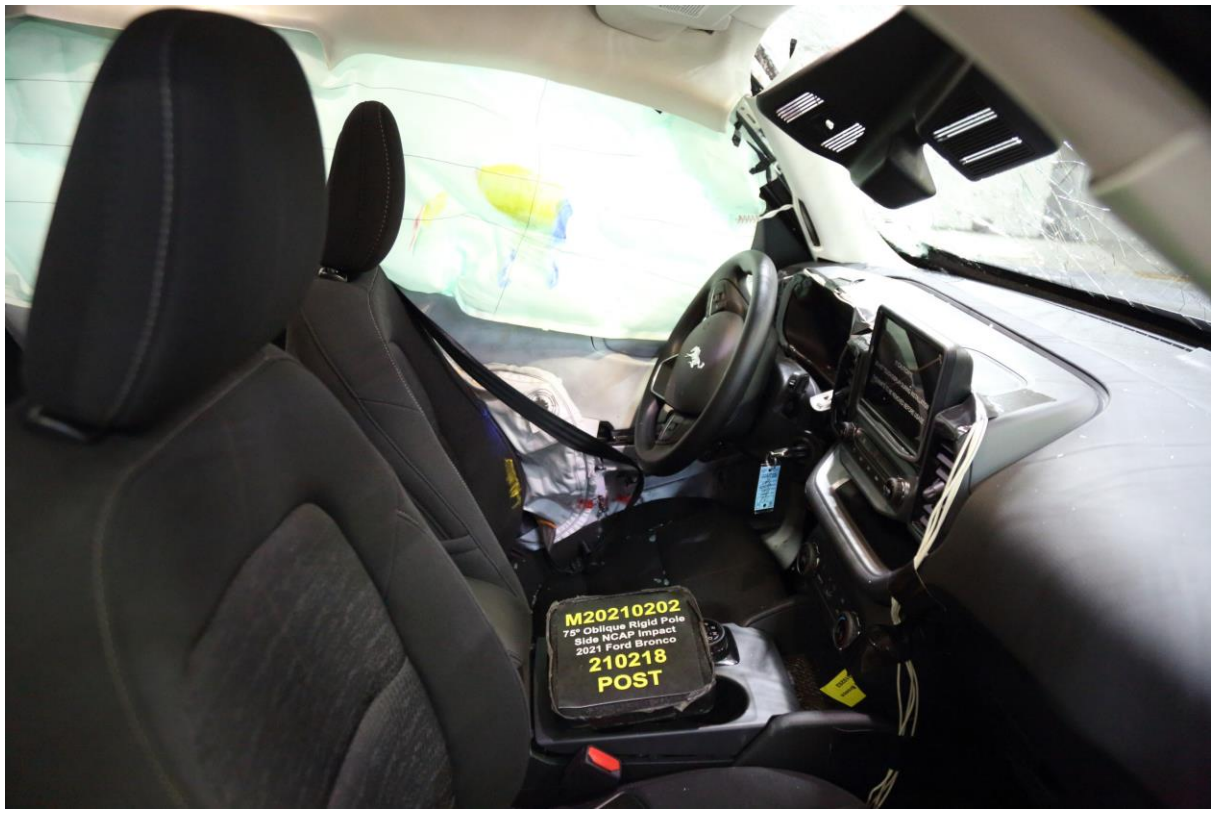

**No. 041 Post-Test Dummy and Door Clearance View**



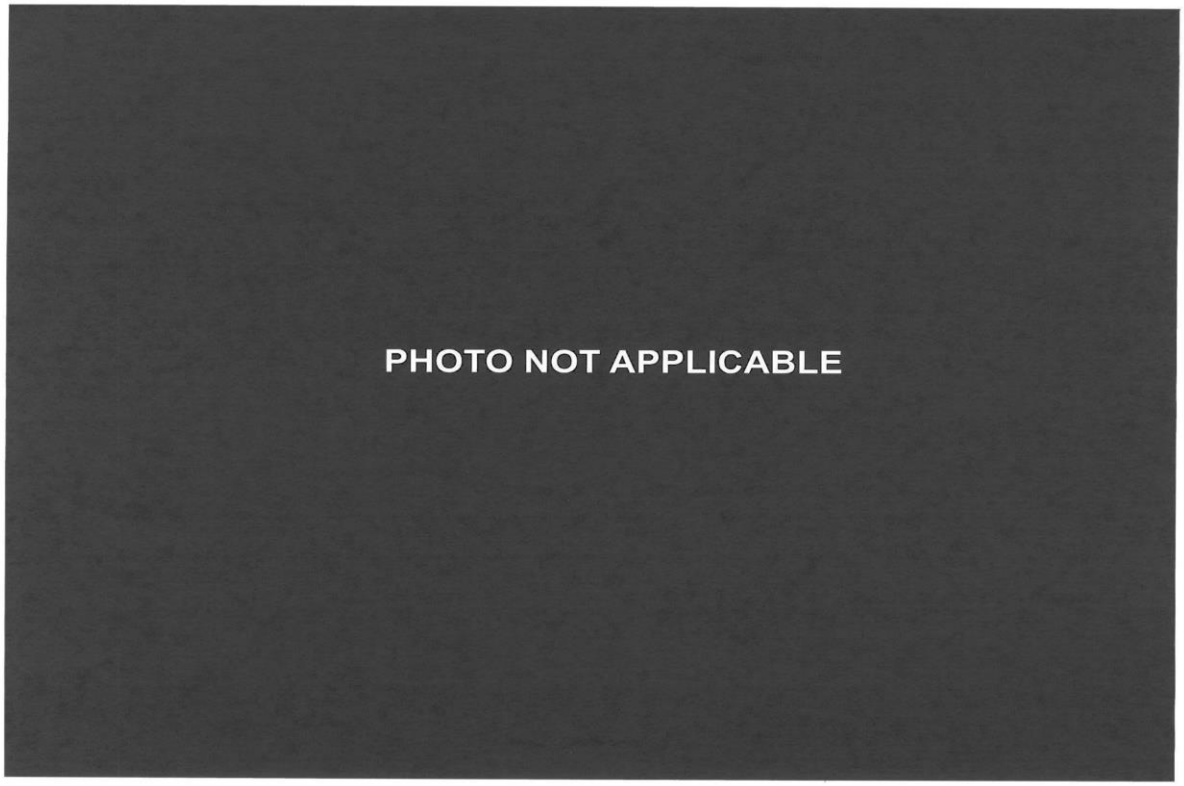

**No. 042 Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment**


**No. 043 Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment**


**No. 044 Pre-Test Inner Door Panel View**




**No. 045 Post-Test Inner Door Panel View Showing Dummy Contact Location**




**No. 046  Post-Test Dummy Close-Up Head Contact with Vehicle Interior View**

**Intentionally Left Blank**


**No. 047 Post-Test Dummy Close-Up Head Contact with Side Airbag View**

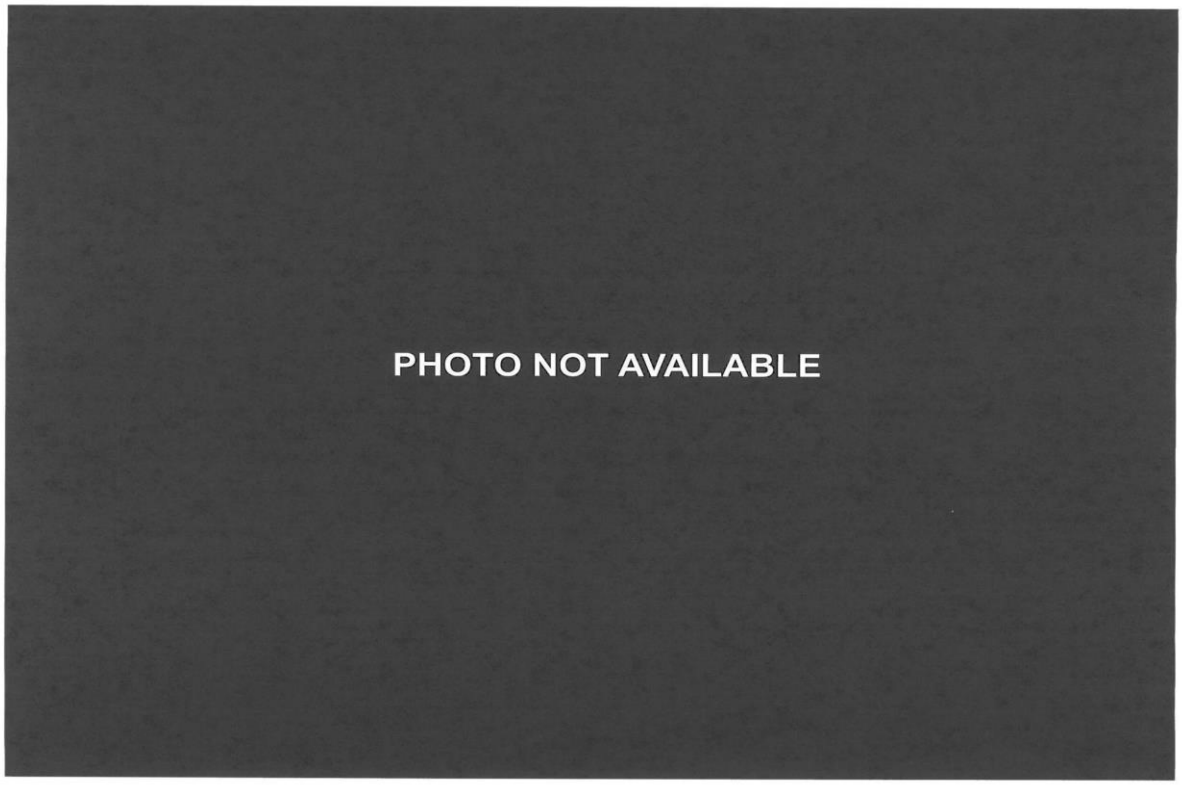

**No. 048 Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View**


**No. 049 Post-Test Dummy Close-Up Torso Contact with Side Airbag View**


**No. 050 Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View**


**No. 051 Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View**


**No. 052 Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View**

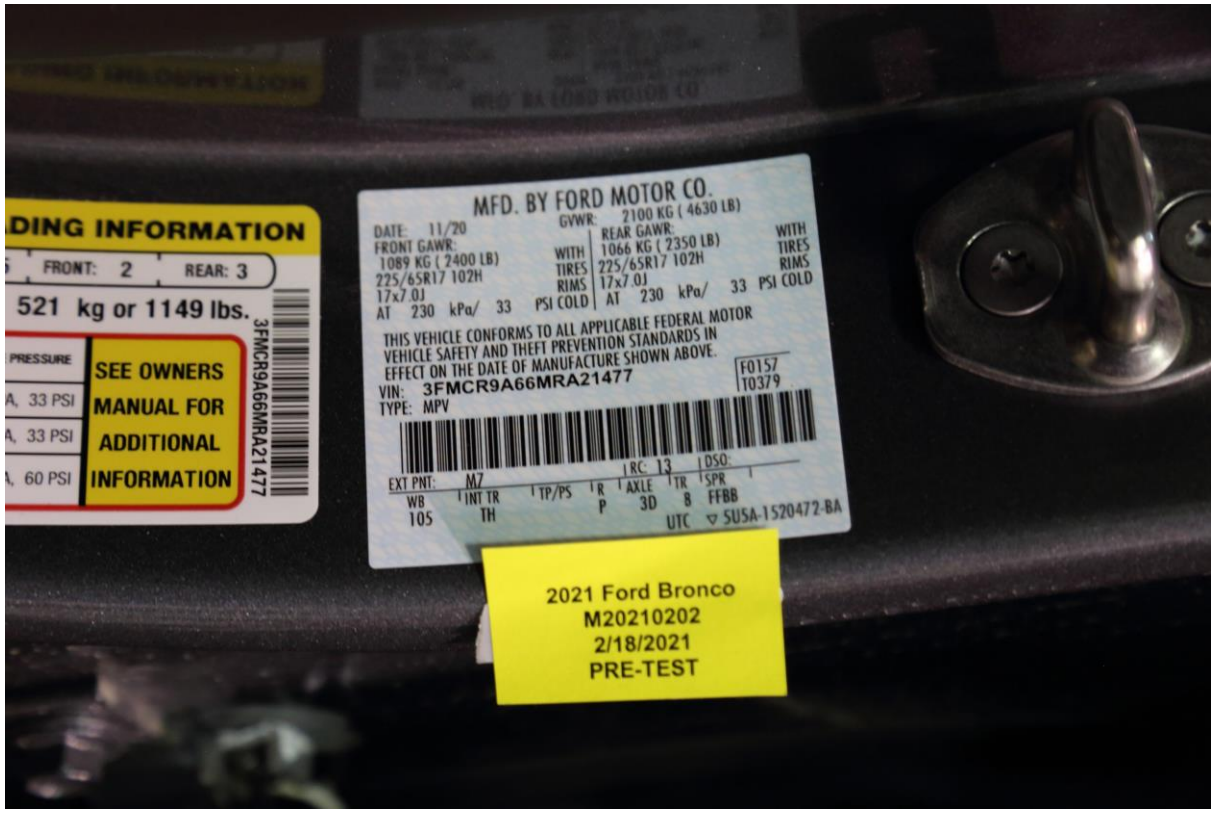



**No. 053 Post-Test Right Side View of Dummy and Rear Seat of Occupant Compartment**


**No. 054 Post-Test Inner Rear Passenger Torso Air Bag Deployment View**

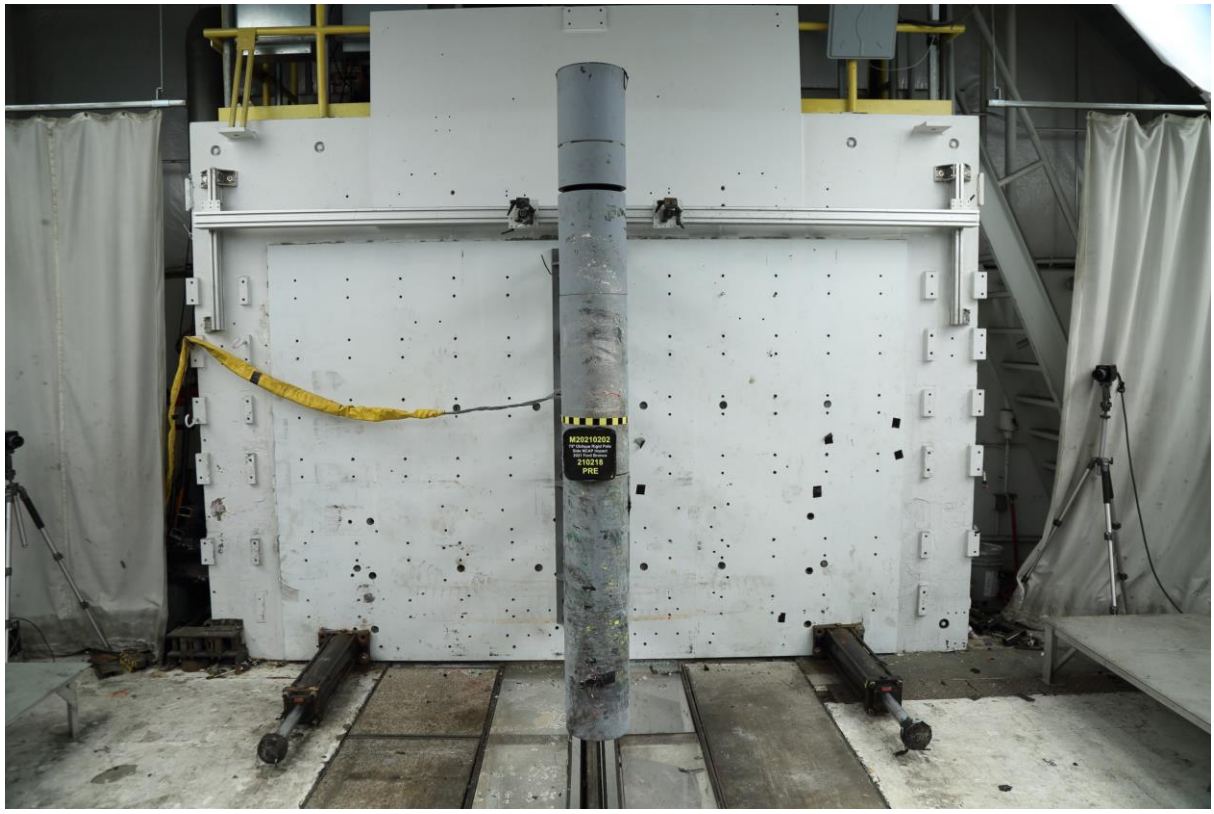

**No. 055 Pre-Test View of Fuel Filler Cap or Fuel Filler Neck**


**No. 056 Post-Test View of Fuel Filler Cap or Fuel Filler Neck**

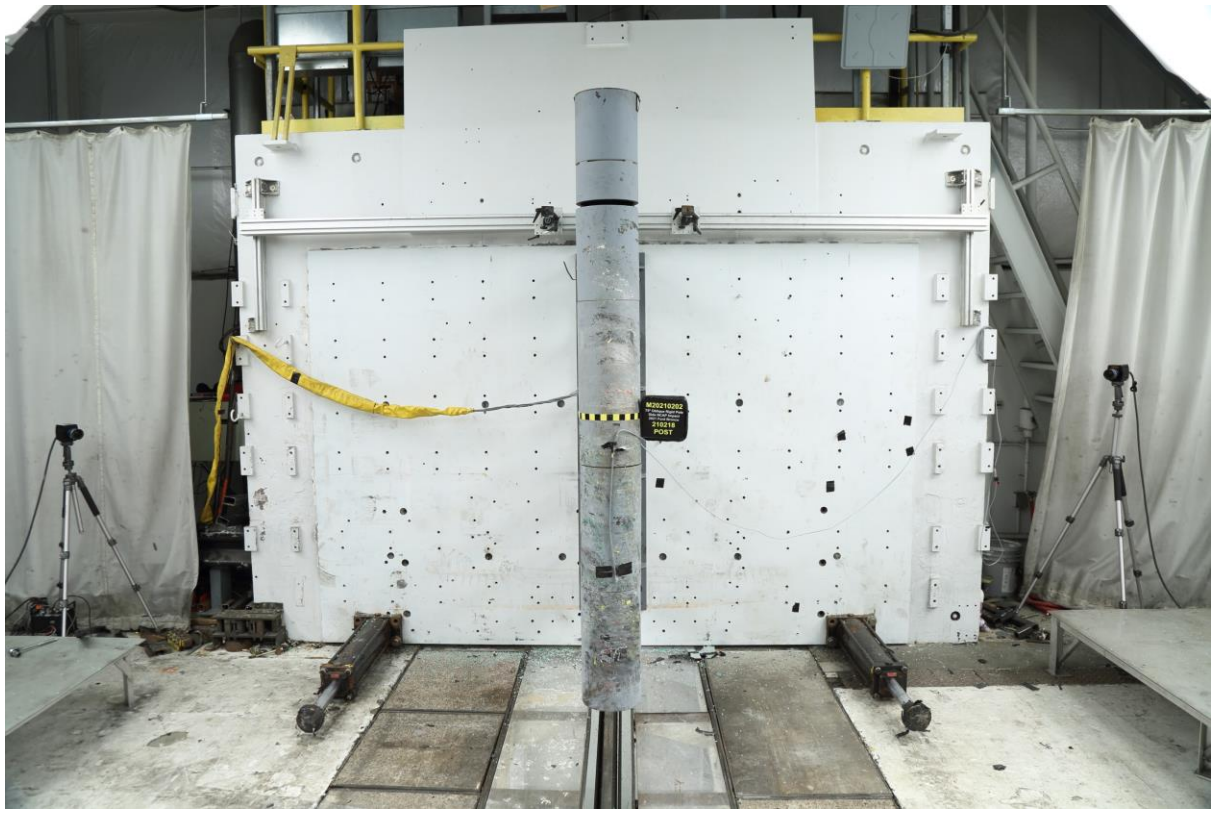



**No. 057 Close-Up View of Vehicle Certification Label**

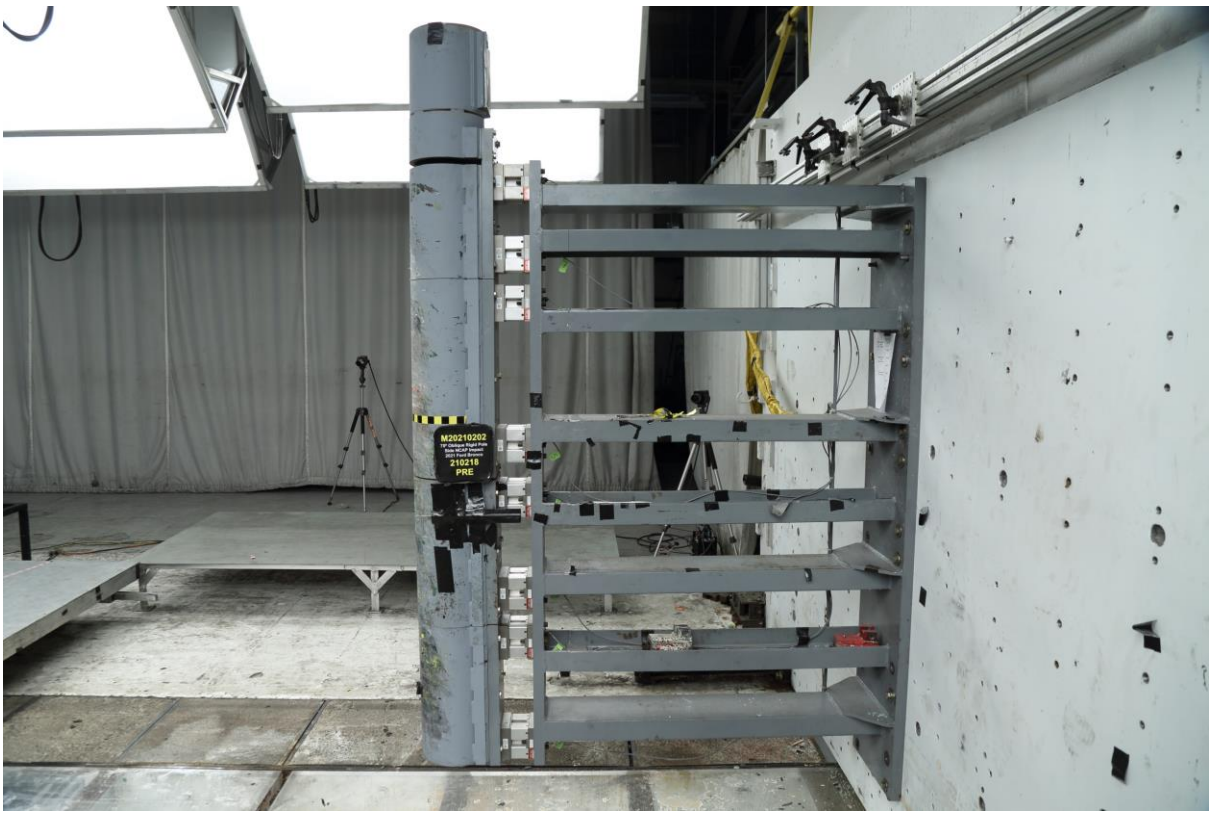

**No. 058 Close-Up View of Vehicle Tire Information Placard or Label**




**No. 059 Pre-Test Pole Barrier Front View**

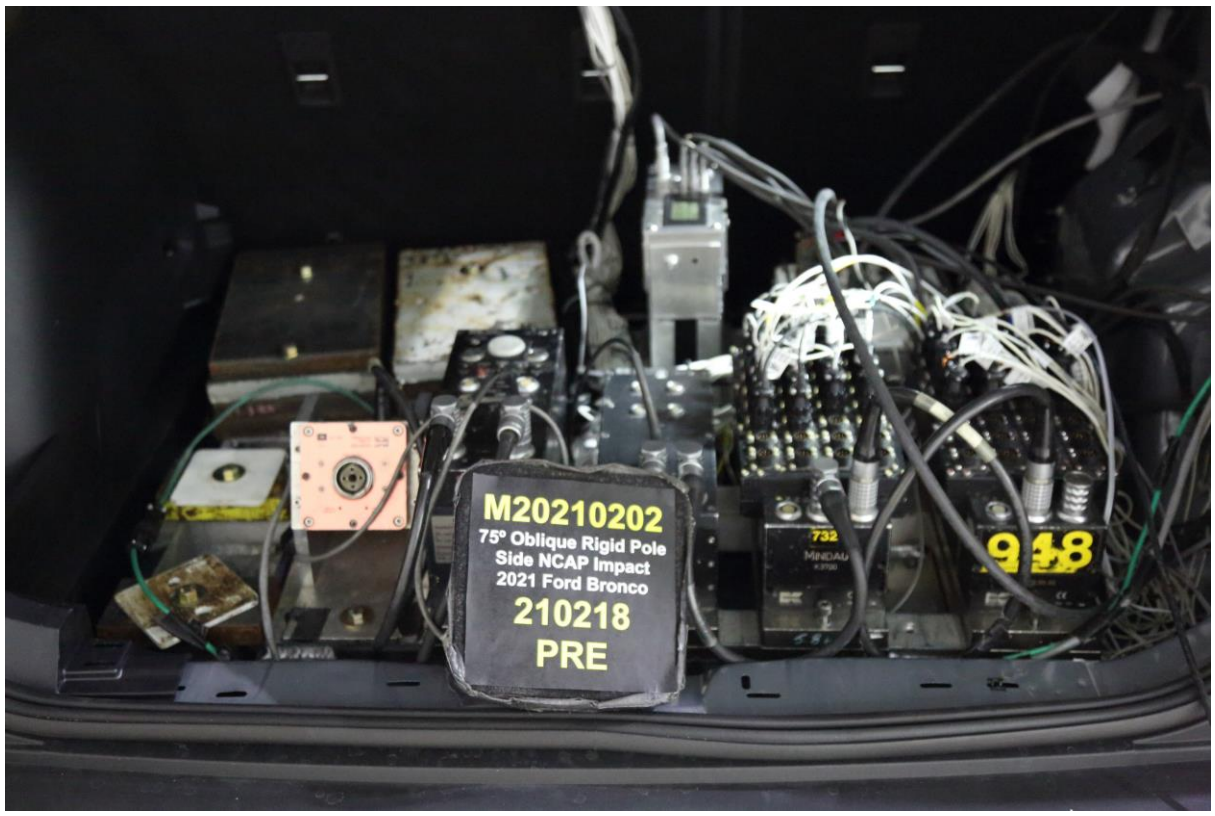



**No. 060 Post-Test Pole Barrier Front View**



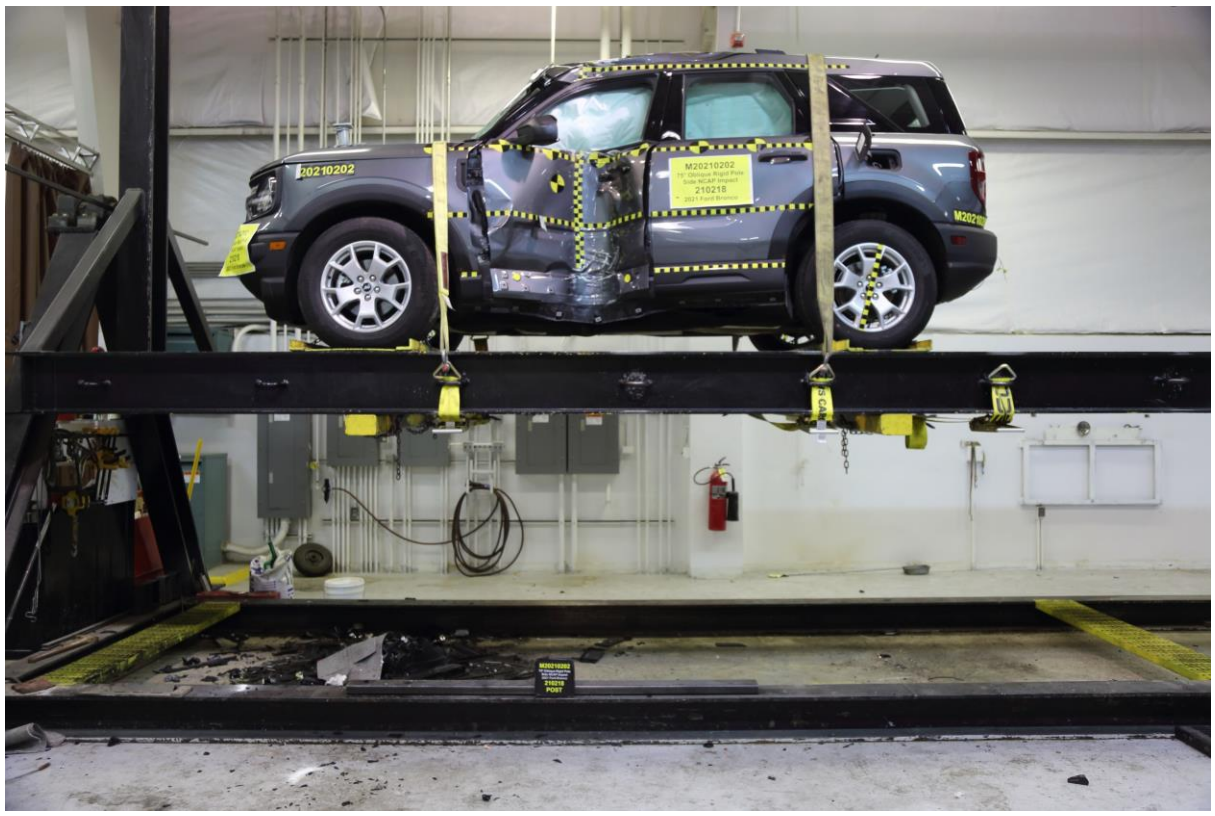

**No. 061 Pre-Test Pole Barrier Side View**


**No. 062 Post-Test Pole Barrier Side View**



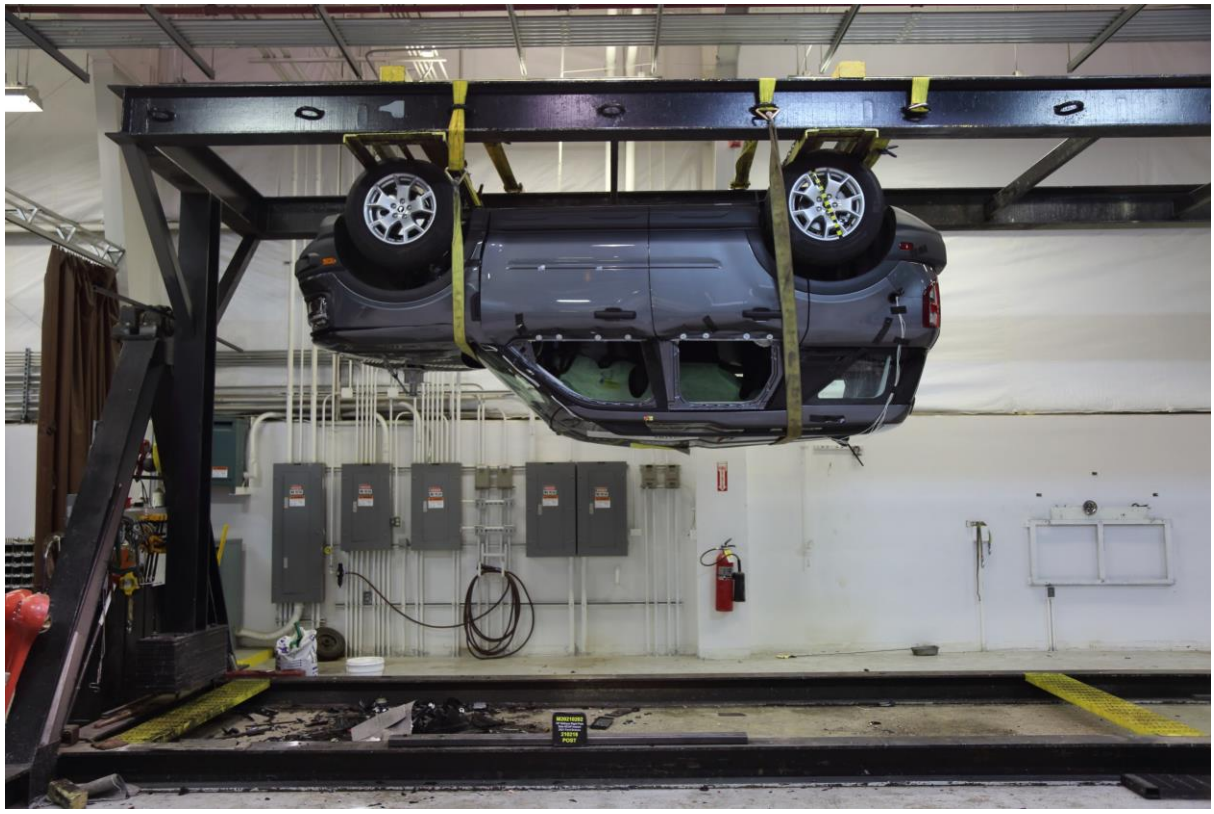

**No. 063 Pre-Test Ballast View**


**No. 064 Post-Test Primary and Redundant Speed Trap Read Out**




**No. 065 FMVSS No. 301 Static Rollover 0 Degrees**


**No. 066 FMVSS No. 301 Static Rollover 90 Degrees**

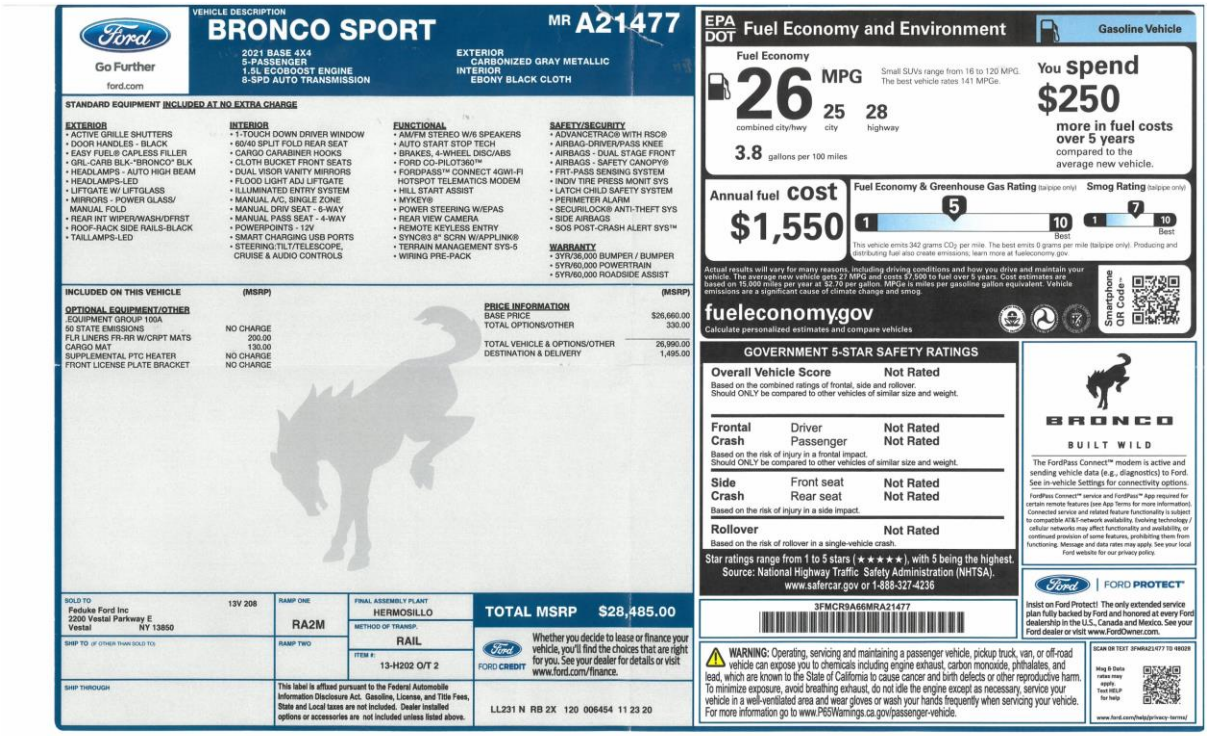


**No. 067  FMVSS No. 301 Static Rollover 180 Degrees**


**No. 068  FMVSS No. 301 Static Rollover 270 Degrees**


**No. 069  FMVSS No. 301 Static Rollover 360 Degrees**


**No. 070  Impact Event**



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VEHICLE DESCRIPTION
**BRONCO SPORT** MR A21477
2021 BASE 4X4
5-PASSENGER
1.5L ECOBOOST ENGINE
8-SPD AUTO TRANSMISSION
EXTERIOR CARBONIZED GRAY METALLIC
INTERIOR EBONY BLACK CLOTH

STANDARD EQUIPMENT INCLUDED AT NO EXTRA CHARGE

EXTERIOR
- ACTIVE GRILLE SHUTTERS
- DOOR HANDLES - BLACK
- EASY FUEL® CAPLESS FILLER
- GRL-CARB BLK-"BRONCO" BLK
- HEADLAMPS - AUTO HIGH BEAM
- HEADLAMPS-LED
- LIFTGATE W/ LIFTGLASS
- MIRRORS - POWER GLASS/ MANUAL FOLD
- REAR INT WIPER/WASH/DFRST
- ROOF-RACK SIDE RAILS-BLACK
- TAILLAMPS-LED

INTERIOR
- 1-TOUCH DOWN DRIVER WINDOW
- 60/40 SPLIT FOLD REAR SEAT
- CARGO CARABINER HOOKS
- CLOTH BUCKET FRONT SEATS
- DUAL VISOR VANITY MIRRORS
- FLOOD LIGHT ADJ LIFTGATE
- ILLUMINATED ENTRY SYSTEM
- MANUAL A/C, SINGLE ZONE
- MANUAL DRIV SEAT - 6-WAY
- MANUAL PASS SEAT - 4-WAY
- POWERPOINTS - 12V
- SMART CHARGING USB PORTS
- STEERING:TILT/TELESCOPE, CRUISE & AUDIO CONTROLS

FUNCTIONAL
- AM/FM STEREO W/6 SPEAKERS
- AUTO START STOP TECH
- BRAKES, 4-WHEEL DISC/ABS
- FORD CO-PILOT360™
- FORDPASS™ CONNECT 4GWI-FI HOTSPOT TELEMATICS MODEM
- HILL START ASSIST
- MYKEY®
- POWER STEERING W/EPAS
- REAR VIEW CAMERA
- REMOTE KEYLESS ENTRY
- SYNC®3 8" SCRN W/APPLINK®
- TERRAIN MANAGEMENT SYS-S
- WIRING PRE-PACK

SAFETY/SECURITY
- ADVANCETRAC® WITH RSC®
- AIRBAG-DRIVER/PASS KNEE
- AIRBAGS - DUAL STAGE FRONT
- AIRBAGS - SAFETY CANOPY®
- FRT-PASS SENSING SYSTEM
- INDIV TIRE PRESS MONIT SYS
- LATCH CHILD SAFETY SYSTEM
- PERIMETER ALARM
- SECURILOCK® ANTI-THEFT SYS
- SIDE AIRBAGS
- SOS POST-CRASH ALERT SYS™

WARRANTY
- 3YR/36,000 BUMPER / BUMPER
- 5YR/60,000 POWERTRAIN
- 5YR/60,000 ROADSIDE ASSIST

INCLUDED ON THIS VEHICLE (MSRP)

OPTIONAL EQUIPMENT/OTHER
- EQUIPMENT GROUP 100A
- 50 STATE EMISSIONS — NO CHARGE
- FLR LINERS FR-RR W/CRPT MATS — 200.00
- CARGO MAT — 130.00
- SUPPLEMENTAL PTC HEATER — NO CHARGE
- FRONT LICENSE PLATE BRACKET — NO CHARGE

PRICE INFORMATION (MSRP)
- BASE PRICE — $26,660.00
- TOTAL OPTIONS/OTHER — 330.00
- TOTAL VEHICLE & OPTIONS/OTHER — 26,990.00
- DESTINATION & DELIVERY — 1,495.00

SOLD TO: Feduke Ford Inc, 2200 Vestal Parkway E, Vestal NY 13850 — 13V 208
SHIP TO (IF OTHER THAN SOLD TO):
SHIP THROUGH:
RAMP ONE: RA2M
RAMP TWO:
FINAL ASSEMBLY PLANT: HERMOSILLO
METHOD OF TRANSP.: RAIL
ITEM #: 13-H202 O/T 2

**TOTAL MSRP $28,485.00**

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

This label is affixed pursuant to the Federal Automobile Information Disclosure Act. Gasoline, License, and Title Fees, State and Local taxes are not included. Dealer installed options or accessories are not included unless listed above.

LL231 N RB 2X 120 006454 11 23 20

EPA DOT **Fuel Economy and Environment** — Gasoline Vehicle

Fuel Economy: **26** MPG (combined city/hwy) — 25 city — 28 highway
3.8 gallons per 100 miles
Small SUVs range from 16 to 120 MPG. The best vehicle rates 141 MPGe.

You spend **$250** more in fuel costs over 5 years compared to the average new vehicle.

Annual fuel cost **$1,550**

Fuel Economy & Greenhouse Gas Rating (tailpipe only): 5 (1 – 10 Best)
Smog Rating (tailpipe only): 7 (1 – 10 Best)

This vehicle emits 342 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 $7,500 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at $2.70 per gallon. MPGe is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

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

Smartphone QR Code™

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

3FMCR9A66MRA21477

BRONCO
BUILT WILD

The FordPass Connect™ modem is active and sending vehicle data (e.g., diagnostics) to Ford. See in-vehicle Settings for connectivity options.

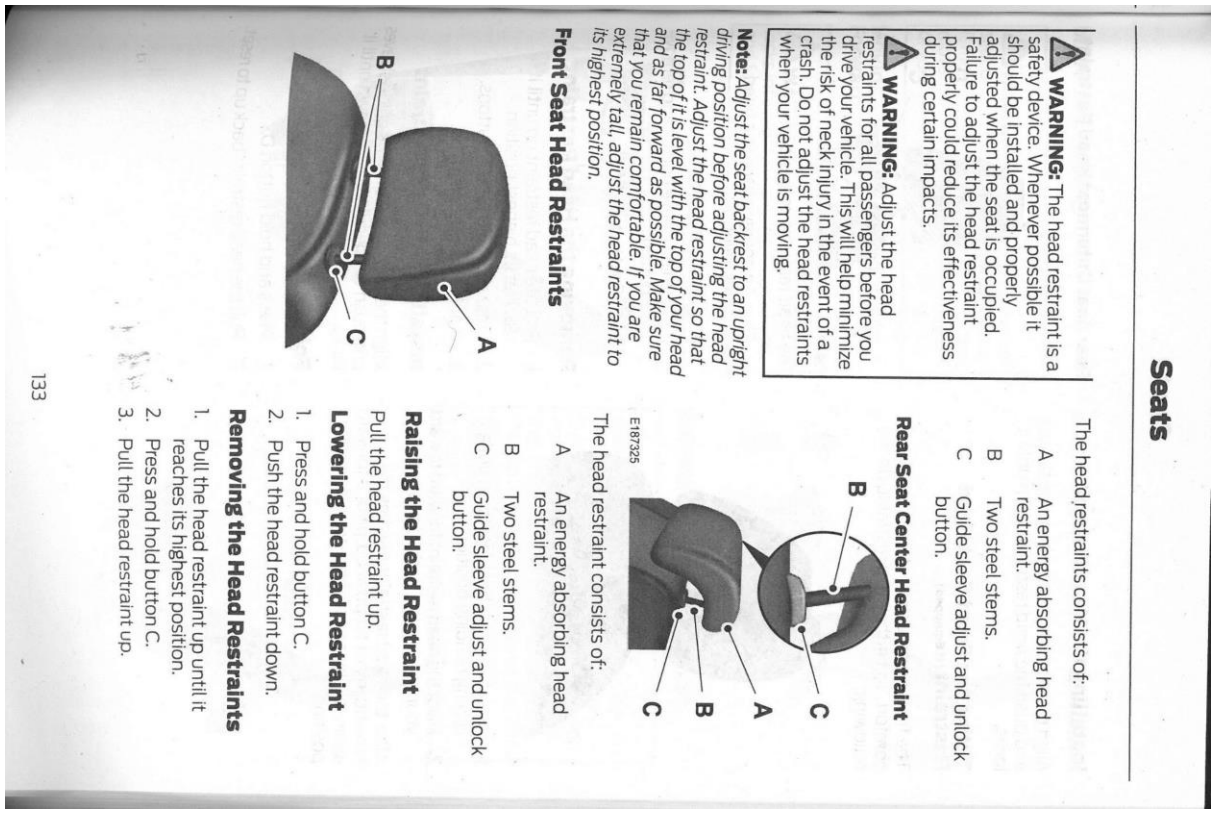
FordPass Connect™ service and FordPass™ App required for certain remote features (see App Terms for more information). Connected service and related feature functionality is subject to compatible AT&T-network availability, evolving technology / cellular networks may affect functionality and availability, or continued provision of some features, prohibiting them from functioning. Message and data rates may apply. See your local Ford website for our privacy policy.

FORD PROTECT
Insist on Ford Protect! The only extended service plan fully backed by Ford and honored at every Ford dealership in the U.S., Canada and Mexico. See your Ford dealer or visit www.FordOwner.com.

SCAN OR TEXT 3FMCR9A66MRA21477 TO 48028
Msg & Data rates may apply. Text HELP for help
www.ford.com/help/privacy-terms/

WARNING: Operating, servicing and maintaining a passenger vehicle, pickup truck, van, or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to www.P65Warnings.ca.gov/passenger-vehicle.

**No. 071 Monroney Label**



Seats

The head restraints consists of:
A An energy absorbing head restraint.
B Two steel stems.
C Guide sleeve adjust and unlock button.

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

**WARNING:** Adjust the head restraints for all passengers before you drive your vehicle. This will help minimize the risk of neck injury in the event of a crash. Do not adjust the head restraints when your vehicle is moving.

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

**Front Seat Head Restraints**




**Rear Seat Center Head Restraint**




E187325

The head restraint consists of:
A An energy absorbing head restraint.
B Two steel stems.
C Guide sleeve adjust and unlock button.

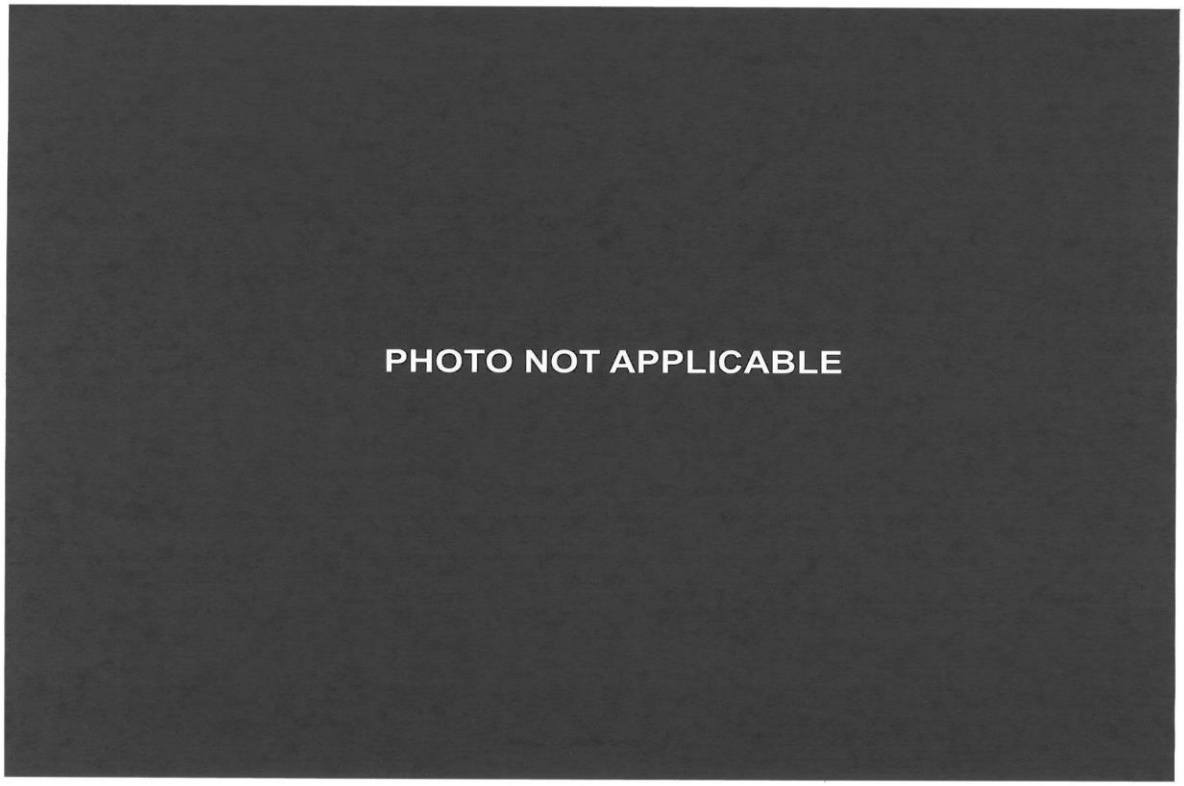
**Raising the Head Restraint**
Pull the head restraint up.

**Lowering the Head Restraint**
1. Press and hold button C.
2. Push the head restraint down.

**Removing the Head Restraints**
1. Pull the head restraint up until it reaches its highest position.
2. Press and hold button C.
3. Pull the head restraint up.

133

**No. 072 Head Restraint Use and Adjustment Information from Vehicle Owner Manual**




**No. 073  Post-Test View of Shattered Vehicle Inner Door Panel**

# APPENDIX B
# VEHICLE AND DUMMY RESPONSE DATA PLOTS

## TABLE OF DATA PLOTS



The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at: www.nhtsa.gov.

### Additional Driver Dummy Instrumentation Data

Driver Head Acceleration (X) Redundant
Driver Head Acceleration (Y) Redundant
Driver Head Acceleration (Z) Redundant
Driver Upper Thorax Rib Deflection (Y)
Driver Middle Thorax Rib Deflection (Y)
Driver Lower Thorax Rib Deflection (Y)
Driver Upper Abdomen Rib Deflection (Y)
Driver Lower Abdomen Rib Deflection (Y)
Driver Head Angular Velocity (X)
Driver Head Angular Velocity (Y)
Driver Head Angular Velocity (Z)

**Vehicle Instrumentation Data**

Vehicle Center of Gravity Acceleration (X)
Vehicle Center of Gravity Acceleration (Y)
Vehicle Center of Gravity Acceleration (Z)
Left Floor Sill Acceleration (Y)
Left A-Pillar Sill Acceleration (Y)
Left Lower A-Pillar Acceleration (Y)
Left Mid A-Pillar Acceleration (Y)
Left B-Pillar Sill Acceleration (Y)
Left Lower B-Pillar Acceleration (Y)
Left Mid B-Pillar Acceleration (Y)
Driver Seat Track at Dummy Hip Point Acceleration (Y)
Engine Top Acceleration (X)
Engine Top Acceleration (Y)
Firewall Center Acceleration (Y)
Right Roof at Vertical Impact Reference Line Acceleration (Y)
Right Sill at Vertical Impact Reference Line Acceleration (Y)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

**Pole Instrumentation Data**

Load Cell Pole Barrier #1 Force (X)
Load Cell Pole Barrier #2 Force (X)
Load Cell Pole Barrier #3 Force (X)
Load Cell Pole Barrier #4 Force (X)
Load Cell Pole Barrier #5 Force (X)
Load Cell Pole Barrier #6 Force (X)
Load Cell Pole Barrier #7 Force (X)
Load Cell Pole Barrier #8 Force (X)

**NHTSA**

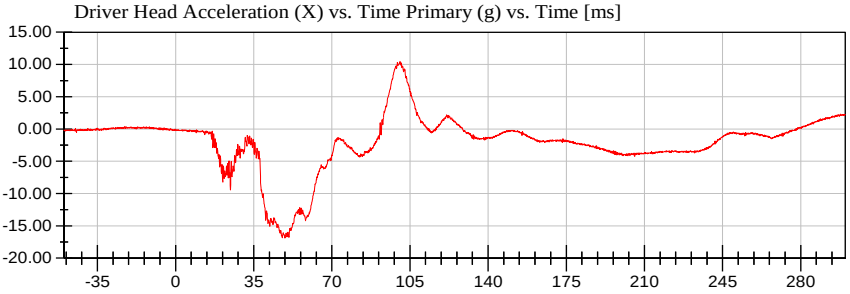
Test Date: 02/18/2021

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 210218 (M20210202)

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




**<Max>**

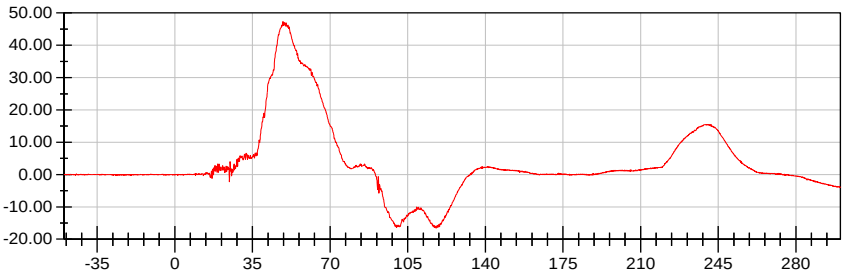
10.44 g at 100.56 ms

**<Min>**

-16.92 g at 48.96 ms

CFC_1000

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




**<Max>**

47.33 g at 48.72 ms

**<Min>**

-16.53 g at 117.92 ms

CFC_1000

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


**<Max>**

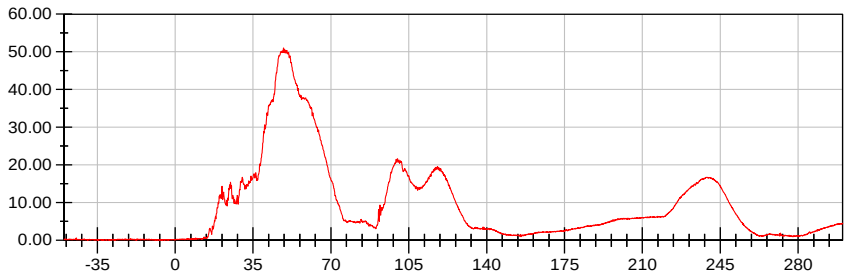
20.26 g at 40.24 ms

**<Min>**

-10.48 g at 118.40 ms

CFC_1000

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




**<Max>**

51.05 g at 48.72 ms

**<Min>**

0.02 g at -36.08 ms

CFC_1000

**NHTSA**

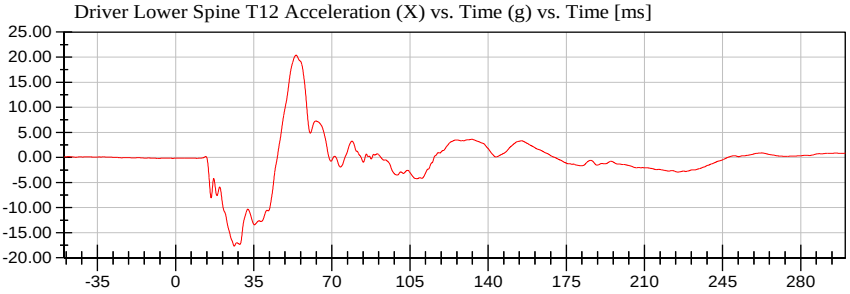
Test Date: 02/18/2021

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 210218 (M20210202)

Driver Lower Spine T12 Acceleration (X) vs. Time (g) vs. Time [ms]




**<Max>**

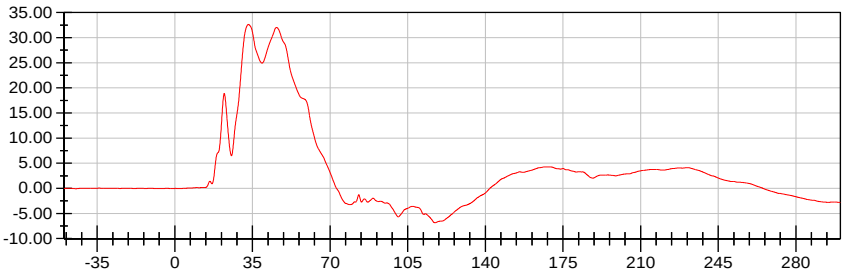
20.39 g at 54.00 ms

**<Min>**

-17.67 g at 26.24 ms

CFC_180

Driver Lower Spine T12 Acceleration (Y) vs. Time (g) vs. Time [ms]




**<Max>**

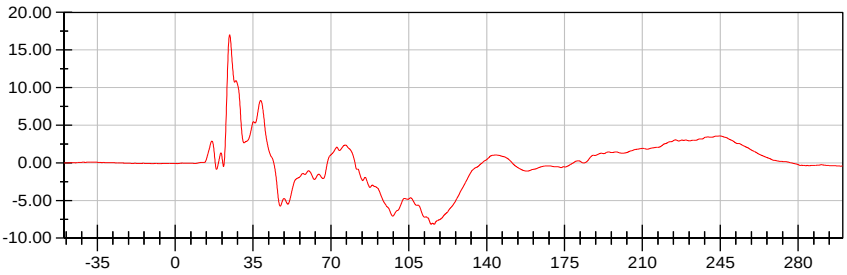
32.62 g at 33.12 ms

**<Min>**

-6.85 g at 117.28 ms

CFC_180

Driver Lower Spine T12 Acceleration (Z) vs. Time (g) vs. Time [ms]




**<Max>**

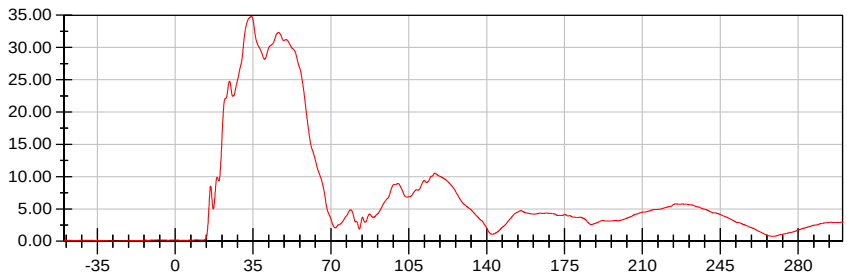
17.02 g at 24.48 ms

**<Min>**

-8.17 g at 116.40 ms

CFC_180

Driver Lower Spine T12 Acceleration Resultant vs. Time (g) vs. Time [ms]




**<Max>**

34.82 g at 34.16 ms

**<Min>**

0.02 g at -26.00 ms

CFC_180

**NHTSA**

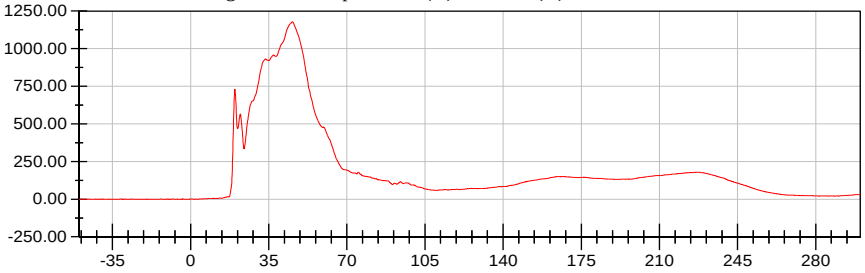
Test Date: 02/18/2021

Position #1 SID IIs Dummy (297)

Test Lab: CTF

Test Number: 210218 (M20210202)

Driver Iliac Wing Force on Impact Side (Y) vs. Time (N) vs. Time [ms]




**<Max>**

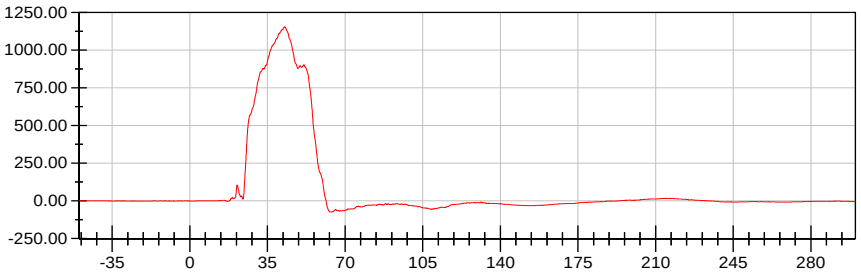
1,178.02 N at 45.52 ms

**<Min>**

-1.17 N at -35.28 ms

CFC_600

Driver Acetabulum Force on Impact Side (Y) vs. Time (N) vs. Time [ms]




**<Max>**

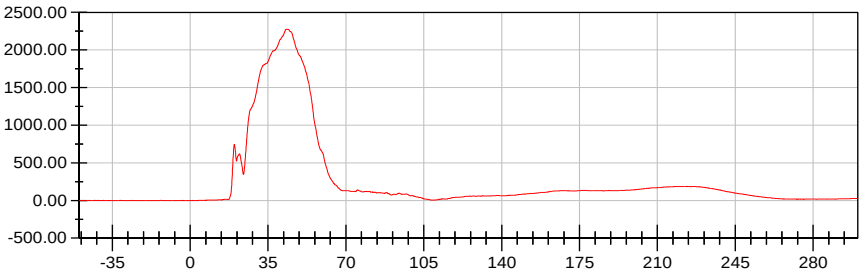
1,156.67 N at 42.72 ms

**<Min>**

-73.93 N at 63.52 ms

CFC_600

Driver Total Pelvis Force on Impact Side (Y) vs. Time (N) vs. Time [ms]




**<Max>**

2,276.42 N at 43.44 ms

**<Min>**

-1.38 N at -35.28 ms

CFC_600

# APPENDIX C
# DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA

**TABLE OF CALIBRATION MEASUREMENTS AND PLOTS**
**SID-IIs (Driver) Dummy**
**Description**

**Table 1.** External Measurements
**Table 2.** Head Drop Test
- Resultant Head Acceleration (G's) vs. Time (ms)
- Head (X) Acceleration (G's) vs. Time (ms)
- Head (Y) Acceleration (G's) vs. Time (ms)
- Head (Z) Acceleration (G's) vs. Time (ms)

**Table 3.** Lateral Neck Pendulum Test
- Pendulum Velocity (m/s) vs. Time (ms)
- Flexion Angle (°) vs. Time (ms)
- Moment About Occipital Condyle (Nm) vs. Time (ms)

**Table 4.** Shoulder Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Shoulder Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)

**Table 5.** Thorax (With Arm) Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Shoulder Displacement (mm) vs. Time (ms)
- Upper Rib Displacement (mm) vs. Time (ms)
- Middle Rib Displacement (mm) vs. Time (ms)
- Lower Rib Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

**Table 6.** Thorax (Without Arm) Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Upper Rib Displacement (mm) vs. Time (ms)
- Middle Rib Displacement (mm) vs. Time (ms)
- Lower Rib Displacement (mm) vs. Time (ms)
- Upper Spine Acceleration (G's) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

**Table 7.** Abdomen Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Upper Abdominal Rib Displacement (mm) vs. Time (ms)
- Lower Abdominal Rib Displacement (mm) vs. Time (ms)
- Lower Spine Acceleration (G's) vs. Time (ms)

**Table 8.** Pelvis Plug Quasi-Static Test (Optional*)
**Table 9.** Pelvis Acetabulum Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Pelvis (Y) Acceleration (G's) vs. Time (ms)
- Acetabulum Force (N) vs. Time (ms)

**Table 10.** Pelvis Iliac Impact Test
- Impactor Acceleration (G's) vs. Time (ms)
- Pelvis (Y) Acceleration (G's) vs. Time (ms)
- Iliac Force (N) vs. Time (ms)

**Pre-Test Calibration Sheets**
**Driver S/N 297**

**Transportation Research Center Inc.**
**SIDIIs Dummy - Level D**
**External Dimensions**
**Serial No. 297 Calibration No. 50**

| Symbol | Description | Specification | Results | Pass |
|---|---|---|---|---|
| | | mm | mm | |
| A | Sitting Height | 772.0 - 788.0 | 780 | Yes |
| B | Shoulder Pivot Height | 437.0 - 453.0 | 450 | Yes |
| C | H-Point Height | 79.0 - 89.0 | 85 | Yes |
| D | H-Point from Seat Back | 141.0 - 151.0 | 147 | Yes |
| E | Shoulder Pivot from Backline | 97.0 - 107.0 | 102 | Yes |
| F | Thigh Clearance | 119.0 - 135.0 | 130 | Yes |
| G | Head Breadth | 140.0 - 148.0 | 147 | Yes |
| H | Head Back from Backline | 40.0 - 46.0 | 45 | Yes |
| I | Head Depth | 178.0 - 188.0 | 183 | Yes |
| J | Head Circumference | 541.0 - 551.0 | 544 | Yes |
| K | Buttock to Knee Length | 514.0 - 540.0 | 528 | Yes |
| L | Popliteal Height | 343.0 - 369.0 | 353 | Yes |
| M | Knee Pivot to Floor Height | 393.0 - 409.0 | 400 | Yes |
| N | Buttock Popliteal Length | 416.0 - 442.0 | 430 | Yes |
| O | Chest Depth without Jacket | 195.0 - 211.0 | 200 | Yes |
| P | Foot Length (right) | 216.0 - 232.0 | 223 | Yes |
| P | Foot Length (left) | 216.0 - 232.0 | 223 | Yes |
| Q | Hip Breadth | 313.0 - 323.0 | 320 | Yes |
| R | Arm Length | 249.0 - 259.0 | 254 | Yes |
| S | Knee Joint to seat Back | 478.0 - 493.0 | 485 | Yes |
| V | Shoulder Width (only one arm installed) | 341.0 - 357.0 | 347 | Yes |
| W | Foot Width (right) | 78.0 - 94.0 | 85 | Yes |
| W | Foot Width (left) | 78.0 - 94.0 | 85 | Yes |
| Y | Chest Circumference with Jacket | 851.0 - 881.0 | 879 | Yes |
| Z | Waist Circumference | 761.0 - 791.0 | 782 | Yes |

# Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.6 °C | 21.2 °C | Yes |
| Relative Humidity | 10 - 70 % | 38 % | Yes |
| Peak Head Resultant Acceleration | 115 - 137 g | 136.2 g | Yes |
| Peak Head Longitudinal Acceleration | (-15) - 15 g | -2.0 g | Yes |
| Is Head Resultant Acceleration Curve Unimodal within 15% of Peak? | < 15 % | 1.16 % | Yes |

**Test meets specifications.**

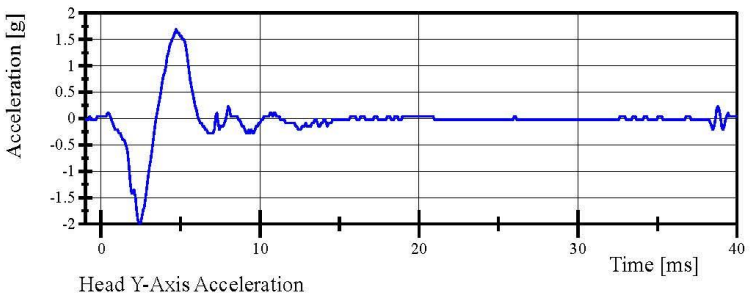
**Condition: Used**

**Comments:**
**Head S/N: 1330**

# Transportation Research Center Inc.

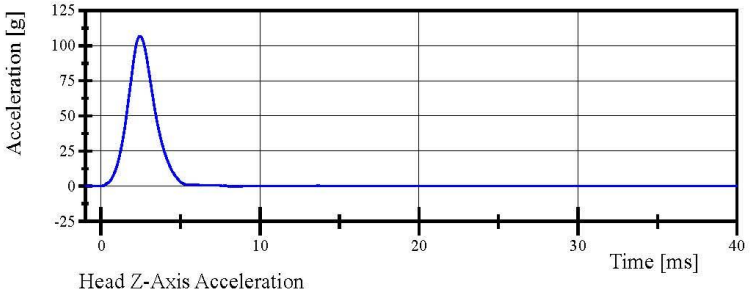
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Head X-Axis Acceleration



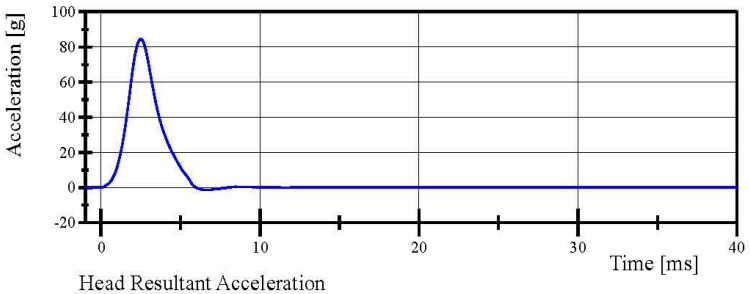

Filter Class: CFC_1000
Max: 1.7 g at 4.7 ms
Min: -2.0 g at 2.4 ms

Head Y-Axis Acceleration



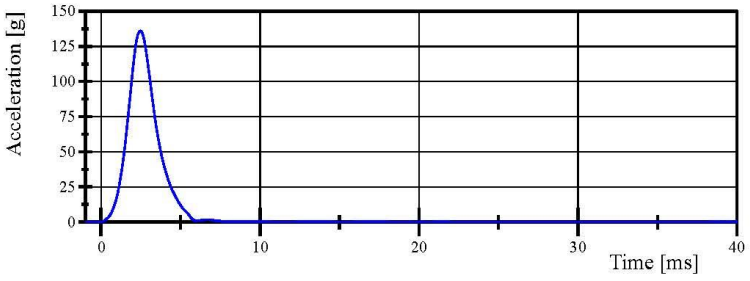

Filter Class: CFC_1000
Max: 106.7 g at 2.5 ms
Min: -0.1 g at 8.2 ms

Head Z-Axis Acceleration




Filter Class: CFC_1000
Max: 84.6 g at 2.5 ms
Min: -1.4 g at 6.7 ms

Head Resultant Acceleration




Filter Class: CFC_1000
Max: 136.2 g at 2.5 ms
Min: 0.0 g at -1.0 ms

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

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# Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 297 Certification No. 50-2
Test Date: 1/8/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 41 % | Yes |
| Pendulum Velocity | (-5.51) - (-5.63) m/s | -5.612 m/s | Yes |
| Pendulum Integrated Velocity Change at 10 ms | 2.20 - 2.80 m/s | 2.292 m/s | Yes |
| Change at 15 ms | 3.30 - 4.10 m/s | 3.361 m/s | Yes |
| Change at 20 ms | 4.40 - 5.40 m/s | 4.526 m/s | Yes |
| Change at 25 ms | 5.40 - 6.10 m/s | 5.504 m/s | Yes |
| Change at 25 to 100 ms | 5.50 - 6.20 m/s | 5.831 m/s | Yes |
| Maximum Headform Flexion occurring between 50ms and 70ms. | | | |
| Peak | (-71) - (-81) deg | -78.0 deg | Yes |
| Time of Peak | 50 - 70 ms | 66.9 ms | Yes |
| Total Neck Occipital Condyles Moment | 36 - 44 N·m | 37.6 N·m | Yes |
| Total Neck Occipital Condyles Moment Decay Time to 0 N·m | 102 - 126 ms | 122.9 ms | Yes |

**Test meets specifications.**

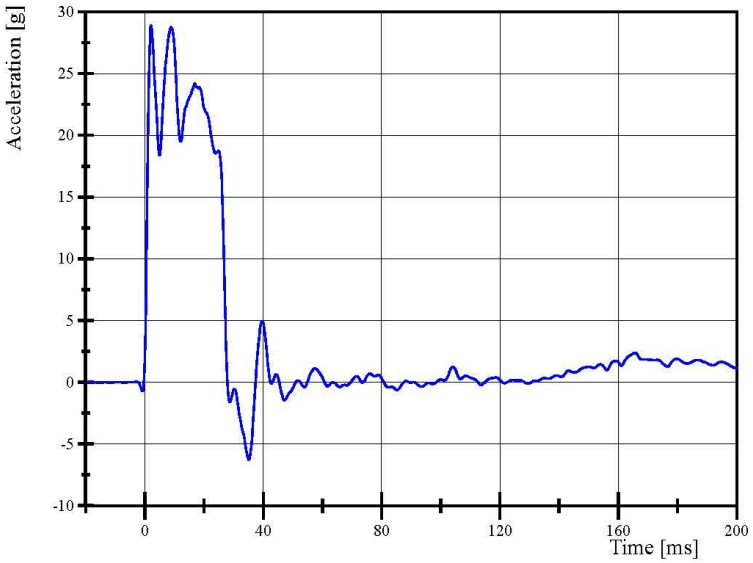
**Condition: Used**

**Comments:**
**Neck S/N: 779**

# Transportation Research Center Inc.

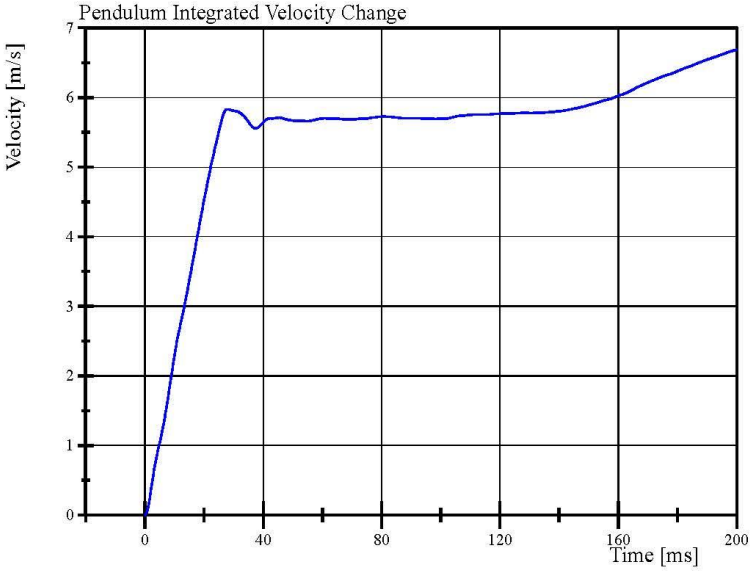
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 50-2
Test Date: 1/8/2021

Pendulum Acceleration




Filter Class: CFC_180
Max: 28.9 g at 2.1 ms
Min: -6.3 g at 35.1 ms

Pendulum Integrated Velocity Change




Filter Class: CFC_180
Max: 6.7 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

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

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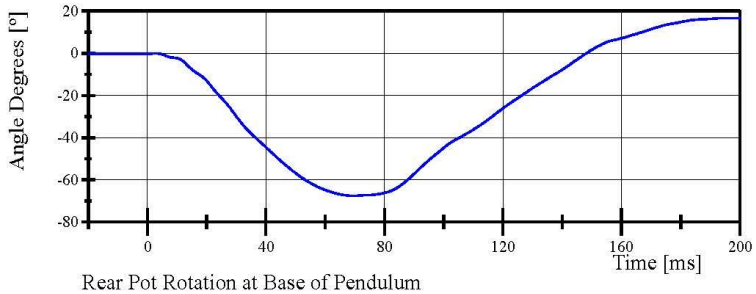
# Transportation Research Center Inc.

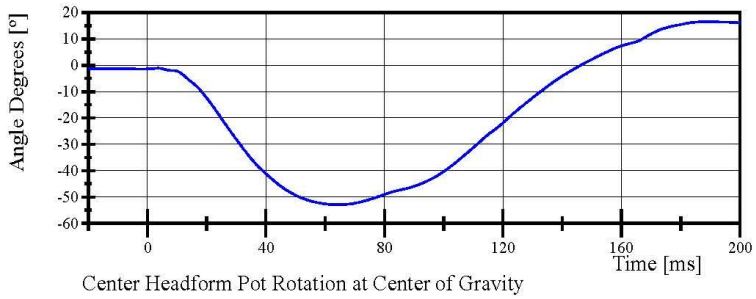
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 50-2
Test Date: 1/8/2021

Forward Pot Rotation at Base of Pendulum



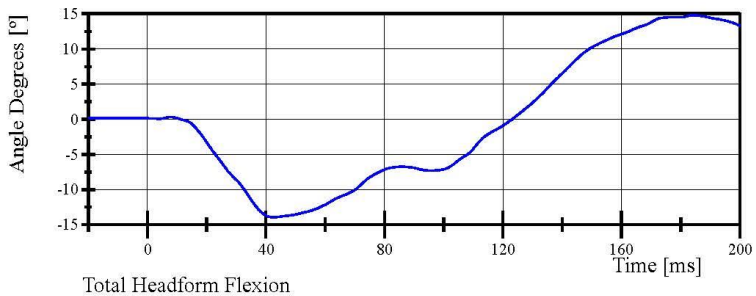

Filter Class: CFC_60
Max: 16.8 ° at 196.6 ms
Min: -67.5 ° at 69.4 ms

Rear Pot Rotation at Base of Pendulum



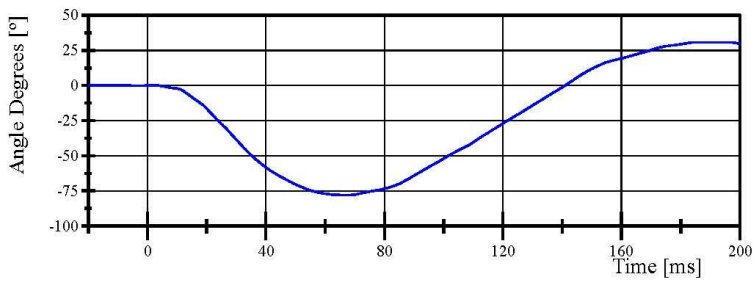

Filter Class: CFC_60
Max: 16.5 ° at 188.7 ms
Min: -52.9 ° at 64.1 ms

Center Headform Pot Rotation at Center of Gravity




Filter Class: CFC_60
Max: 14.8 ° at 184.5 ms
Min: -13.9 ° at 42.5 ms

Total Headform Flexion




Filter Class: CFC_60
Max: 30.8 ° at 187.4 ms
Min: -78.0 ° at 66.9 ms

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

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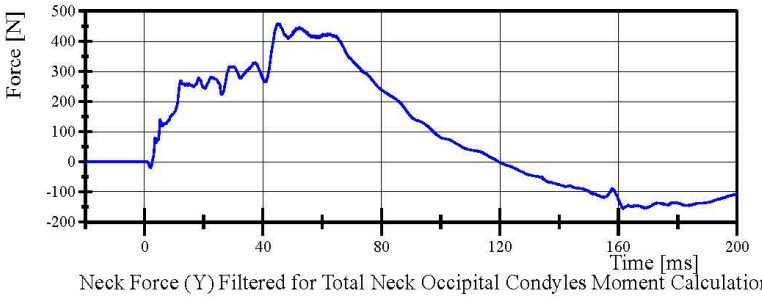
# Transportation Research Center Inc.

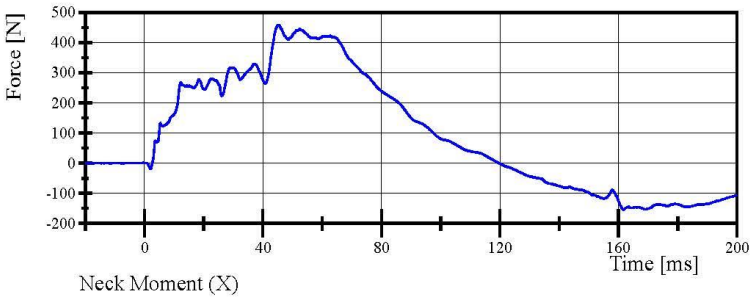
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 50-2
Test Date: 1/8/2021

Neck Force (Y)



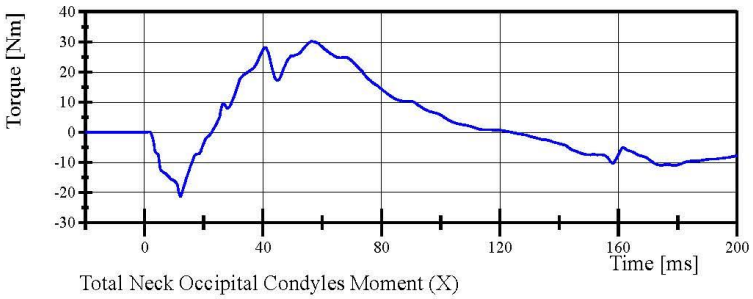

Filter Class: CFC_1000
Max: 458.2 N at 45.0 ms
Min: -155.1 N at 161.6 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



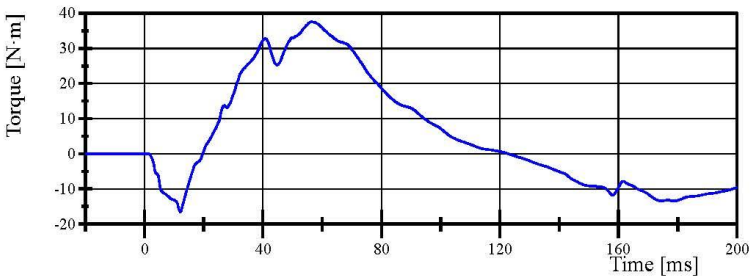

Filter Class: CFC_600
Max: 457.9 N at 45.0 ms
Min: -154.6 N at 161.7 ms

Neck Moment (X)




Filter Class: CFC_600
Max: 30.2 Nm at 56.3 ms
Min: -21.2 Nm at 12.2 ms

Total Neck Occipital Condyles Moment (X)




Filter Class: Without_(Constar
Max: 37.6 N·m at 56.4 ms
Min: -16.5 N·m at 12.1 ms

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

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# Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.2 °C | Yes |
| Relative Humidity | 10 - 70 % | 38 % | Yes |
| Impactor Velocity | 4.2 - 4.4 m/s | 4.27 m/s | Yes |
| Impactor Acceleration | (-13) - (-18) g | -15.0 g | Yes |
| Shoulder Displacement | 28 - 37 mm | 30.3 mm | Yes |
| Upper Spine Lateral Acceleration | 17 - 22 g | 19.8 g | Yes |

**Test meets specifications.**

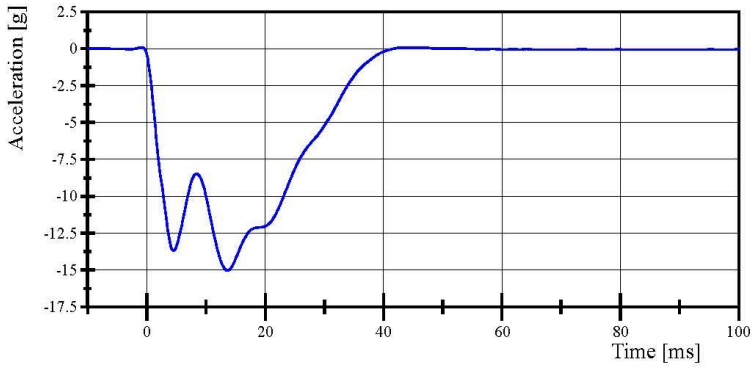
**Condition: Used**

**Comments:**
**Left Arm S/N: 940L**
**Shoulder Rib S/N: 180-3355 259**

# Transportation Research Center Inc.

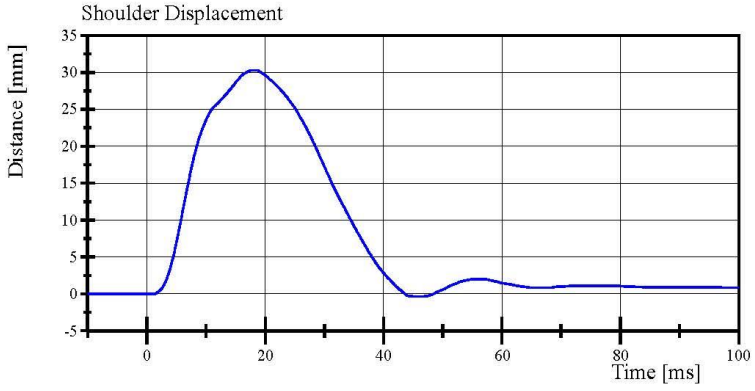
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Probe Acceleration



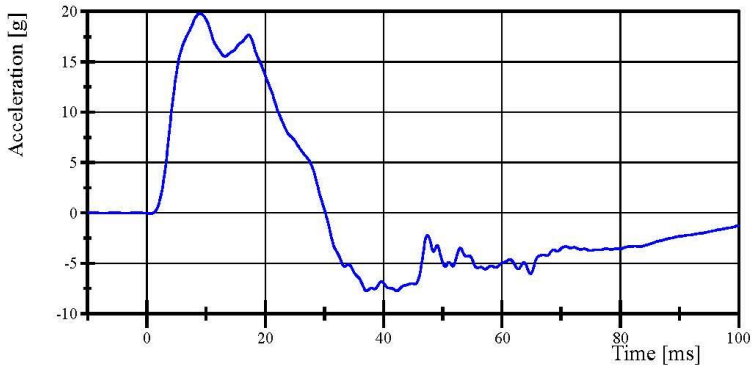

Filter Class: CFC_180
Max: 0.1 g at -0.9 ms
Min: -15.0 g at 13.6 ms

Shoulder Displacement




Filter Class: CFC_600
Max: 30.3 mm at 18.2 ms
Min: -0.3 mm at 46.6 ms

Upper Spine Acceleration (Y)




Filter Class: CFC_180
Max: 19.8 g at 8.9 ms
Min: -7.7 g at 37.1 ms

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

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# Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.3 °C | Yes |
| Relative Humidity | 10 - 70 % | 39 % | Yes |
| Impactor Velocity | 6.60 - 6.80 m/s | 6.738 m/s | Yes |
| Impactor Acceleration | (-30) - (-36) g | -33.2 g | Yes |
| Shoulder Displacement | 31 - 40 mm | 35.6 mm | Yes |
| Upper Thorax Rib Displacement | 25 - 32 mm | 26.9 mm | Yes |
| Center Thorax Rib Displacement | 30 - 36 mm | 31.1 mm | Yes |
| Lower Thorax Rib Displacement | 32 - 38 mm | 33.4 mm | Yes |
| Upper Spine Lateral Acceleration | 34 - 43 g | 38.1 g | Yes |
| Lower Spine Lateral Acceleration | 29 - 37 g | 36.4 g | Yes |

**Test meets specifications.**

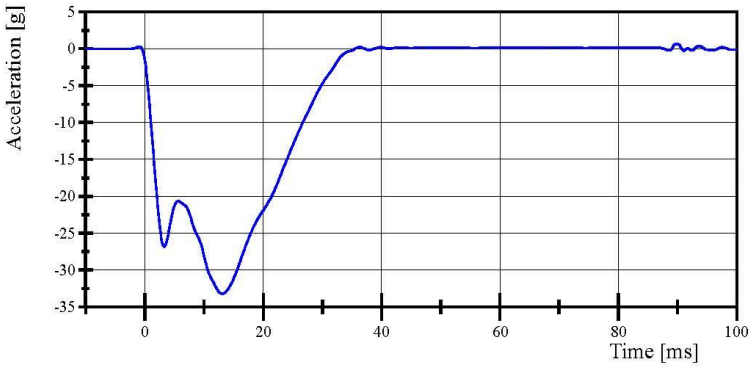
**Condition: Used**

**Comments:**
**Left Arm S/N: 940L**
**Shoulder Rib S/N: 180-3355 259**
**Upper Thorax Rib #1 S/N: DM5020**
**Middle Thorax Rib #2 S/N: DM5021**
**Lower Thorax Rib #3 S/N: DM5022**

# Transportation Research Center Inc.

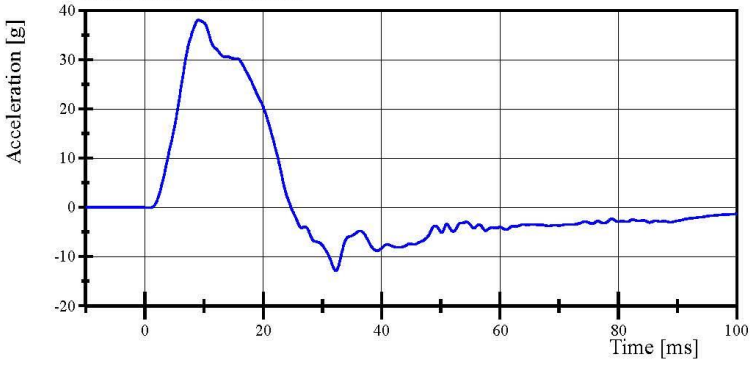
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Probe Acceleration



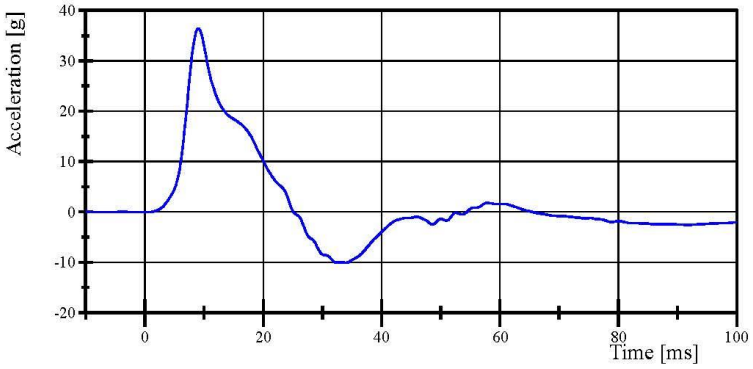

Filter Class: CFC_180
Max: 0.7 g at 90.0 ms
Min: -33.2 g at 13.0 ms

Upper Spine Acceleration




Filter Class: CFC_180
Max: 38.1 g at 9.1 ms
Min: -12.9 g at 32.2 ms

Lower Spine Acceleration




Filter Class: CFC_180
Max: 36.4 g at 9.0 ms
Min: -10.1 g at 33.9 ms

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

01.07.2021 10:30:55 600

Report Number: 297_S2F50

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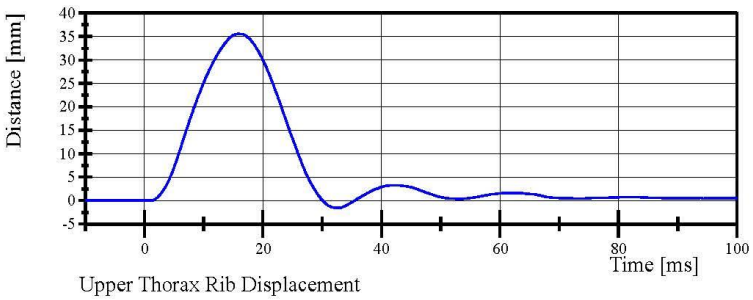
# Transportation Research Center Inc.

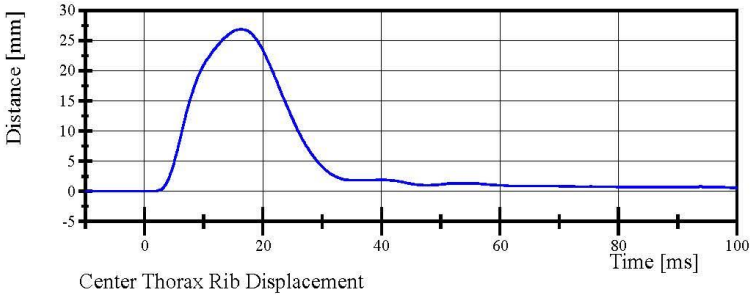
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Shoulder Rib Displacement



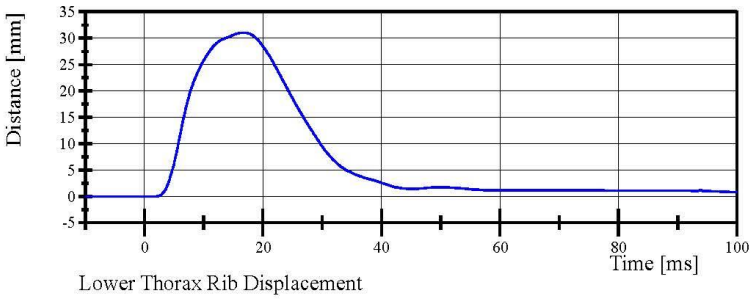

Filter Class: CFC_600
Max: 35.6 mm at 15.8 ms
Min: -1.6 mm at 32.6 ms

Upper Thorax Rib Displacement



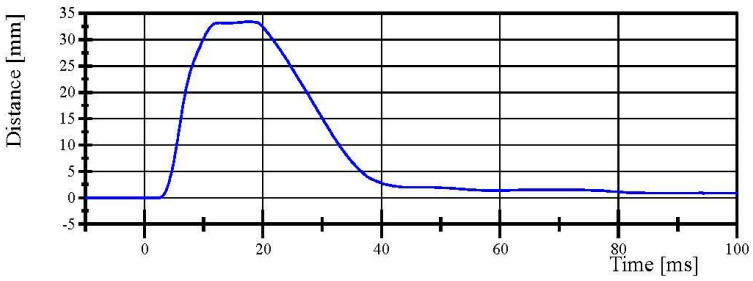

Filter Class: CFC_600
Max: 26.9 mm at 16.3 ms
Min: -0.0 mm at 1.0 ms

Center Thorax Rib Displacement




Filter Class: CFC_600
Max: 31.1 mm at 16.7 ms
Min: -0.0 mm at 1.2 ms

Lower Thorax Rib Displacement




Filter Class: CFC_600
Max: 33.4 mm at 17.6 ms
Min: -0.0 mm at 2.3 ms

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

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# Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 41 % | Yes |
| Impactor Velocity | 4.20 - 4.40 m/s | 4.335 m/s | Yes |
| Impactor Acceleration | (-14) - (-18) g | -15.4 g | Yes |
| Upper Thorax Rib Displacement | 32 - 40 mm | 36.9 mm | Yes |
| Center Thorax Rib Displacement | 39 - 45 mm | 41.3 mm | Yes |
| Lower Thorax Rib Displacement | 35 - 43 mm | 38.0 mm | Yes |
| Upper Spine Lateral Acceleration | 13 - 17 g | 14.8 g | Yes |
| Lower Spine Lateral Acceleration | 7 - 11 g | 9.3 g | Yes |

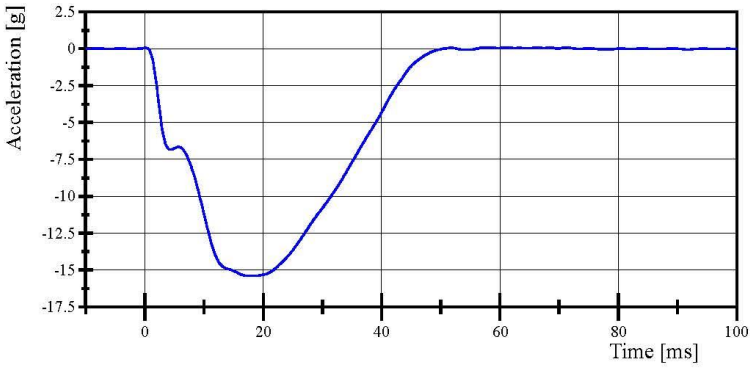
**Test meets specifications.**

**Condition: Used**
**Comments:**
**Upper Thorax Rib #1 S/N: DM5020**
**Middle Thorax Rib #2 S/N: DM5021**
**Lower Thorax Rib #3 S/N: DM5022**

# Transportation Research Center Inc.

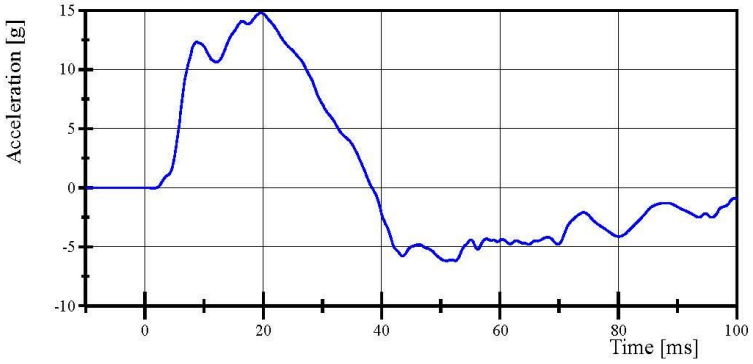
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Probe Acceleration



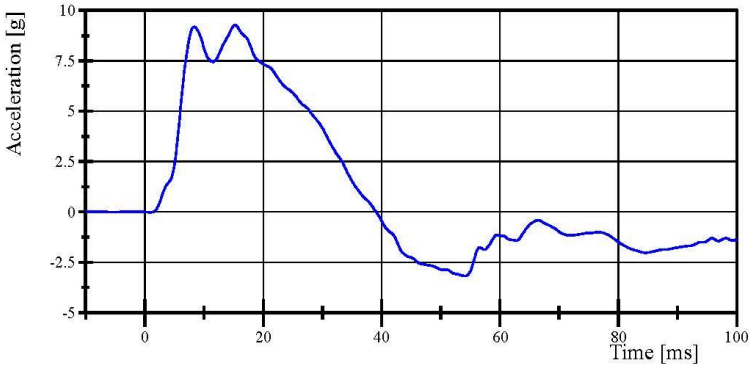

Filter Class: CFC_180
Max: 0.1 g at 71.1 ms
Min: -15.4 g at 18.1 ms

Upper Spine Acceleration




Filter Class: CFC_180
Max: 14.8 g at 19.6 ms
Min: -6.2 g at 51.0 ms

Lower Spine Acceleration




Filter Class: CFC_180
Max: 9.3 g at 15.2 ms
Min: -3.2 g at 54.0 ms

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

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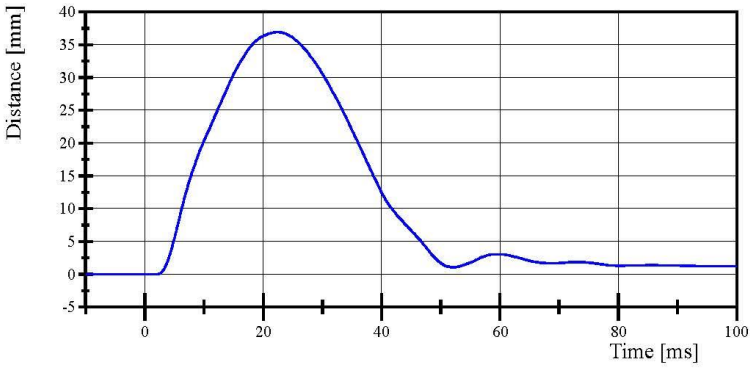
# Transportation Research Center Inc.

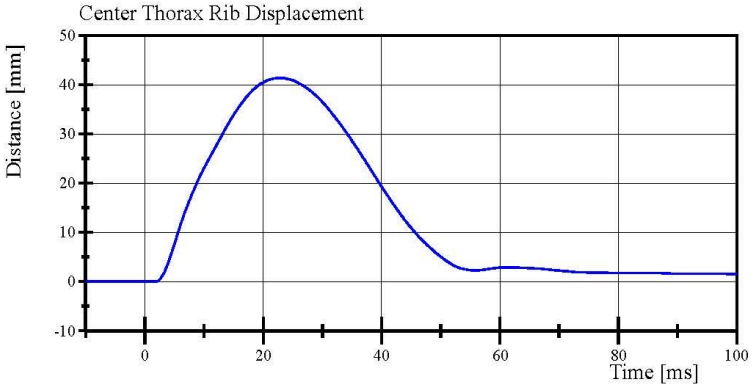
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Upper Thorax Rib Displacement



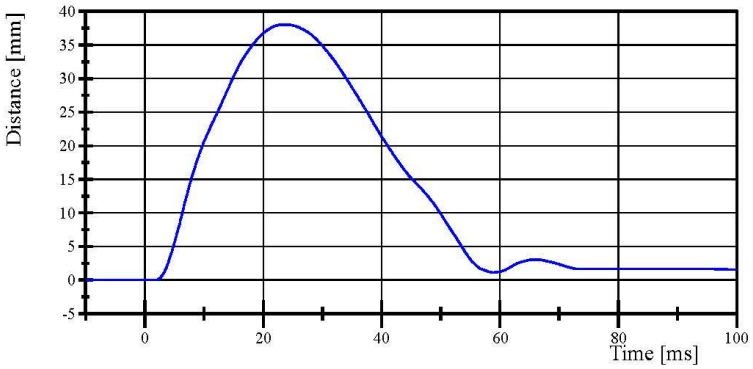

Filter Class: CFC_600
Max: 36.9 mm at 22.4 ms
Min: -0.0 mm at 1.6 ms

Center Thorax Rib Displacement




Filter Class: CFC_600
Max: 41.3 mm at 22.8 ms
Min: -0.0 mm at 1.7 ms

Lower Thorax Rib Displacement




Filter Class: CFC_600
Max: 38.0 mm at 23.7 ms
Min: -0.0 mm at 1.7 ms

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

01.07.2021 09:58:26 808

# Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.7 °C | Yes |
| Relative Humidity | 10 - 70 % | 39 % | Yes |
| Impactor Velocity | 4.2 - 4.4 m/s | 4.27 m/s | Yes |
| Impactor Acceleration | (-12) - (-16) g | -14.7 g | Yes |
| Upper Abdominal Rib Displacement | 36 - 47 mm | 39.8 mm | Yes |
| Lower Abdominal Rib Displacement | 33 - 44 mm | 39.7 mm | Yes |
| Lower Spine Lateral Acceleration | 9 - 14.0 g | 10.88 g | Yes |

**Test meets specifications.**

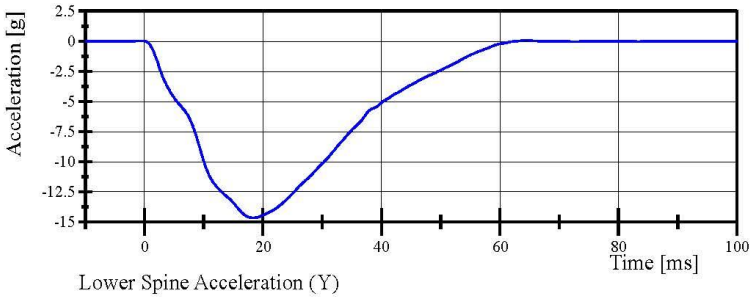
**Condition: Used**

**Comments:**
**Upper Abdominal Rib S/N: DM7281**
**Lower Abdominal Rib S/N: DM7275**

# Transportation Research Center Inc.

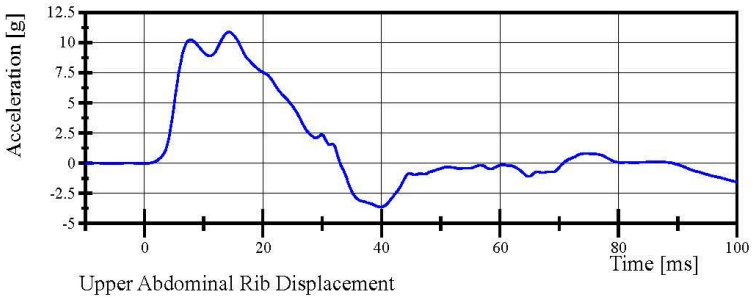
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Probe Acceleration



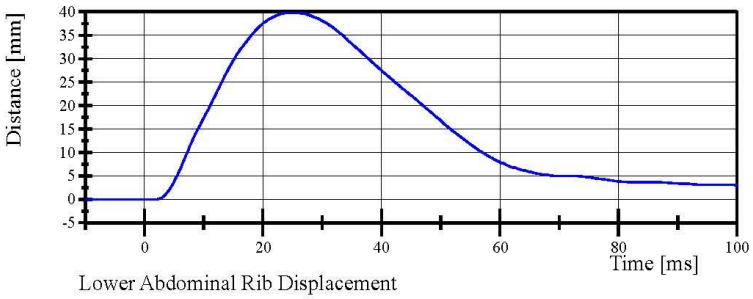

Filter Class: CFC_180
Max: 0.1 g at 64.6 ms
Min: -14.7 g at 18.3 ms

Lower Spine Acceleration (Y)



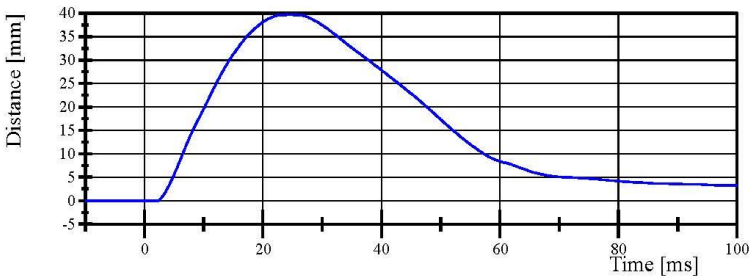

Filter Class: CFC_180
Max: 10.9 g at 14.3 ms
Min: -3.6 g at 39.9 ms

Upper Abdominal Rib Displacement




Filter Class: CFC_600
Max: 39.8 mm at 24.6 ms
Min: -0.0 mm at -6.5 ms

Lower Abdominal Rib Displacement




Filter Class: CFC_600
Max: 39.7 mm at 24.6 ms
Min: -0.0 mm at 2.2 ms

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

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# Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.7 °C | Yes |
| Relative Humidity | 10 - 70 % | 41 % | Yes |
| Pendulum Velocity | 6.6 - 6.8 m/s | 6.64 m/s | Yes |
| Impactor Acceleration | (-38.0) - (-47.0) g | -44.94 g | Yes |
| Peak Pelvis Lateral Acceleration after 6ms | 34 - 42 g | 38.7 g | Yes |
| Acetabulum Force | 3,600 - 4,300 N | 4,051.4 N | Yes |

**Test meets specifications.**

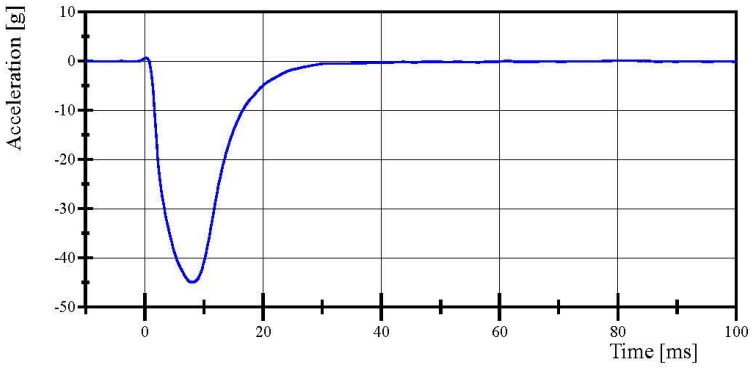
**Condition: Used**

**Comments:**
**Pelvis Skin S/N: EN1590**
**Pelvis Plug Info:**
**Manufacturer: Saco**
**S/N: 13193**
**Cal Date: 20190808**

# Transportation Research Center Inc.

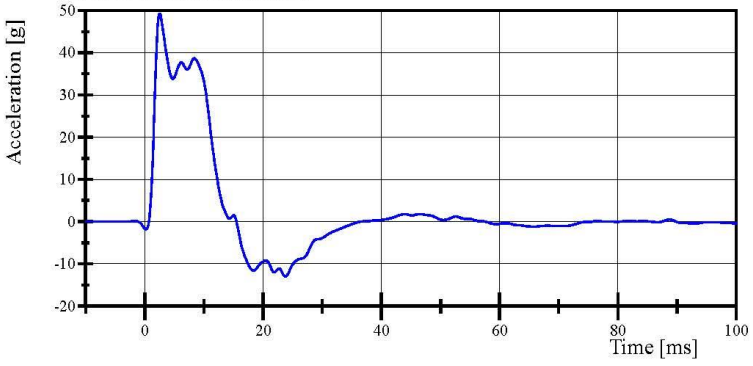
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Probe Acceleration



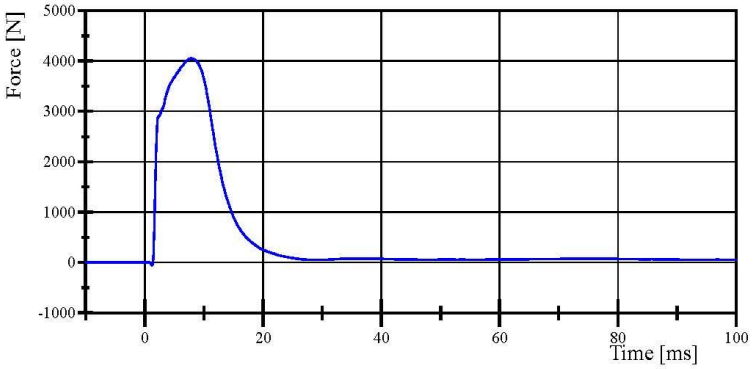

Filter Class: CFC_180
Max: 0.7 g at 0.2 ms
Min: -44.9 g at 7.9 ms

Pelvis Y-Axis Acceleration




Filter Class: CFC_180
Max: 49.3 g at 2.6 ms
Min: -13.0 g at 23.8 ms

Acetabulum Y-Axis Force




Filter Class: CFC_600
Max: 4,051.4 N at 7.9 ms
Min: -55.2 N at 1.2 ms

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

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# Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 38 % | Yes |
| Pendulum Velocity | 4.2 - 4.4 m/s | 4.27 m/s | Yes |
| Impactor Acceleration | (-36) - (-45) g | -38.8 g | Yes |
| Peak Pelvis Lateral Acceleration | 28 - 39 g | 29.6 g | Yes |
| Iliac Force | 4,100 - 5,100 N | 4,391.8 N | Yes |

**Test meets specifications.**

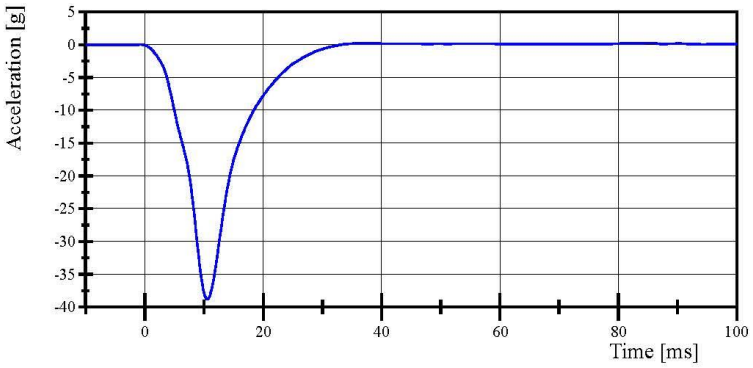
**Condition: Used**

**Comments:**
**Pelvis S/N: EN1590**

# Transportation Research Center Inc.

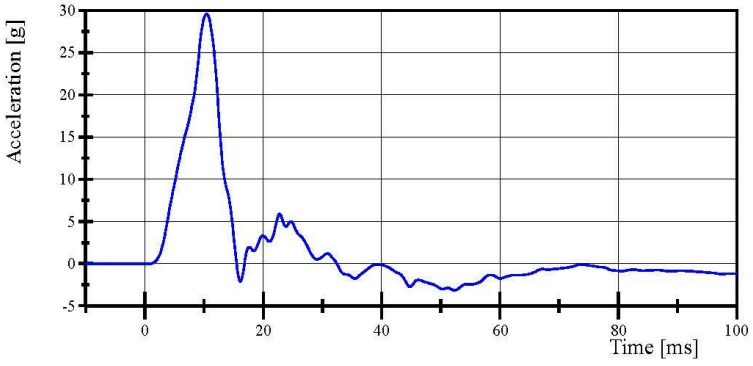
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 50-1
Test Date: 1/7/2021

Probe Acceleration



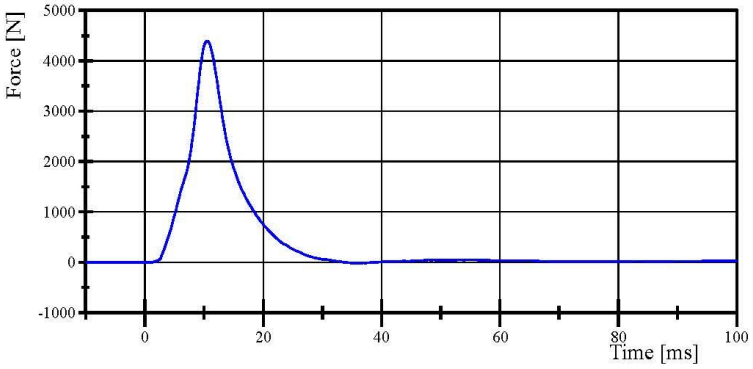

Filter Class: CFC_180
Max: 0.3 g at 85.4 ms
Min: -38.8 g at 10.6 ms

Pelvis Y-Axis Acceleration




Filter Class: CFC_180
Max: 29.6 g at 10.5 ms
Min: -3.2 g at 52.3 ms

Iliac Y-Axis Force




Filter Class: CFC_600
Max: 4,391.8 N at 10.6 ms
Min: -18.0 N at 35.3 ms

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

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**Post-Test Calibration Sheets**
**Driver S/N 297**

**Transportation Research Center Inc.**
**SIDIIs Dummy - Level D**
**External Dimensions**
**Serial No. 297 Calibration No. 51**

| Symbol | Description | Specification | Results | Pass |
|---|---|---|---|---|
| | | mm | mm | |
| A | Sitting Height | 772.0 - 788.0 | 780 | Yes |
| B | Shoulder Pivot Height | 437.0 - 453.0 | 450 | Yes |
| C | H-Point Height | 79.0 - 89.0 | 85 | Yes |
| D | H-Point from Seat Back | 141.0 - 151.0 | 147 | Yes |
| E | Shoulder Pivot from Backline | 97.0 - 107.0 | 102 | Yes |
| F | Thigh Clearance | 119.0 - 135.0 | 130 | Yes |
| G | Head Breadth | 140.0 - 148.0 | 147 | Yes |
| H | Head Back from Backline | 40.0 - 46.0 | 45 | Yes |
| I | Head Depth | 178.0 - 188.0 | 183 | Yes |
| J | Head Circumference | 541.0 - 551.0 | 544 | Yes |
| K | Buttock to Knee Length | 514.0 - 540.0 | 528 | Yes |
| L | Popliteal Height | 343.0 - 369.0 | 353 | Yes |
| M | Knee Pivot to Floor Height | 393.0 - 409.0 | 400 | Yes |
| N | Buttock Popliteal Length | 416.0 - 442.0 | 430 | Yes |
| O | Chest Depth without Jacket | 195.0 - 211.0 | 200 | Yes |
| P | Foot Length (right) | 216.0 - 232.0 | 223 | Yes |
| P | Foot Length (left) | 216.0 - 232.0 | 223 | Yes |
| Q | Hip Breadth | 313.0 - 323.0 | 320 | Yes |
| R | Arm Length | 249.0 - 259.0 | 254 | Yes |
| S | Knee Joint to seat Back | 478.0 - 493.0 | 485 | Yes |
| V | Shoulder Width (only one arm installed) | 341.0 - 357.0 | 347 | Yes |
| W | Foot Width (right) | 78.0 - 94.0 | 85 | Yes |
| W | Foot Width (left) | 78.0 - 94.0 | 85 | Yes |
| Y | Chest Circumference with Jacket | 851.0 - 881.0 | 878 | Yes |
| Z | Waist Circumference | 761.0 - 791.0 | 782 | Yes |

# Transportation Research Center Inc.

Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 18.9 - 25.6 °C | 21.3 °C | Yes |
| Relative Humidity | 10 - 70 % | 33 % | Yes |
| Peak Head Resultant Acceleration | 115 - 137 g | 133.8 g | Yes |
| Peak Head Longitudinal Acceleration | (-15) - 15 g | -3.9 g | Yes |
| Is Head Resultant Acceleration Curve Unimodal within 15% of Peak? | < 15 % | 1.00 % | Yes |

**Test meets specifications.**

**Condition: Used**

**Comments:**
**Head S/N: 1330**

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

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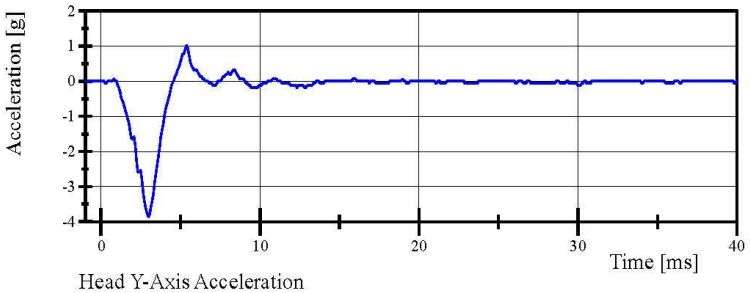
# Transportation Research Center Inc.

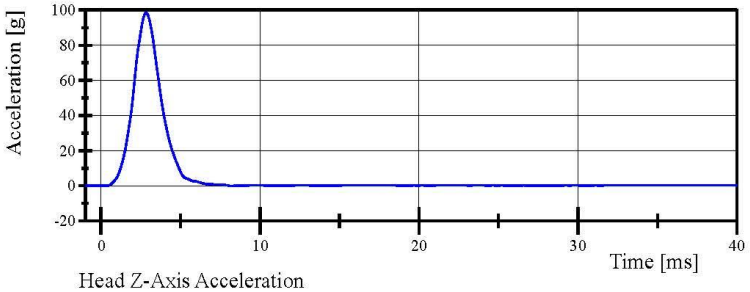
Left Lateral Head Drop
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Head X-Axis Acceleration



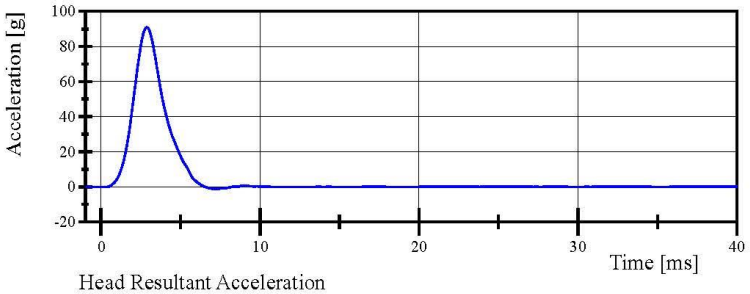

Filter Class: CFC_1000
Max: 1.0 g at 5.4 ms
Min: -3.9 g at 3.0 ms

Head Y-Axis Acceleration



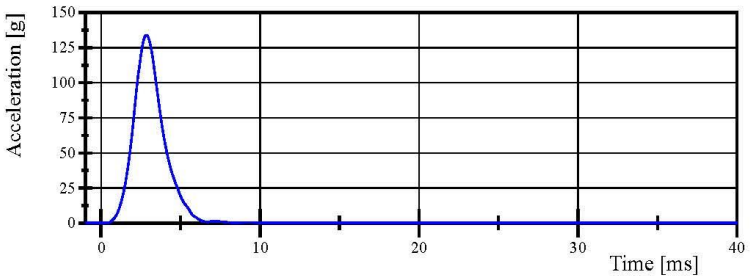

Filter Class: CFC_1000
Max: 98.4 g at 2.8 ms
Min: -0.1 g at 8.2 ms

Head Z-Axis Acceleration




Filter Class: CFC_1000
Max: 90.9 g at 2.9 ms
Min: -1.2 g at 7.2 ms

Head Resultant Acceleration




Filter Class: CFC_1000
Max: 133.8 g at 2.9 ms
Min: 0.0 g at -1.0 ms

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

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# Transportation Research Center Inc.

Left Lateral Neck
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 36 % | Yes |
| Pendulum Velocity | (-5.51) - (-5.63) m/s | -5.558 m/s | Yes |
| Pendulum Integrated Velocity Change at 10 ms | 2.20 - 2.80 m/s | 2.375 m/s | Yes |
| Change at 15 ms | 3.30 - 4.10 m/s | 3.507 m/s | Yes |
| Change at 20 ms | 4.40 - 5.40 m/s | 4.792 m/s | Yes |
| Change at 25 ms | 5.40 - 6.10 m/s | 5.742 m/s | Yes |
| Change at 25 to 100 ms | 5.50 - 6.20 m/s | 5.844 m/s | Yes |
| Maximum Headform Flexion occurring between 50ms and 70ms. | | | |
| Peak | (-71) - (-81) deg | -72.5 deg | Yes |
| Time of Peak | 50 - 70 ms | 67.6 ms | Yes |
| Total Neck Occipital Condyles Moment | 36 - 44 N·m | 38.4 N·m | Yes |
| Total Neck Occipital Condyles Moment Decay Time to 0 N·m | 102 - 126 ms | 122.0 ms | Yes |

**Test meets specifications.**

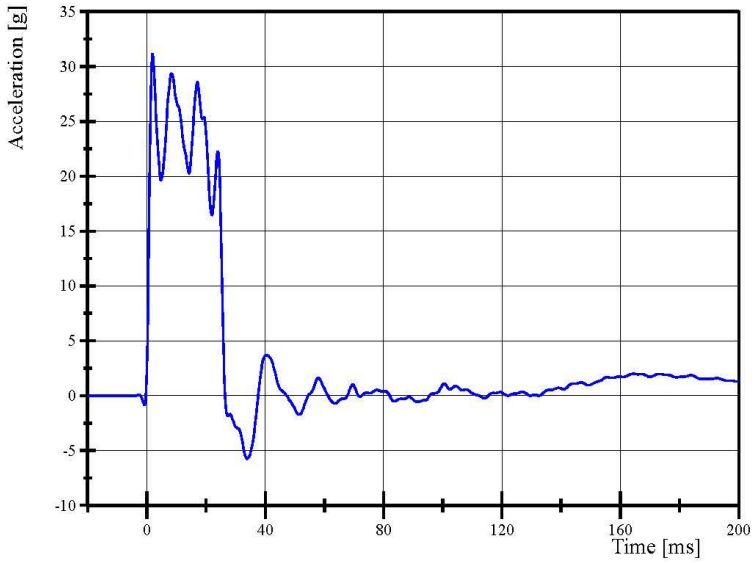
**Condition: Used**

**Comments:**
**Neck S/N: 779**

# Transportation Research Center Inc.

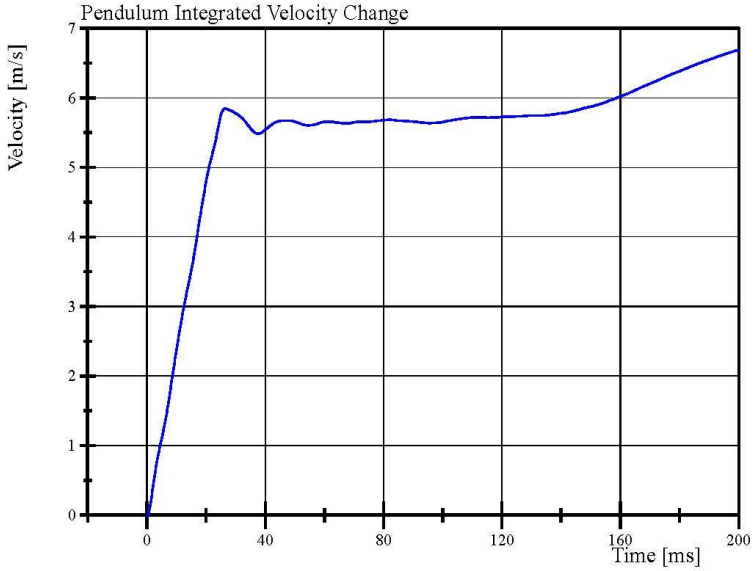
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Pendulum Acceleration




Filter Class: CFC_180
Max: 31.2 g at 1.9 ms
Min: -5.7 g at 33.8 ms

Pendulum Integrated Velocity Change




Filter Class: CFC_180
Max: 6.7 m/s at 200.0 ms
Min: 0.0 m/s at 0.0 ms

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

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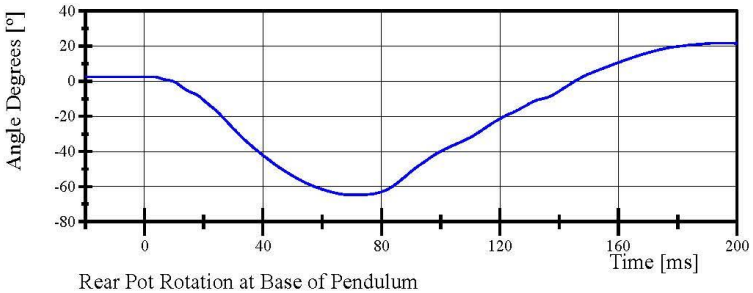
# Transportation Research Center Inc.

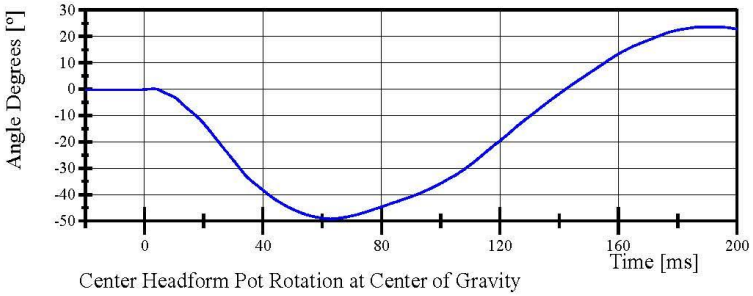
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Forward Pot Rotation at Base of Pendulum



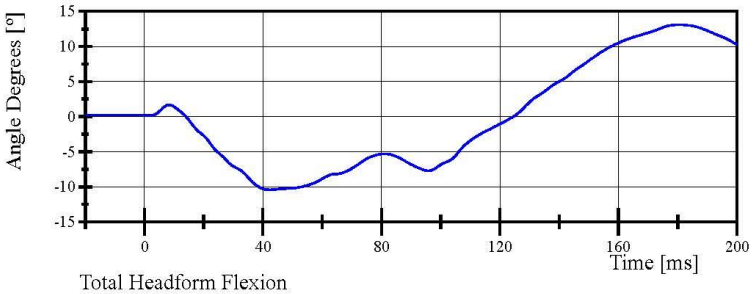

Filter Class: CFC_60
Max: 21.7 ° at 194.0 ms
Min: -64.8 ° at 70.2 ms

Rear Pot Rotation at Base of Pendulum



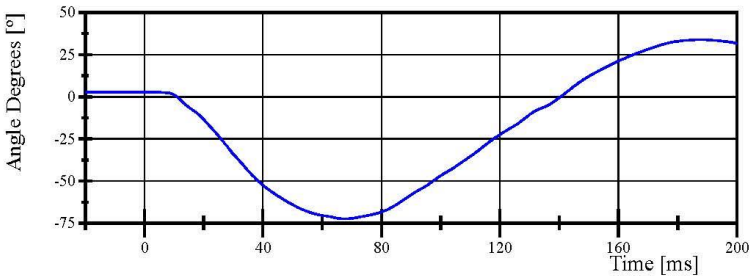

Filter Class: CFC_60
Max: 23.6 ° at 188.6 ms
Min: -49.2 ° at 62.9 ms

Center Headform Pot Rotation at Center of Gravity




Filter Class: CFC_60
Max: 13.1 ° at 180.5 ms
Min: -10.4 ° at 42.3 ms

Total Headform Flexion




Filter Class: CFC_60
Max: 33.8 ° at 187.5 ms
Min: -72.5 ° at 67.6 ms

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

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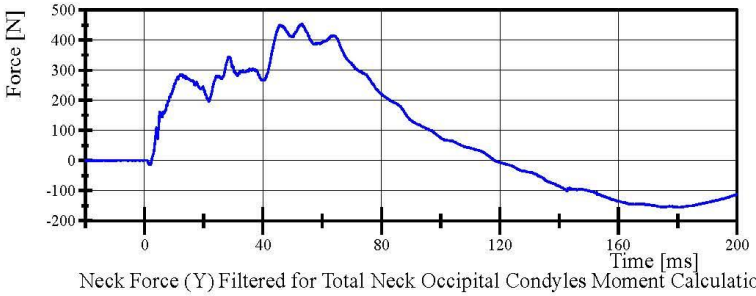
# Transportation Research Center Inc.

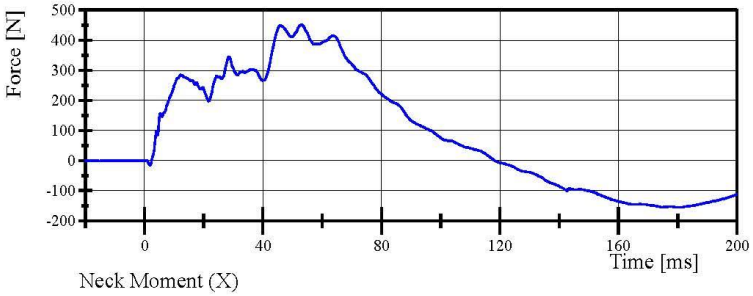
Left Lateral Neck
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Neck Force (Y)



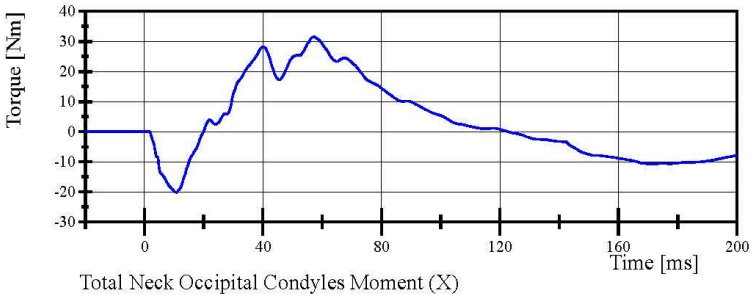

Filter Class: CFC_1000
Max: 453.5 N at 53.2 ms
Min: -155.2 N at 180.0 ms

Neck Force (Y) Filtered for Total Neck Occipital Condyles Moment Calculation



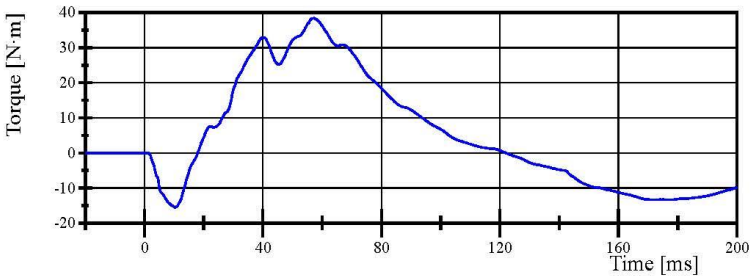

Filter Class: CFC_600
Max: 452.6 N at 53.0 ms
Min: -155.1 N at 180.2 ms

Neck Moment (X)




Filter Class: CFC_600
Max: 31.5 Nm at 57.3 ms
Min: -20.1 Nm at 10.8 ms

Total Neck Occipital Condyles Moment (X)




Filter Class: Without_(Constar
Max: 38.4 N·m at 57.2 ms
Min: -15.5 N·m at 10.2 ms

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

02.19.2021 08:33:28 724

# Transportation Research Center Inc.

Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.2 °C | Yes |
| Relative Humidity | 10 - 70 % | 35 % | Yes |
| Impactor Velocity | 4.2 - 4.4 m/s | 4.28 m/s | Yes |
| Impactor Acceleration | (-13) - (-18) g | -15.2 g | Yes |
| Shoulder Displacement | 28 - 37 mm | 30.2 mm | Yes |
| Upper Spine Lateral Acceleration | 17 - 22 g | 19.6 g | Yes |

**Test meets specifications.**

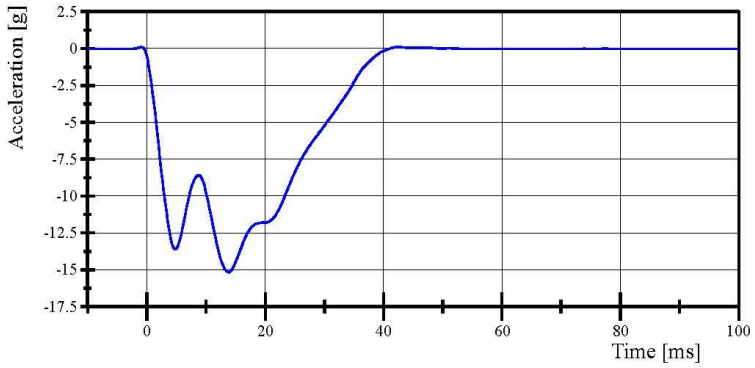
**Condition: Used**

**Comments:**
**Left Arm S/N: 940L**
**Shoulder Rib S/N: 180-3355 259**

# Transportation Research Center Inc.

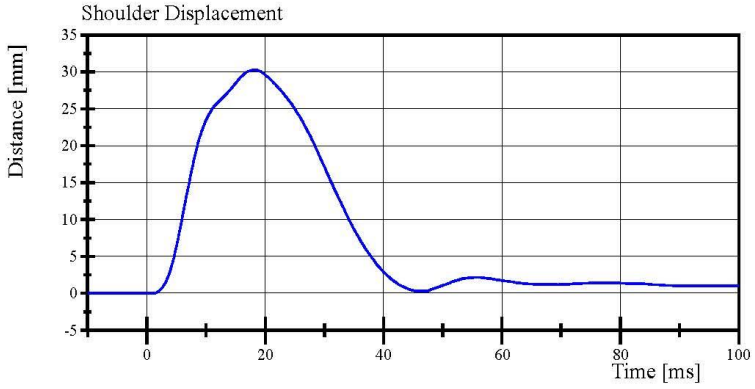
Left Lateral Shoulder
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Probe Acceleration



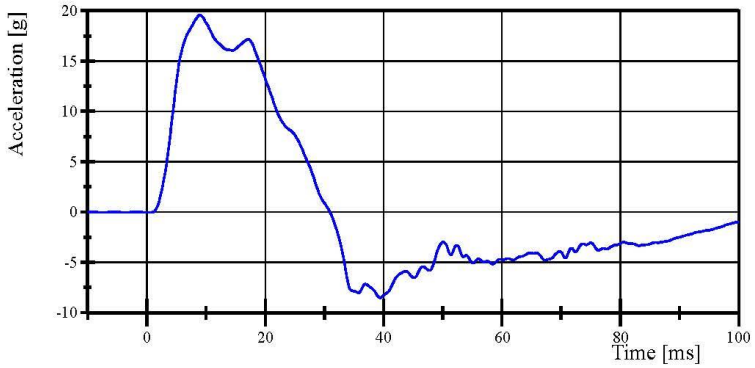

Filter Class: CFC_180
Max: 0.1 g at 42.4 ms
Min: -15.2 g at 13.8 ms

Shoulder Displacement




Filter Class: CFC_600
Max: 30.2 mm at 18.3 ms
Min: -0.0 mm at -4.2 ms

Upper Spine Acceleration (Y)




Filter Class: CFC_180
Max: 19.6 g at 8.9 ms
Min: -8.5 g at 39.4 ms

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

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# Transportation Research Center Inc.

Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.5 °C | Yes |
| Relative Humidity | 10 - 70 % | 35 % | Yes |
| Impactor Velocity | 6.60 - 6.80 m/s | 6.740 m/s | Yes |
| Impactor Acceleration | (-30) - (-36) g | -35.0 g | Yes |
| Shoulder Displacement | 31 - 40 mm | 36.8 mm | Yes |
| Upper Thorax Rib Displacement | 25 - 32 mm | 27.5 mm | Yes |
| Center Thorax Rib Displacement | 30 - 36 mm | 31.2 mm | Yes |
| Lower Thorax Rib Displacement | 32 - 38 mm | 33.1 mm | Yes |
| Upper Spine Lateral Acceleration | 34 - 43 g | 38.8 g | Yes |
| Lower Spine Lateral Acceleration | 29 - 37 g | 36.4 g | Yes |

**Test meets specifications.**

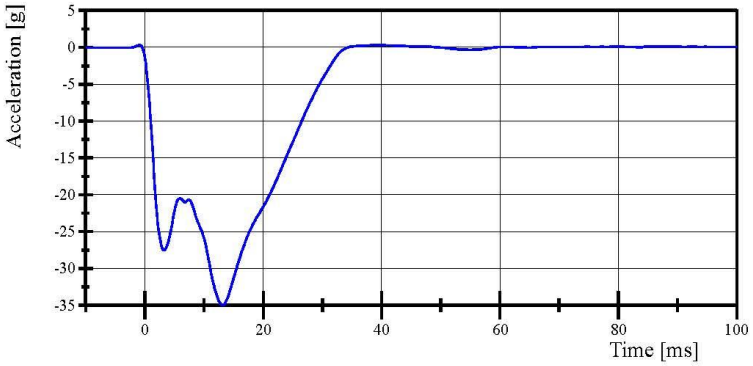
**Condition: Used**

**Comments:**
**Left Arm S/N: 940L**
**Shoulder Rib S/N: 180-3355 259**
**Upper Thorax Rib #1 S/N: DM5020**
**Middle Thorax Rib #2 S/N: DM5021**
**Lower Thorax Rib #3 S/N: DM5022**

# Transportation Research Center Inc.

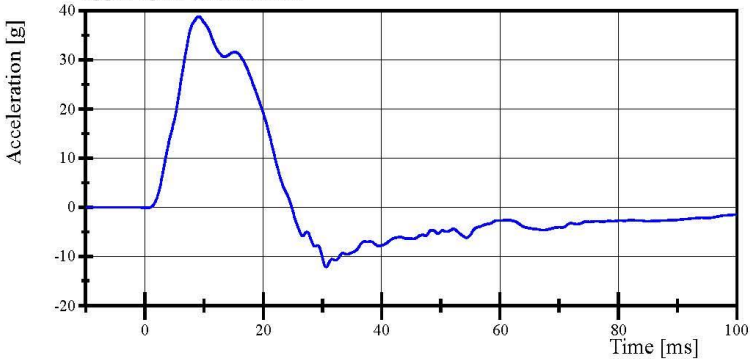
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Probe Acceleration



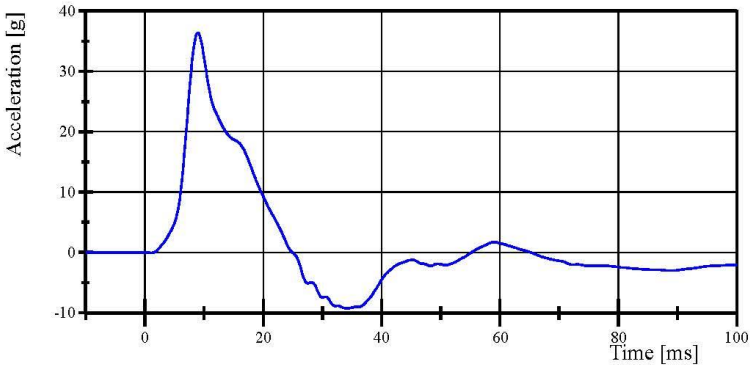

Filter Class: CFC_180
Max: 0.3 g at -0.9 ms
Min: -35.0 g at 13.1 ms

Upper Spine Acceleration




Filter Class: CFC_180
Max: 38.8 g at 9.1 ms
Min: -12.1 g at 30.6 ms

Lower Spine Acceleration




Filter Class: CFC_180
Max: 36.4 g at 9.0 ms
Min: -9.2 g at 34.2 ms

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

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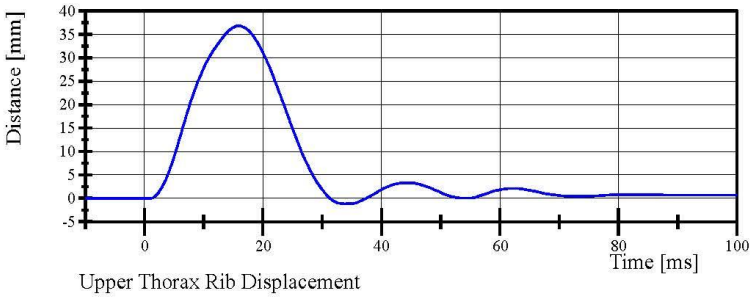
# Transportation Research Center Inc.

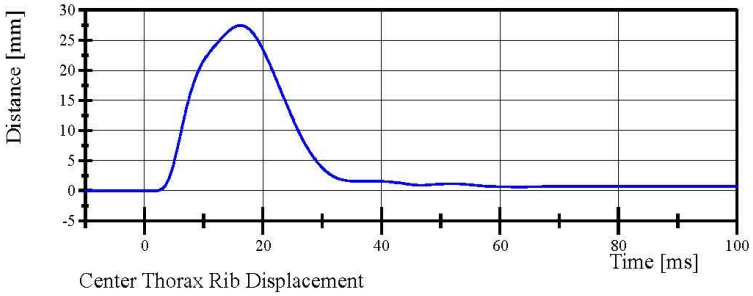
Left Lateral Thorax with Arm
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Shoulder Rib Displacement



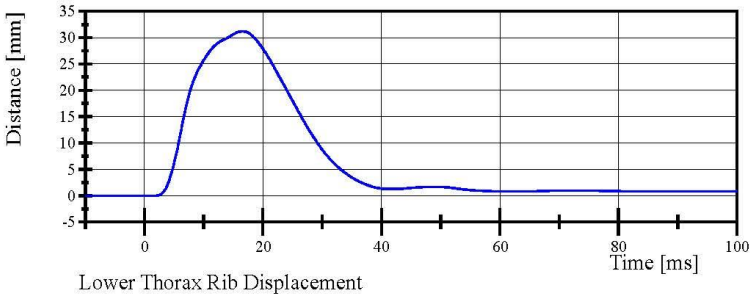

Filter Class: CFC_600
Max: 36.8 mm at 15.8 ms
Min: -1.2 mm at 33.8 ms

Upper Thorax Rib Displacement



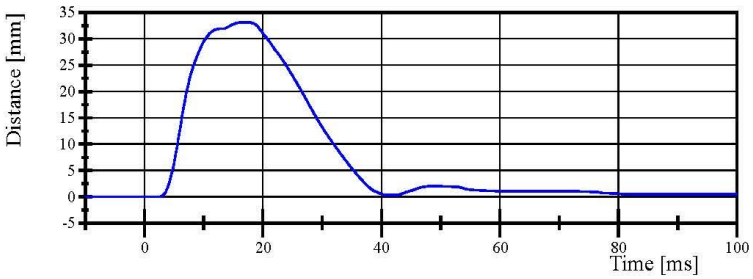

Filter Class: CFC_600
Max: 27.5 mm at 16.2 ms
Min: -0.0 mm at -5.7 ms

Center Thorax Rib Displacement




Filter Class: CFC_600
Max: 31.2 mm at 16.5 ms
Min: -0.0 mm at 1.6 ms

Lower Thorax Rib Displacement




Filter Class: CFC_600
Max: 33.1 mm at 16.5 ms
Min: -0.0 mm at 2.4 ms

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

02.19.2021 10:03:16 617

# Transportation Research Center Inc.

Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.8 °C | Yes |
| Relative Humidity | 10 - 70 % | 35 % | Yes |
| Impactor Velocity | 4.20 - 4.40 m/s | 4.326 m/s | Yes |
| Impactor Acceleration | (-14) - (-18) g | -15.9 g | Yes |
| Upper Thorax Rib Displacement | 32 - 40 mm | 38.1 mm | Yes |
| Center Thorax Rib Displacement | 39 - 45 mm | 42.1 mm | Yes |
| Lower Thorax Rib Displacement | 35 - 43 mm | 38.3 mm | Yes |
| Upper Spine Lateral Acceleration | 13 - 17 g | 14.9 g | Yes |
| Lower Spine Lateral Acceleration | 7 - 11 g | 9.7 g | Yes |

**Test meets specifications.**

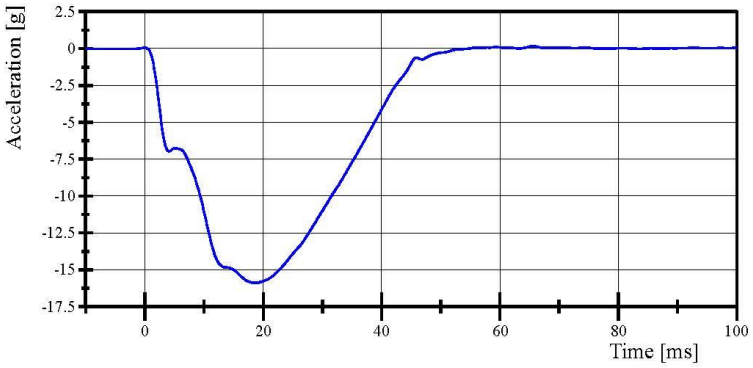
**Condition: Used**

**Comments:**
**Upper Thorax Rib #1 S/N: DM5020**
**Middle Thorax Rib #2 S/N: DM5021**
**Lower Thorax Rib #3 S/N: DM5022**

# Transportation Research Center Inc.

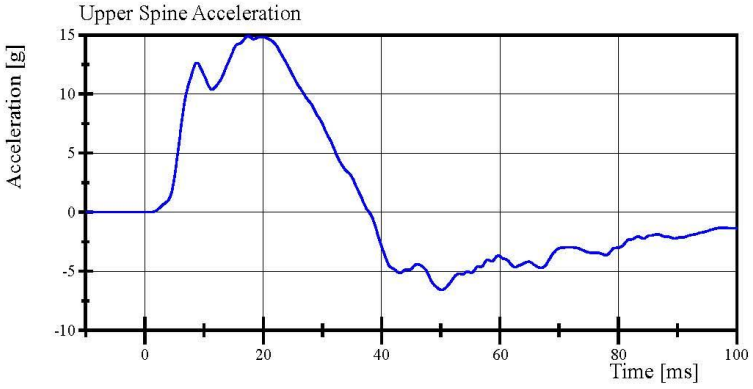
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Probe Acceleration



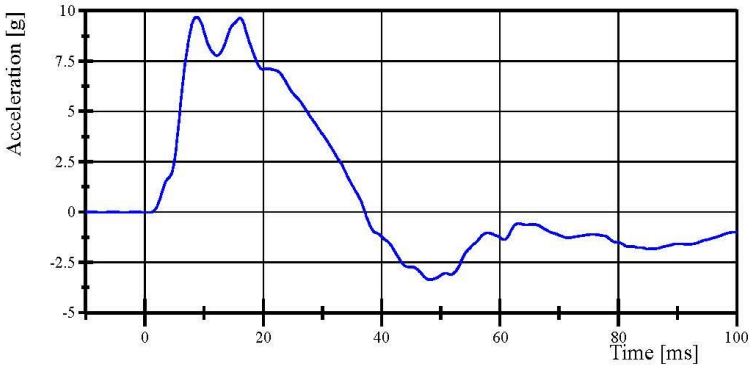

Filter Class: CFC_180
Max: 0.2 g at 65.6 ms
Min: -15.9 g at 18.6 ms

Upper Spine Acceleration




Filter Class: CFC_180
Max: 14.9 g at 17.4 ms
Min: -6.6 g at 50.2 ms

Lower Spine Acceleration




Filter Class: CFC_180
Max: 9.7 g at 8.7 ms
Min: -3.4 g at 48.2 ms

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

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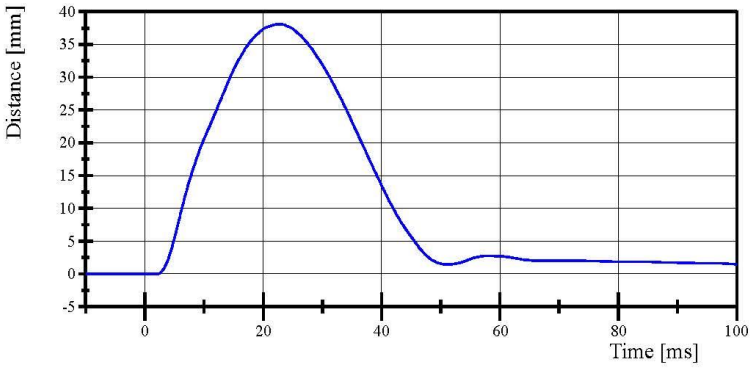
# Transportation Research Center Inc.

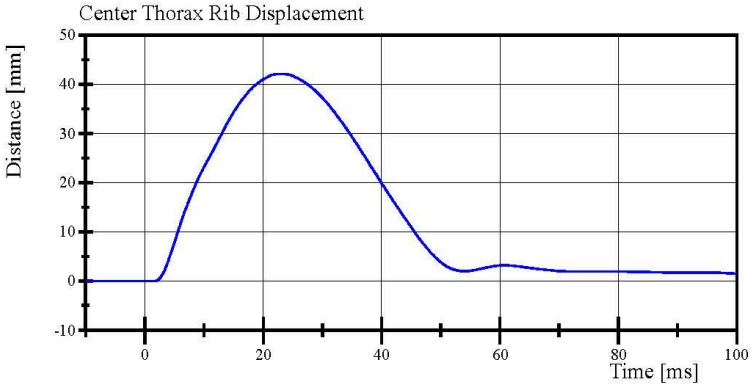
Left Lateral Thorax without Arm
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Upper Thorax Rib Displacement



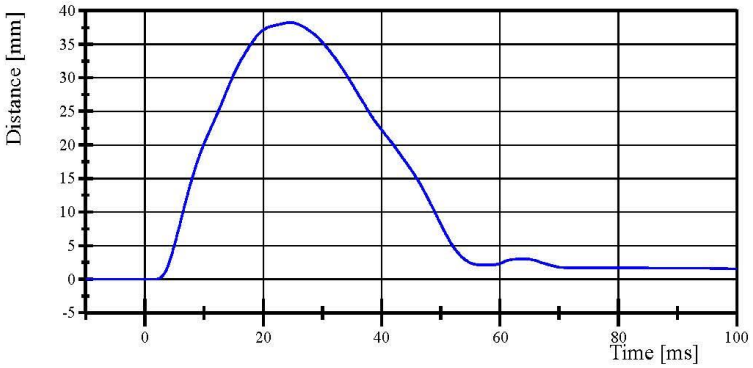

Filter Class: CFC_600
Max: 38.1 mm at 22.7 ms
Min: -0.0 mm at -1.1 ms

Center Thorax Rib Displacement




Filter Class: CFC_600
Max: 42.1 mm at 22.8 ms
Min: -0.0 mm at 1.5 ms

Lower Thorax Rib Displacement




Filter Class: CFC_600
Max: 38.3 mm at 24.6 ms
Min: -0.0 mm at 1.4 ms

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

02.19.2021 09:30:01 707

# Transportation Research Center Inc.

Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.5 °C | Yes |
| Relative Humidity | 10 - 70 % | 37 % | Yes |
| Impactor Velocity | 4.2 - 4.4 m/s | 4.28 m/s | Yes |
| Impactor Acceleration | (-12) - (-16) g | -14.8 g | Yes |
| Upper Abdominal Rib Displacement | 36 - 47 mm | 40.9 mm | Yes |
| Lower Abdominal Rib Displacement | 33 - 44 mm | 38.7 mm | Yes |
| Lower Spine Lateral Acceleration | 9 - 14.0 g | 10.87 g | Yes |

**Test meets specifications.**

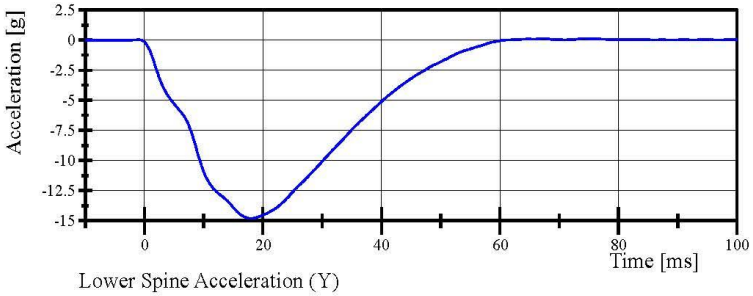
**Condition: Used**

**Comments:**
**Upper Abdominal Rib S/N: DM7281**
**Lower Abdominal Rib S/N: DM7275**

# Transportation Research Center Inc.

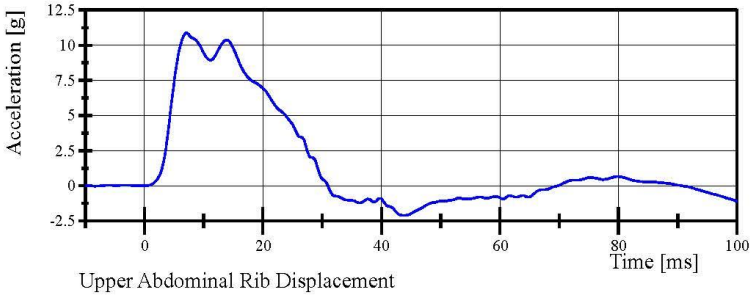
Left Lateral Abdomen
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Probe Acceleration



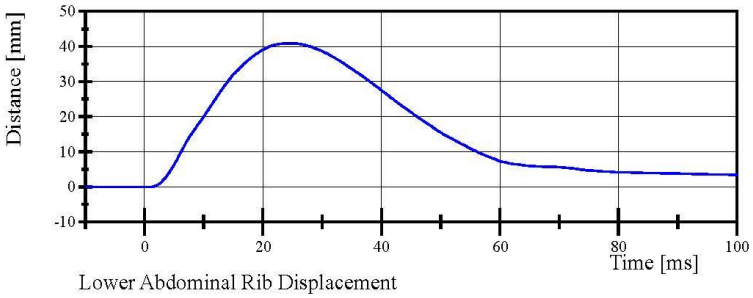

Filter Class: CFC_180
Max: 0.1 g at 74.3 ms
Min: -14.8 g at 18.0 ms

Lower Spine Acceleration (Y)



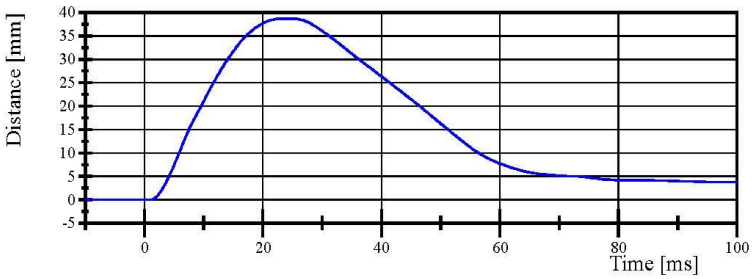

Filter Class: CFC_180
Max: 10.9 g at 7.1 ms
Min: -2.1 g at 44.0 ms

Upper Abdominal Rib Displacement




Filter Class: CFC_600
Max: 40.9 mm at 24.5 ms
Min: -0.0 mm at 0.2 ms

Lower Abdominal Rib Displacement




Filter Class: CFC_600
Max: 38.7 mm at 24.8 ms
Min: -0.0 mm at 0.9 ms

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

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# Transportation Research Center Inc.

Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.4 °C | Yes |
| Relative Humidity | 10 - 70 % | 36 % | Yes |
| Pendulum Velocity | 6.6 - 6.8 m/s | 6.63 m/s | Yes |
| Impactor Acceleration | (-38.0) - (-47.0) g | -45.48 g | Yes |
| Peak Pelvis Lateral Acceleration after 6ms | 34 - 42 g | 40.1 g | Yes |
| Acetabulum Force | 3,600 - 4,300 N | 4,036.5 N | Yes |

**Test meets specifications.**

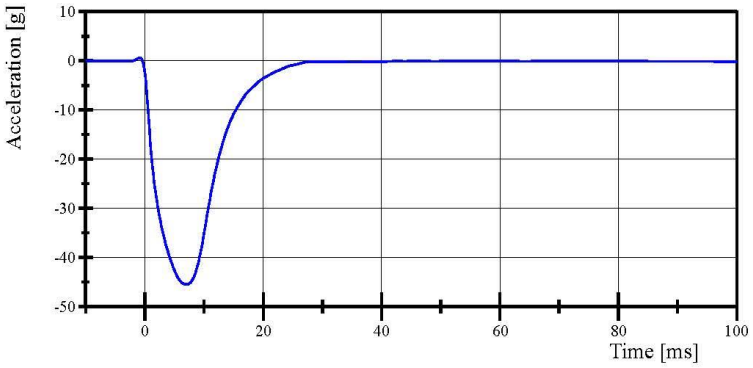
**Condition: Used**

**Comments:**
**Pelvis Skin S/N: EN1590**
**Pelvis Plug Info:**
**Manufacturer: Saco**
**S/N: 13153**
**Cal Date: 20190808**

# Transportation Research Center Inc.

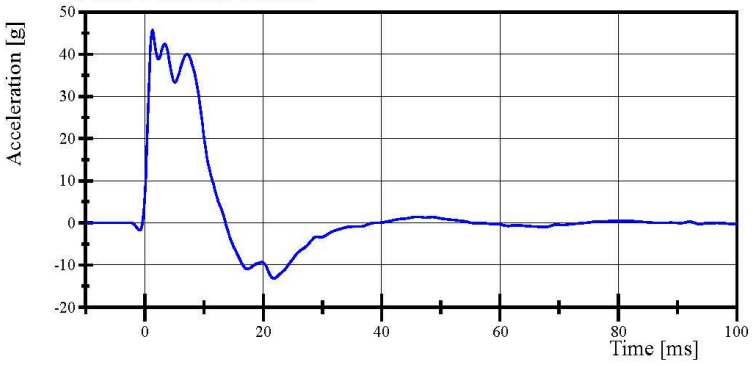
Left Lateral Pelvis
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Probe Acceleration



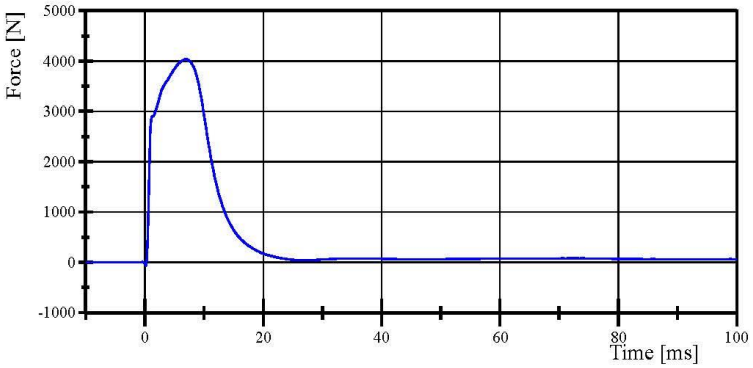

Filter Class: CFC_180
Max: 0.6 g at -0.9 ms
Min: -45.5 g at 7.0 ms

Pelvis Y-Axis Acceleration




Filter Class: CFC_180
Max: 45.7 g at 1.3 ms
Min: -13.1 g at 21.8 ms

Acetabulum Y-Axis Force




Filter Class: CFC_600
Max: 4,036.5 N at 7.0 ms
Min: -61.8 N at 0.2 ms

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

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# Transportation Research Center Inc.

Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

| Test Parameter | Specification | Test Results | Pass |
|---|---|---|---|
| Temperature | 20.6 - 22.2 °C | 21.6 °C | Yes |
| Relative Humidity | 10 - 70 % | 33 % | Yes |
| Pendulum Velocity | 4.2 - 4.4 m/s | 4.28 m/s | Yes |
| Impactor Acceleration | (-36) - (-45) g | -38.2 g | Yes |
| Peak Pelvis Lateral Acceleration | 28 - 39 g | 29.7 g | Yes |
| Iliac Force | 4,100 - 5,100 N | 4,257.8 N | Yes |

**Test meets specifications.**

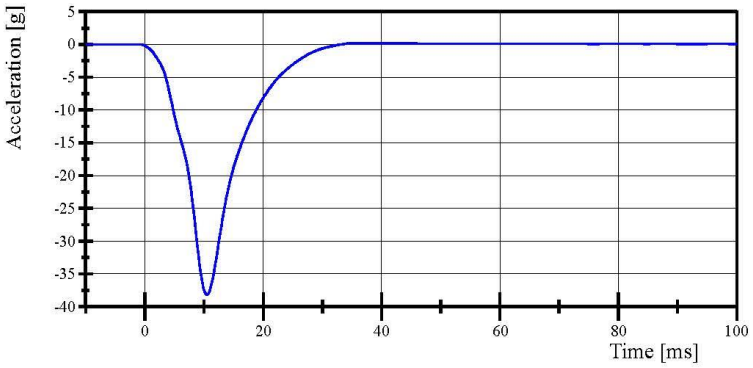
**Condition: Used**

**Comments:**
**Pelvis S/N: EN1590**

# Transportation Research Center Inc.

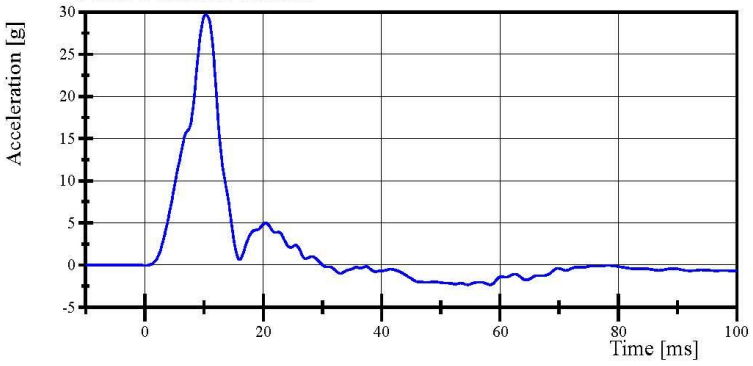
Left Lateral Iliac
SID IIs Serial No. 297 Certification No. 51-1
Test Date: 2/19/2021

Probe Acceleration



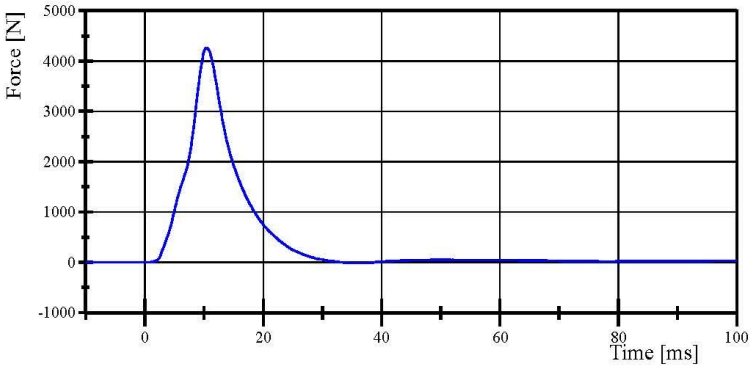

Filter Class: CFC_180
Max: 0.2 g at 40.6 ms
Min: -38.2 g at 10.5 ms

Pelvis Y-Axis Acceleration




Filter Class: CFC_180
Max: 29.7 g at 10.3 ms
Min: -2.3 g at 58.4 ms

Iliac Y-Axis Force




Filter Class: CFC_600
Max: 4,257.8 N at 10.4 ms
Min: -14.8 N at 36.7 ms

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

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# APPENDIX D
# TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA

**TABLE 1 – Dummy Instrumentation (SID-IIs)**

| | | | | SID-IIs S/N 297 | | |
|---|---|---|---|---|---|---|
| | | | | **Serial Number** | **Manufacturer** | **Calibration Date** |
| Head Accelerometers | | | X | P93539 | Endevco | 19-Aug-2020 |
| | | | Y | P93549 | Endevco | 19-Aug-2020 |
| | | | Z | P93776 | Endevco | 19-Aug-2020 |
| Displacement Potentiometers | Shoulder | | Y | N/A | N/A | N/A |
| | Thoracic Rib | Upper | Y | 023 | Servo | 20-Aug-2020 |
| | | Middle | Y | 063 | Servo | 20-Aug-2020 |
| | | Lower | Y | 043 | Servo | 20-Aug-2020 |
| | Abdominal Rib | Upper | Y | 1152 | Servo | 05-Oct-2020 |
| | | Lower | Y | 051 | Servo | 20-Aug-2020 |
| Lower Spine Accelerometers (T12) | | | X | P94425 | Endevco | 19-Aug-2020 |
| | | | Y | P91522 | Endevco | 19-Aug-2020 |
| | | | Z | P91511 | Endevco | 19-Aug-2020 |
| Acetabulum Load Cell | | | Y | 235-FY | FTSS | 20-Aug-2020 |
| Iliac Wing Load Cell | | | Y | 320-FY | FTSS | 20-Aug-2020 |
| Pelvis Plug (struck side) | | | | 13136 | SACO | 08-Aug-2019 |
| Pelvis Plug (non-struck side) | | | | 13205 | SACO | 08-Aug-2019 |

**TABLE 2 – Vehicle Instrumentation**

| Vehicle Instrumentation | | Serial Number | Manufacturer | Calibration Date |
|---|---|---|---|---|
| Vehicle Center of Gravity | X | P34046 | Endevco | 11-Feb-2021 |
| Vehicle Center of Gravity | Y | P57803 | Endevco | 11-Feb-2021 |
| Vehicle Center of Gravity | Z | P50393 | Endevco | 11-Feb-2021 |
| Left Floor Sill | Y | P33965 | Endevco | 11-Feb-2021 |
| A-Pillar Sill | Y | T11389 | Endevco | 11-Feb-2021 |
| A-Pillar Low | Y | P94498 | Endevco | 11-Feb-2021 |
| A-Pillar Mid | Y | P90293 | Endevco | 11-Feb-2021 |
| B-Pillar Sill | Y | P34205 | Endevco | 11-Feb-2021 |
| B-Pillar Low | Y | P88030 | Endevco | 11-Feb-2021 |
| B-Pillar Mid | Y | P90297 | Endevco | 11-Feb-2021 |
| Driver Seat | Y | P58557 | Endevco | 11-Feb-2021 |
| Engine Top | X | T23828 | Endevco | 29-Sep-2020 |
| Engine Top | Y | T23795 | Endevco | 17-Sep-2020 |
| Firewall | Y | T23866 | Endevco | 15-Sep-2020 |
| Right Roof | Y | P57192 | Endevco | 27-Aug-2020 |
| Right Floor Sill | Y | P80720 | Endevco | 8-Feb-2021 |
| Rear Floor Pan | X | P91613 | Endevco | 11-Feb-2021 |
| Rear Floor Pan | Y | P91965 | Endevco | 11-Feb-2021 |

**TABLE 3 – Pole Instrumentation**

| Pole Instrumentation | Serial Number | Manufacturer | Calibration Date |
|---|---|---|---|
| Load Cell 1 | DK7091S | Humanetics | 12-Nov-2020 |
| Load Cell 2 | DK7120S | Humanetics | 12-Nov-2020 |
| Load Cell 3 | DK7118S | Humanetics | 12-Nov-2020 |
| Load Cell 4 | DK7124S | Humanetics | 12-Nov-2020 |
| Load Cell 5 | DK7111S | Humanetics | 12-Nov-2020 |
| Load Cell 6 | DK7126S | Humanetics | 12-Nov-2020 |
| Load Cell 7 | DK7112S | Humanetics | 12-Nov-2020 |
| Load Cell 8 | DK7074S | Humanetics | 12-Nov-2020 |