

REPORT NUMBER: 301-KAR-21-002
SAFETY COMPLIANCE TESTING FOR FMVSS 301R
FUEL SYSTEM INTEGRITY – REAR IMPACT
79.3 KM/H 70% OVERLAP REAR IMPACT

FORD MOTOR COMPANY
2021 FORD BRONCO SPORT 5-DOOR MPV

NHTSA NUMBER: C20210203

PREPARED BY:
APPLUS+ IDIADA KARCO ENGINEERING, LLC.
9270 HOLLY ROAD
ADELANTO, CA 92301



TEST DATE:
JULY 6, 2021

REPORT DATE:
JULY 20, 2021
FINAL REPORT

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
ROOM 6111, NVS-220
400 SEVENTH STREET, SW
WASHINGTON, DC 20590

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Prepared By:  _____

Mr. Noah A. Partida, Project Engineer
Applus+ IDIADA KARCO Engineering, LLC.

Reviewed By:  _____

Mr. Steven D. Matsusaka, Engineering Manager
Applus+ IDIADA KARCO Engineering, LLC.

Approved By:  _____

Mr. Michael L. Dunlap, Director of Operations
Applus+ IDIADA KARCO Engineering, LLC.

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7. Authors Mr. Noah Partida, Project Engineer, Applus+ IDIADA KARCO Mr. Steven Matsusaka, Engineering Manager, Applus+ IDIADA KARCO		8. Performing Organization Report No. TR-P41211-01-NC	
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16. Abstract <p>A 79.3 km/h 70% overlap rear impact test was conducted on the subject 2021 Ford Bronco Sport 5-Door MPV in accordance with the Office of Vehicle Safety Compliance Laboratory Test Procedure No. TP-301R-02 for the determination of FMVSS 301 compliance. The test was conducted at the Applus+ IDIADA KARCO Engineering, LLC. facility in Adelanto, California on July 6, 2021.</p> <p>The impact velocity was 79.43 km/h and the outside ambient temperature was 36.7° C. There was no Stoddard solvent leakage immediately after the test nor during any portion of the static rollover. The test vehicle appeared to comply with all requirements of FMVSS 301R.</p>			
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SECTION 1

SUMMARY OF TEST

SUMMARY

The purpose of this rear impact test is to measure the performance of the subject vehicle, a 2021 Ford Bronco Sport 5-Door MPV, for FMVSS 301 compliance.

This 79.3 km/h 70% Overlap Rear Impact is sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-16-D-00029. It was conducted in accordance with the Office of Vehicle Safety Compliance Laboratory Test Procedure TP-301R-02 for FMVSS 301R "Fuel System Integrity – Rear Impact", dated January 2007.

The test was performed at Applus+ IDIADA KARCO Engineering, LLC. on July 6, 2021. Pre- and post- test photographs of the vehicle and ATD's can be found in Appendix A of this report.

Two (2) real-time cameras and three (3) high-speed cameras were used to document the rear impact event.

Two Part 572E 50th percentile male anthropomorphic test devices (ATD) were placed in the driver and right front passenger seating positions. Neither of the ATD's were instrumented for this test.

There was no Stoddard solvent leakage after the impact or during any portion of the static rollover. The test vehicle appeared to comply with all requirements of FMVSS 301R-02 "Fuel System Integrity – Rear Impact". FMVSS 301 data is summarized in Data Sheets 4 and 5.

SECTION 2
DATA SHEETS

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV

NHTSA No.: C20210203

Test Program: 79.3 km/h 70% Overlap Rear Impact

Test Date: 07/06/21

CONVERSION FACTORS

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

DATA SHEET NO. 1

TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV NHTSA No.: C20210203
 Test Program: 79.3 km/h 70% Overlap Rear Impact Test Date: 07/06/21

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	C20210203
Model Year	2021
Make	Ford
Model	Bronco Sport
Body Style	5-Door MPV
VIN	3FMCR9A66MRA21494
Body Color	Oxford White
Odometer Reading (km / mi)	47 / 29
Engine Displacement (L)	1.5
Type / No. of Cylinders	Inline 3-Cylinder
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	8
Overdrive	Yes
Final Drive	AWD
Roof Rack	Yes
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

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

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

DATA FROM CERTIFICATION LABEL

Manufactured By	Ford Motor Company
Date of Manufacture	December-20

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

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Split Bench			
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				530.0	A
DSC x 68.04 (kg)				340.2	B
Cargo Weight (RCLW) (kg)				136*	A-B

*Maximum RCLW of 136 kg is used for Trucks, MPVs, or Buses

DATA SHEET NO. 1 ... (CONTINUED)

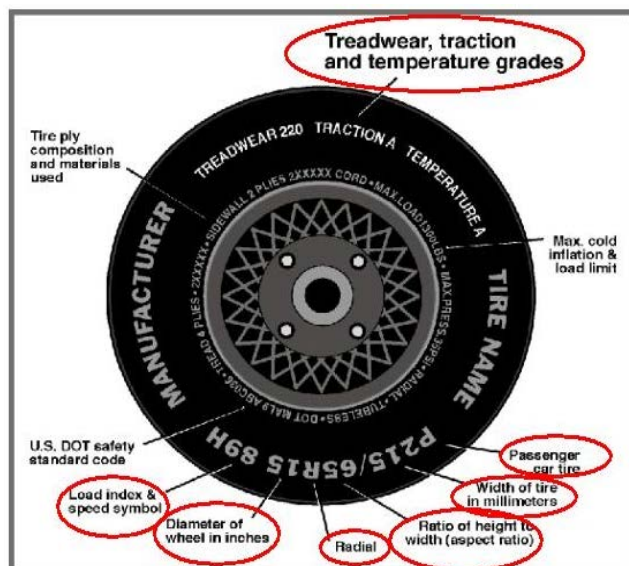
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV

NHTSA No.: C20210203

Test Program: 79.3 km/h 70% Overlap Rear Impact

Test Date: 07/06/21



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max Tire Pressure (kPa)	350	350
Cold Tire Pressure (kPa)	230	230
Recommended Tire Size	P225/65R17	P225/65R17
Tire Size on Vehicle	P225/65R17	P225/65R17
Tire Manufacturer	Continental	Continental
Tire Model	Pro Contact	Pro Contact
Treadwear Rating	800	540
Traction Rating	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester	1 Polyester
Tire Plies Body	1 Polyester, 2 Steel, 1 Polyamide	1 Polyester, 2 Steel, 1 Polyamide
Load Index/Speed Symbol	102H	102H
Tire Material	Polyester, Steel, Polyamide	Polyester, Steel, Polyamide
DOT Safety Code Left	1P5 OFBC3K 4620	1P5 OFBC3K 4620
DOT Safety Code Right	1P5 OFBC3K 4620	1P5 OFBC3K 4620
Type of Spare Tire	T155/70D17	
Location of Tire Placard on Vehicle	Driver Door Latch Post	

DATA SHEET NO. 2

PRE-TEST DATA

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV

NHTSA No.: C20210203

Test Program: 79.3 km/h 70% Overlap Rear Impact

Test Date: 07/06/21

TEST VEHICLE AXLE WEIGHTS

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	453.0	348.0	801.0	518.5	433.5	952.0
Right	kg	452.0	314.0	766.0	510.0	380.0	890.0
Ratio	%	57.8%	42.2%	100.0%	55.8%	44.2%	100.0%
Total	kg	905.0	662.0	1567.0	1028.5	813.5	1842.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1567.0	A
Actual Weight of 2 P572 ATDs Used	kg	148.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	136.0	C
Calculated Vehicle Target Wt (TVTWT)	kg	1851.0	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	822	828	846	858	1128
As Tested	mm	795	804	818	819	1179

GENERAL TEST VEHICLE DATA

Measured Parameter	Units	Value
Total Vehicle Wheel Base	mm	2670
Total Vehicle Length	mm	4400
Total Vehicle Width	mm	1840
Amount of Stoddard Solvent in Fuel Tank	L	58.67

DATA SHEET NO. 2... (CONTINUED)

PRE-TEST DATA

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV NHTSA No.: C20210203
 Test Program: 79.3 km/h 70% Overlap Rear Impact Test Date: 07/06/21

BALLAST DATA

Description	Value
Type of Ballast	Ballast Bottle
Method of Securing Ballast	Seatbelt
Total Weight of Ballast	100.0 kg
Weight of Vehicle Components Removed	0.0 kg

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:

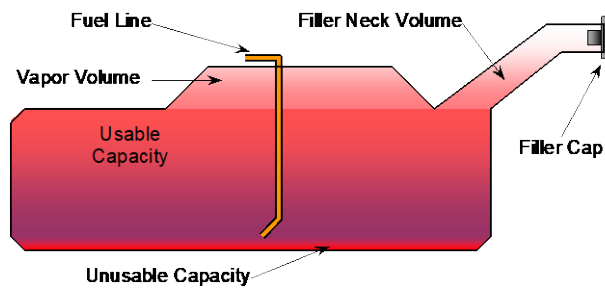
None

FUEL TANK CAPACITY

Description	Liters
Fuel System Capacity Listed in Owners Manual	63.22
Usable Capacity of "Standard Tank"	63.22
91 - 94% of Usable Capacity	58.3-59.43
Actual Amount of Stoddard Solvent Used	58.67

FUEL PUMP

The vehicle is equipped with an electric fuel pump. Fuel pump cycles for a brief period when key is moved to on position, but does not pump fuel unless the engine is running.



VEHICLE FUEL TANK ASSEMBLY

TEST FLUID

Description	Value
Test Fluid Type	Stoddard Solvent
Test Fluid Specific Gravity	0.758
Test Fluid Kinematic Viscosity	0.96
Test Fluid Color	Purple

DATA SHEET NO. 2... (CONTINUED)

PRE-TEST DATA

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV

NHTSA No.: C20210203

Test Program: 79.3 km/h 70% Overlap Rear Impact

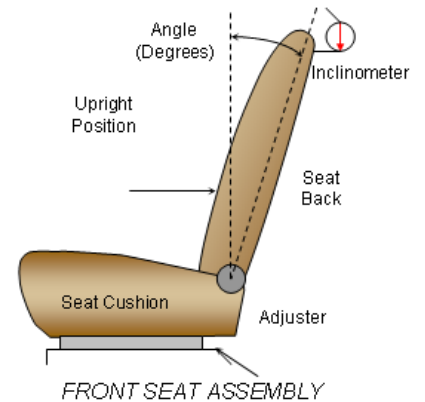
Test Date: 07/06/21

NOMINAL DESIGN RIDING POSITION

Seat back angle is measured using a digital inclinometer placed on the headrest post.

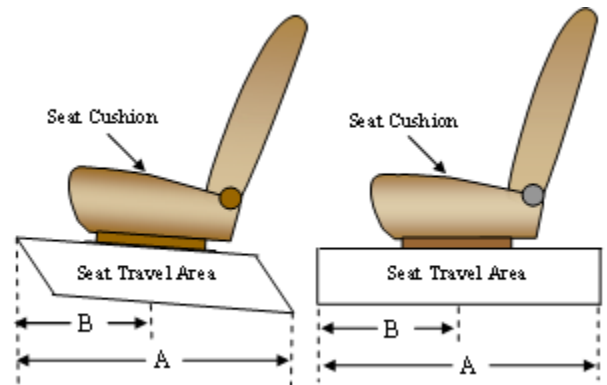
SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	3.0
Passenger Seat Back Angle	3.0



SEAT FORE / AFT POSITIONING

The total seat travel is measured from the forward most possible position to the rear most possible position. The driver's and passenger's seats are set to the middle of the fore-aft travel.



SEAT FORE/AFT POSITIONS

Seating Position	Total Fore-Aft Travel	Placed in Position
Driver Seat	240 mm (36 detents)	120 mm (18 detents)
Passenger Seat	254 mm (38 detents)	127 mm (19 detents)

DATA SHEET NO. 2... (CONTINUED)

PRE-TEST DATA

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV

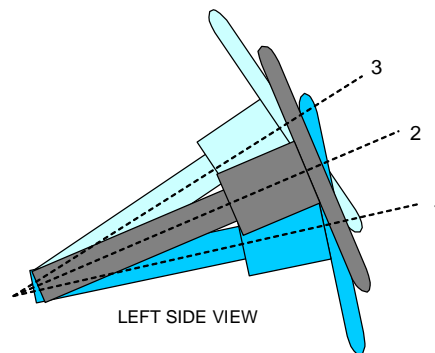
NHTSA No.: C20210203

Test Program: 79.3 km/h 70% Overlap Rear Impact

Test Date: 07/06/21

STEERING COLUMN ADJUSTMENT

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. A digital inclinometer is used to measure a plate which is placed across the rim of the steering wheel for angular measurements. A tape measure is used to measure telescoping steering wheel travel.



STEERING COLUMN ASSEMBLY

STEERING COLUMN POSITIONING

	Degrees	Fore-Aft Position (mm)
Lowermost Position, No. 1	22.6	105
Geometric Center Position, No. 2	24.7	133
Uppermost Position, No. 3	26.8	160
Telescoping Steering Wheel Travel		
Test Position	24.7	133

DATA SHEET NO. 3
MOVING BARRIER DATA

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV

NHTSA No.: C20210203

Test Program: 79.3 km/h 70% Overlap Rear Impact

Test Date: 07/06/21

MOVING BARRIER TEST WEIGHT

	Units	As Tested Weights (ATW)		
		Front Axle	Rear Axle	Total
Left	kg	386.5	316.5	703.0
Right	kg	385.5	271.5	657.0
Ratio	%	56.8%	43.2%	100.0%
Total	kg	772.0	588.0	1360.0

MOVING BARRIER TIRE INFORMATION

Measured Parameter	Front	Rear
Recommended Tire Size	205/75R15	205/75R15
Tire Size on Vehicle	205/75R15	205/75R15
Tire Manufacturer	Pacemark	Pacemark
Tire Model	All Weather	All Weather
Treadwear	420	420
Traction	A	A
Temperature Grades	B	B
Tire Pressure - Front	220	220
Tire Pressure - Rear	220	220

MOVING BARRIER DIMENSIONS

Measurement Description	Length (mm)
Overall Width	1676
Overall Height	559
Honeycomb Depth	381
Overall Depth	483
Bottom Honeycomb to Bottom Bumper	51
Bumper Height	203
Ground to Top of MDB	788
Ground to Bottom of MDB	229
Ground to Bottom of Bumper	280
Ground to Top of Bumper	483

DATA SHEET NO. 4**POST-TEST DATA**Test Vehicle: 2021 Ford Bronco Sport 5-Door MPVNHTSA No.: C20210203Test Program: 79.3 km/h 70% Overlap Rear ImpactTest Date: 07/06/21Temperature at Time of Impact: 36.7°CTest Time: 2:27 PMVIN: 3FMCR9A66MRA21494**IMPACT VELOCITY DATA**

Measured Parameter	Units	Value
Trap No. 1 Velocity (Primary)	km/h	79.43
Trap No. 2 Velocity (Redundant)	km/h	79.50

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Width	mm		1840
Vertical Impact Reference Line (Right of Vehicle Center Line)	mm		490
Actual Impact Point (Right of Vehicle Center Line)	mm		472
Horizontal Offset (+ right / - left)	mm	± 50 of Intended Impact Point	-18
Vertical Offset (- down / + up)	mm	± 40 of Intended Impact Point	0

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length at Centerline	4400	4055	345
2	Total Length	4400	4380	20
3	Total Width	1840	1964	-124
4	Left Side Wheelbase	2670	2590	80
5	Right Side Wheelbase	2670	2675	-5

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Row	Vertical Location		From Centerline		Max. Crush (mm)
	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	785	800	Right	366
B	Top of Bumper	846	0	C/L	386
C	Mid Level	919	800	Right	368
D	Top of Stack	664	800	Left	327

DATA SHEET NO. 4... (CONTINUED)

POST-TEST DATA

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV NHTSA No.: C20210203
Test Program: 79.3 km/h 70% Overlap Rear Impact Test Date: 07/06/21

DOOR OPENING AND SEAT TRACK INFORMATION

Description	Driver	Passenger
Front Door Opening	Remained closed and latched	Remained closed and latched
Rear Door Opening	Remained closed and latched	Remained closed and latched
Hatch and other doors	Rear Hatch Jammed Shut	

FMVSS 301 FUEL SYSTEM INTEGRITY POST-IMPACT DATA

Stoddard Solvent Spillage Measurements

- A. From impact until vehicle motion ceases: 0 g
(Maximum allowable = 28 g)
- B. For the 5 minute period after motion ceases: 0 g
(Maximum allowable = 142 g)
- C. For the following 25 minutes: 0 g
(Maximum allowable = 28 g/minute)
- D. Spillage: None

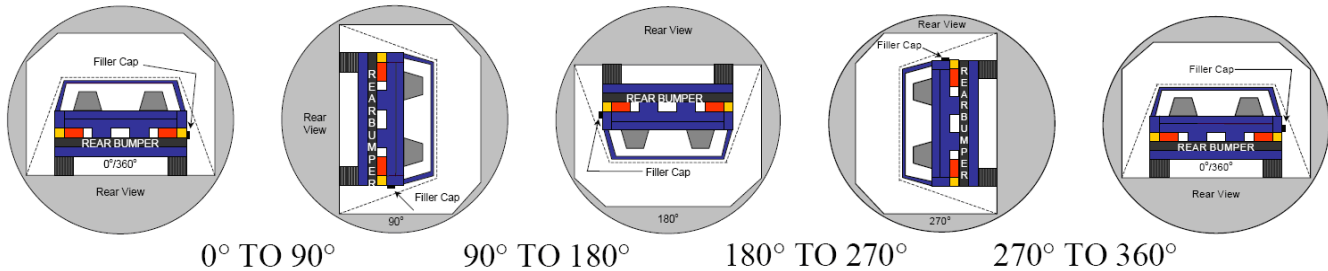
DATA SHEET NO. 5
STATIC ROLLOVER TEST DATA

Test Vehicle: 2021 Ford Bronco Sport 5-Door MPV

NHTSA No.: C20210203

Test Program: 79.3 km/h 70% Overlap Rear Impact

Test Date: 07/06/21



1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.

2. The position hold time at each position is 300 seconds (minimum).

Details of Stoddard solvent spillage: None

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° To 90°	82	300	382
90° To 180°	84	300	384
180° To 270°	82	300	382
270° To 360°	82	300	382

FMVSS 301 SPILLAGE TABLE

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

SOLVENT SPILLAGE LOCATION TABLE

Test Phase	Spillage Location
0° To 90°	No Spillage
90° To 180°	No Spillage
180° To 270°	No Spillage
270° To 360°	No Spillage

**APPENDIX A
PHOTOGRAPHS**

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FIGURE 1. Pre-Test Front View of Test Vehicle



FIGURE 2. Post-Test Front View of Test Vehicle



FIGURE 3. Pre-Test Left Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 4. Post-Test Left Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 5. Pre-Test Left View of Test Vehicle



FIGURE 6. Post-Test Left View of Test Vehicle



FIGURE 7. Pre-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



FIGURE 8. Post-Test Left Rear $\frac{3}{4}$ View of Test Vehicle



FIGURE 9. Pre-Test Rear View of Test Vehicle



FIGURE 10. Post-Test Rear View of Test Vehicle



FIGURE 11. Pre-Test Right Rear $\frac{3}{4}$ View of Test Vehicle



FIGURE 12. Post-Test Right Rear $\frac{3}{4}$ View of Test Vehicle



FIGURE 13. Pre-Test Right View of Test Vehicle



FIGURE 14. Post-Test Right View of Test Vehicle



FIGURE 15. Pre-Test Right Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 16. Post-Test Right Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 17. Pre-Test View of Fuel Filler Cap



FIGURE 18. Post-Test View of Fuel Filler Cap

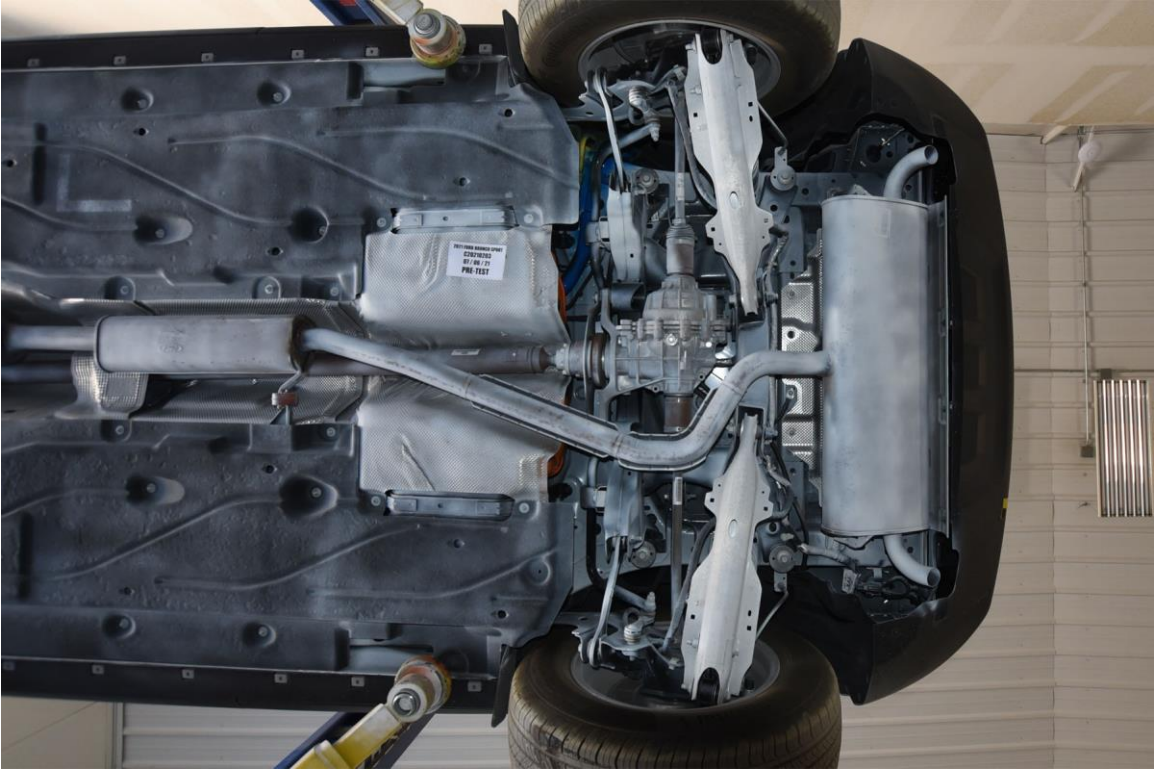


FIGURE 19. Pre-Test Rear Underbody View of Test Vehicle



FIGURE 20. Post-Test Rear Underbody View of Test Vehicle

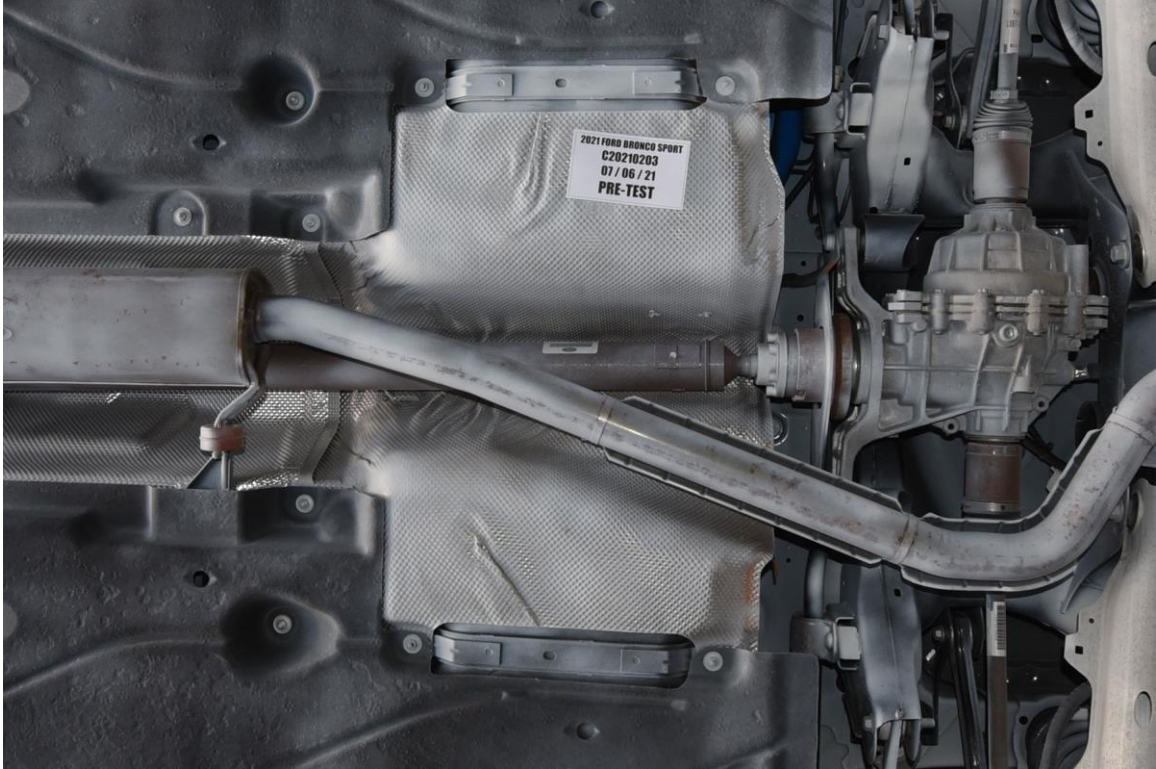


FIGURE 21. Pre-Test Underbody View of Fuel Tank

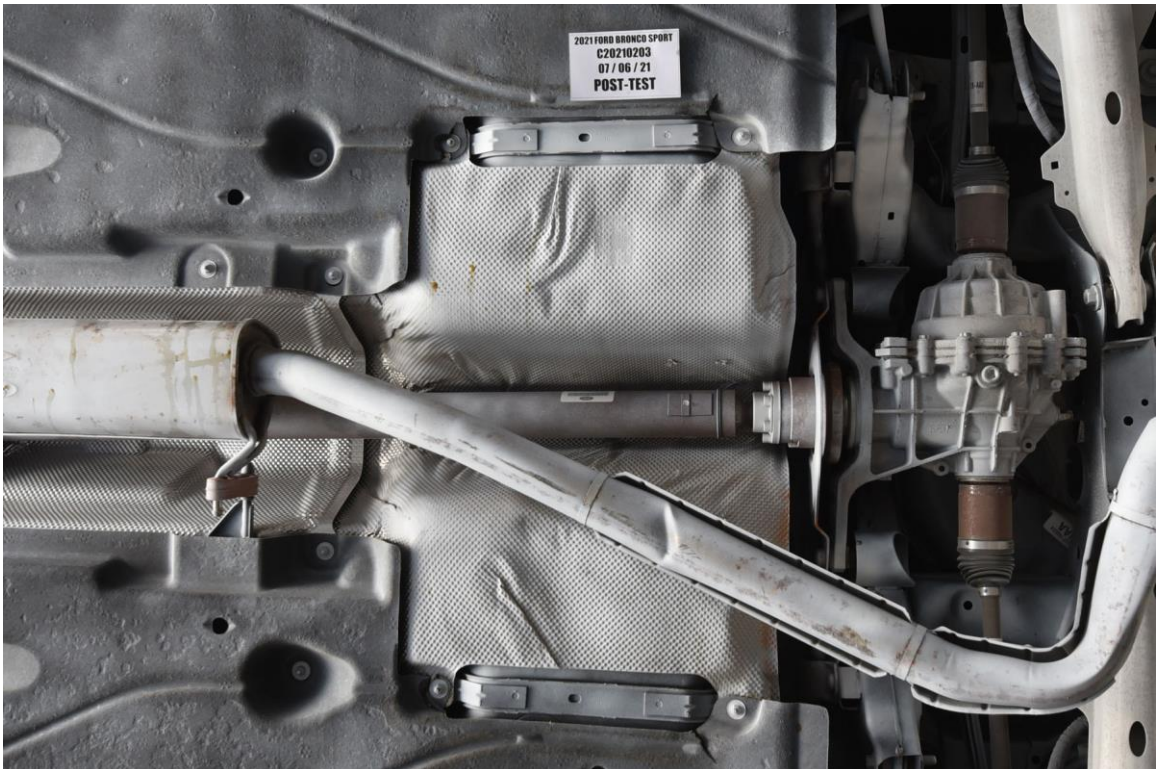


FIGURE 22. Post-Test Underbody View of Fuel Tank

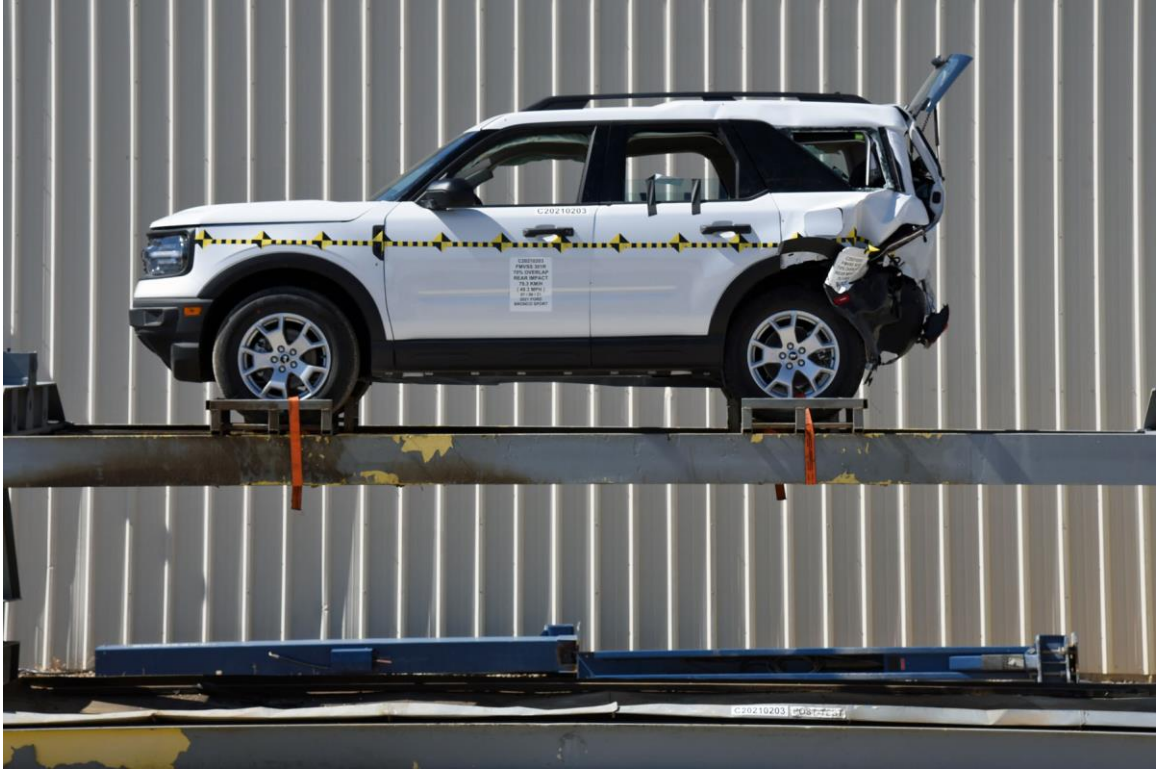


FIGURE 23. Test Vehicle at 0° on FMVSS 301 Static Rollover Device



FIGURE 24. Test Vehicle at 90° on FMVSS 301 Static Rollover Device



FIGURE 25. Test Vehicle at 180° on FMVSS 301 Static Rollover Device

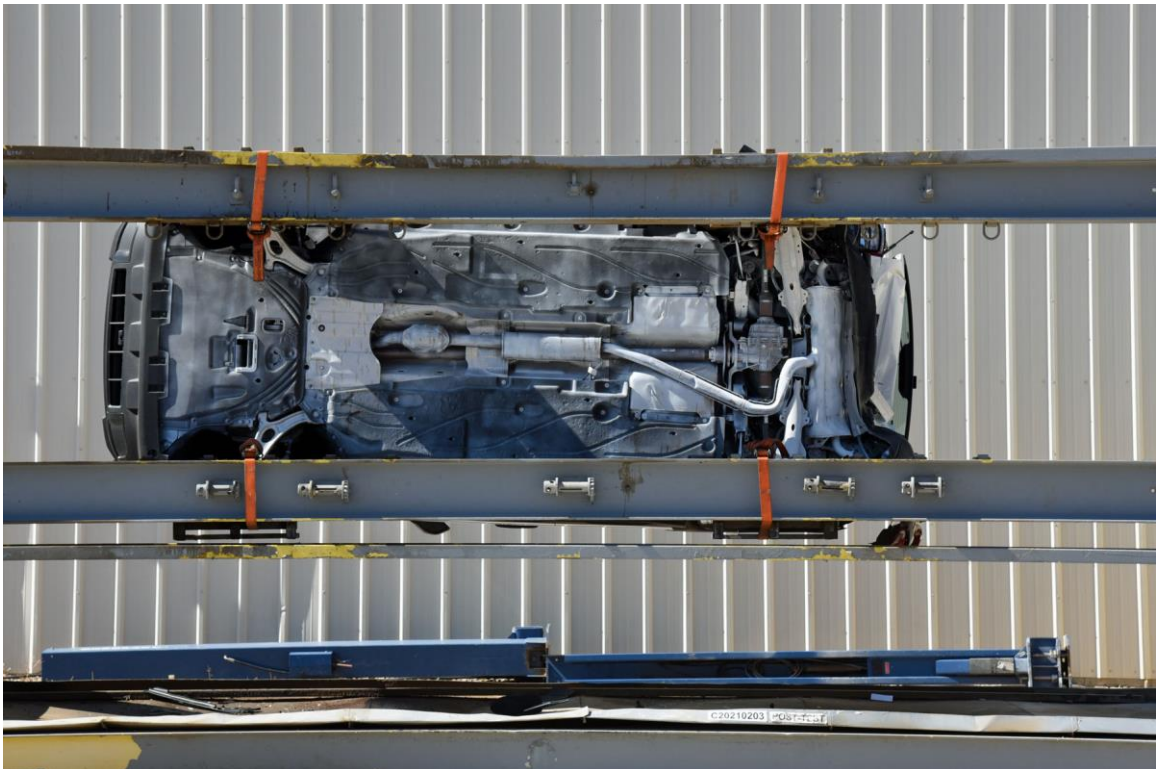


FIGURE 26. Test Vehicle at 270° on FMVSS 301 Static Rollover Device



FIGURE 27. Test Vehicle at 36° on FMVSS 301 Static Rollover Device



FIGURE 28. Test Vehicle Manufacturer's Label

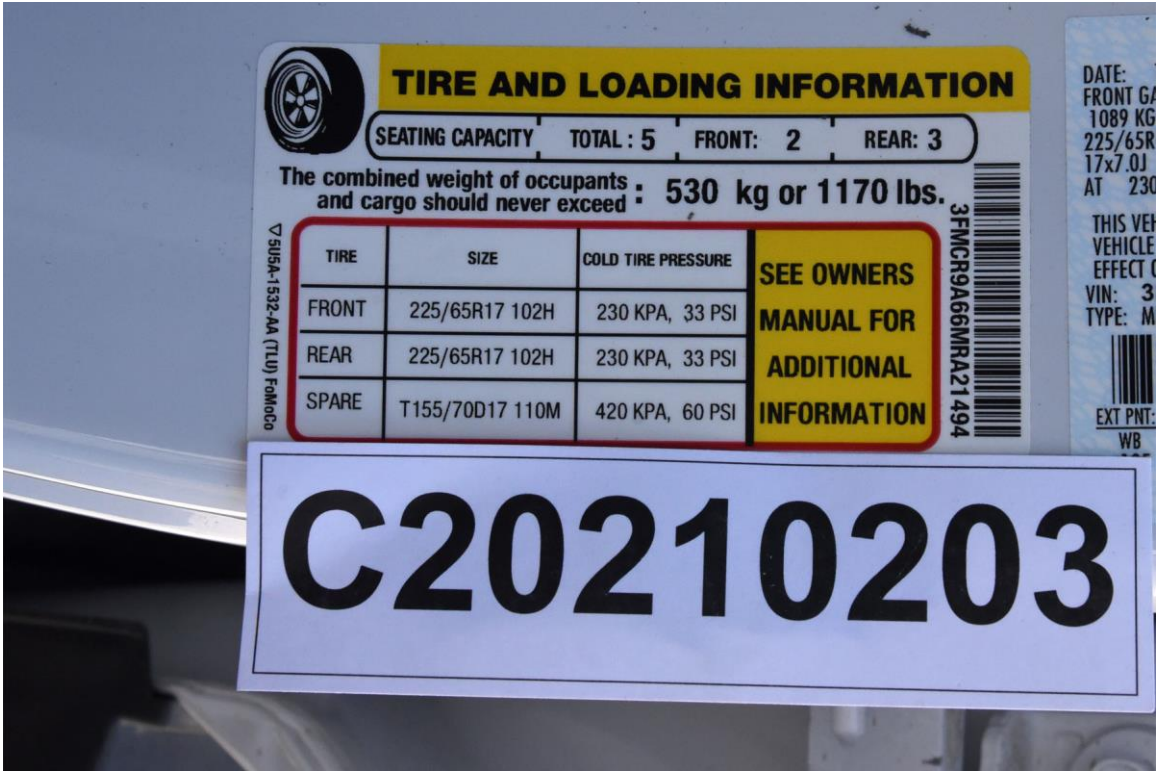


FIGURE 29. Test Vehicle Tire Information Placard



FIGURE 30. Impact Event