

REPORT NUMBER: 301-KAR-19-005
SAFETY COMPLIANCE TESTING FOR FMVSS 301R
FUEL SYSTEM INTEGRITY – REAR IMPACT
79.3 KM/H 70% OVERLAP REAR IMPACT

VOLKSWAGEN AG GERMANY
2019 VOLKSWAGEN ARTEON 5-DOOR HATCHBACK

NHTSA NUMBER: C20195802

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TEST DATE:
SEPTEMBER 27, 2019

REPORT DATE:
OCTOBER 11, 2019
FINAL REPORT

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
ROOM 6111, NVS-220
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16. Abstract A 79.3 km/h 70% overlap rear impact test was conducted on the subject 2019 Volkswagen Arteon 5-Door Hatchback 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 September 27, 2019. The impact velocity was 78.61 km/h and the outside ambient temperature was 32.8° 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.			
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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 2019 Volkswagen Arteon 5-Door Hatchback, 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 September 27, 2019. Pre- and post- test photographs of the vehicle and ATD's can be found in Appendix A of this report.

Three (3) 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: 2019 Volkswagen Arteon 5-Door Hatchback

NHTSA No.: C20195802

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

Test Date: 09/27/19

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: 2019 Volkswagen Arteon 5-Door Hatchback NHTSA No.: C20195802
 Test Program: 79.3 km/h 70% Overlap Rear Impact Test Date: 09/27/19

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA Number	C20195802
Model Year	2019
Make	Volkswagen
Model	Arteon
Body Style	5-Door Hatchback
VIN	WVWBR7AN1KE008745
Body Color	Black
Odometer Reading (km / mi)	35.4 / 22
Engine Displacement (L)	2.0
Type / No. of Cylinders	Inline 4 Cylinder
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	Yes
Anti-Lock Brakes (ABS)	Yes
Automatic Door Locks (ADLs)	Yes

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	No
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?

N/A

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen AG Germany
Date of Manufacture	08/18

GVWR (kg)	2240
GAWR Front (kg)	1170
GAWR Rear (kg)	1120

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total	
Type of Seats	Bucket	Bench			
Designated Seating Capacity	2	3		5	
Capacity Weight (VCW) (kg)				385.0	A
DSC x 68 (kg)				340.0	B
Cargo Weight (RCLW) (kg)				45.0	A-B

DATA SHEET NO. 1 ... (CONTINUED)

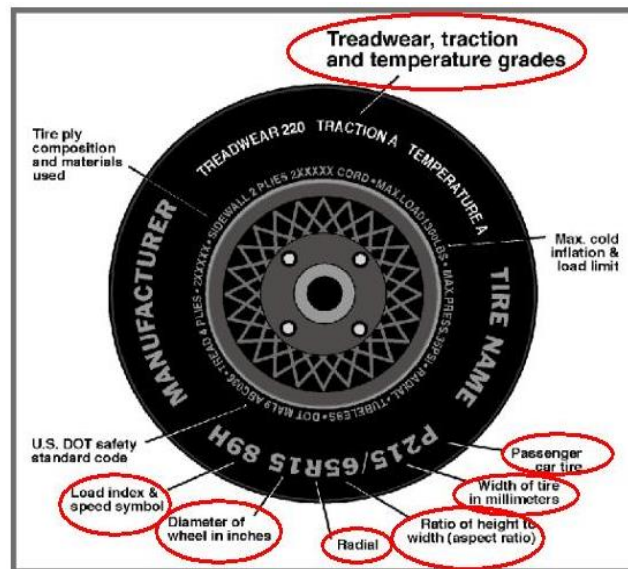
TEST VEHICLE SPECIFICATIONS

Test Vehicle: 2019 Volkswagen Arteon 5-Door Hatchback

NHTSA No.: C20195802

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

Test Date: 09/27/19



VEHICLE TIRE INFORMATION

Measured Parameter	Front	Rear
Max Tire Pressure (kPa)	350	350
Cold Tire Pressure (kPa)	230	230
Recommended Tire Size	245/45R18	245/45R18
Tire Size on Vehicle	245/45R18	245/45R18
Tire Manufacturer	Continental	Continental
Tire Model	Pro Contact TX	Pro Contact TX
Treadwear Rating	500	500
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	96H	96H
Tire Material	Polyester, Steel, Polymide	Polyester, Steel, Polymide
DOT Safety Code Left	6G8U WCAS 2918	6G8U WCAS 2918
DOT Safety Code Right	6G8U WCAS 2918	6G8U WCAS 2918
Type of Spare Tire	T125/70R18	
Location of Tire Placard on Vehicle	Driver Side B-Pillar	

DATA SHEET NO. 2**PRE-TEST DATA**Test Vehicle: 2019 Volkswagen Arteon 5-Door HatchbackNHTSA No.: C20195802Test Program: 79.3 km/h 70% Overlap Rear ImpactTest Date: 09/27/19**TEST VEHICLE AXLE WEIGHTS**

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	503.5	378.5	882.0	562.0	426.0	988.0	550.5	443.5	994.0
Right	kg	497.0	371.0	868.0	537.0	409.0	946.0	526.0	425.0	951.0
Ratio	%	57.2%	42.8%	100.0%	56.8%	43.2%	100.0%	55.3%	44.7%	100.0%
Total	kg	1000.5	749.5	1750.0	1099.0	835.0	1934.0	1076.5	868.5	1945.0

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value	
Total Delivered Weight (UVW)	kg	1747.0	A
Actual Weight of 2 P572 ATDs Used	kg	148.0	B
Rated Cargo/Luggage Wt (RCLW)	kg	45.0	C
Calculated Vehicle Target Wt (TVTW)	kg	1940.0	A+B+C

TEST VEHICLE ATTITUDES

Condition	Units	LF	RF	LR	RR	CG Aft of Front Axle
As Delivered	mm	714	723	728	735	1154
As Tested	mm	701	708	720	725	1164
Fully Loaded	mm	705	712	714	720	1203

GENERAL TEST VEHICLE DATA

Measured Parameter	Units	Value
Total Vehicle Wheel Base	mm	2850
Total Vehicle Length	mm	4855
Total Vehicle Width	mm	1842
Amount of Stoddard Solvent in Fuel Tank	L	61.40

DATA SHEET NO. 2... (CONTINUED)**PRE-TEST DATA**Test Vehicle: 2019 Volkswagen Arteon 5-Door HatchbackNHTSA No.: C20195802Test Program: 79.3 km/h 70% Overlap Rear ImpactTest Date: 09/27/19**BALLAST DATA**

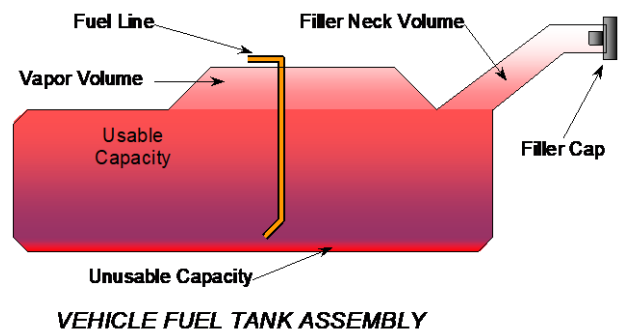
Description	Value
Type of Ballast	Ballast Bags
Method of Securing Ballast	Strapped to Rear Seat
Total Weight of Ballast	21.0 kg
Weight of Vehicle Components Removed	0.0 kg

VEHICLE COMPONENTS REMOVED TO MEET TEST WEIGHT:None**FUEL TANK CAPACITY**

Description	Liters
Fuel System Capacity Listed in Owners Manual	66.01
Usable Capacity of "Standard Tank"	66.01
91 - 94% of Usable Capacity	60.07-62.06
Actual Amount of Stoddard Solvent Used	61.40

FUEL PUMP

The vehicle is equipped with an electric fuel pump. The fuel pump runs for 2 seconds after ignition is switched on. If the engine doesn't run, the fuel pump stops running. If there is a crash signal, it will also stop running.

**TEST FLUID**

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

DATA SHEET NO. 2... (CONTINUED)

PRE-TEST DATA

Test Vehicle: 2019 Volkswagen Arteon 5-Door Hatchback

NHTSA No.: C20195802

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

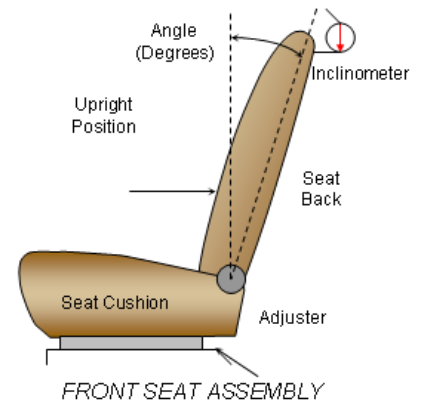
Test Date: 09/27/19

NOMINAL DESIGN RIDING POSITION

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

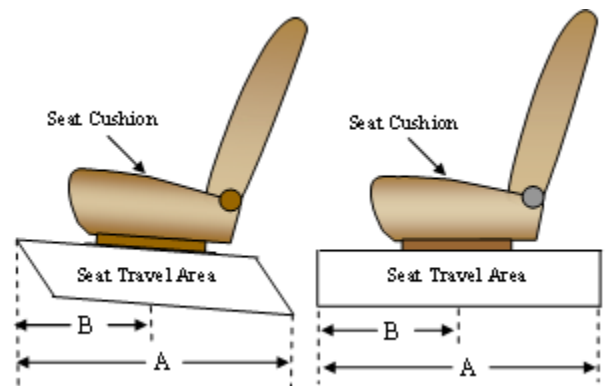
SEAT BACK ANGLE

Seating Position	Degrees
Driver Seat Back Angle	15.0
Passenger Seat Back Angle	15.0



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	320 mm	160 mm
Passenger Seat	325 mm	162 mm

DATA SHEET NO. 2... (CONTINUED)

PRE-TEST DATA

Test Vehicle: 2019 Volkswagen Arteon 5-Door Hatchback

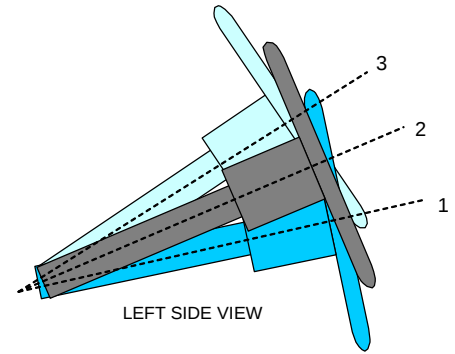
NHTSA No.: C20195802

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

Test Date: 09/27/19

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	19.1	68
Geometric Center Position, No. 2	21.8	98
Uppermost Position, No. 3	24.5	128
Telescoping Steering Wheel Travel		60
Test Position	21.8	98

DATA SHEET NO. 3
MOVING BARRIER DATA

Test Vehicle: 2019 Volkswagen Arteon 5-Door Hatchback

NHTSA No.: C20195802

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

Test Date: 09/27/19

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	380
Overall Depth	482
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	281
Ground to Top of Bumper	482

DATA SHEET NO. 4**POST-TEST DATA**Test Vehicle: 2019 Volkswagen Arteon 5-Door HatchbackNHTSA No.: C20195802Test Program: 79.3 km/h 70% Overlap Rear ImpactTest Date: 09/27/19Temperature at Time of Impact: 32.8°CTest Time: 4:20 PMVIN: WVWBR7AN1KE008745**IMPACT VELOCITY DATA**

Measured Parameter	Units	Value
Trap No. 1 Velocity (Primary)	km/h	78.61
Trap No. 2 Velocity (Redundant)	km/h	78.53

IMPACT POINT LOCATION DATA

Measured Parameter	Units	Tolerance	Value
Vehicle Width	mm		1842
Vertical Impact Reference Line (Left of Vehicle Center Line)	mm		368
Actual Impact Point (Left of Vehicle Center Line)	mm		383
Horizontal Offset (+ right / - left)	mm	± 50 of Intended Impact Point	-15
Vertical Offset (- down / + up)	mm	± 40 of Intended Impact Point	-16

TARGET VEHICLE STRUCTURAL MEASUREMENTS

No.	Description	Pre-Test	Post-Test	Difference
1	Total Length at Centerline	4855	4657	198
2	Total Length	4855	4657	198
3	Total Width	1842	1830	12
4	Left Side Wheelbase	2850	2840	10
5	Right Side Wheelbase	2850	2805	45

MAXIMUM STATIC CRUSH OF HONEYCOMB FACE

Vertical Location			From Centerline		Max. Crush (mm)
Row	Description	Height (mm)	Distance (mm)	Direction	
A	Center of Bumper	432	800	Left	275
B	Top of Bumper	533	800	Left	304
C	Mid Level	686	0	Right	342
D	Top of Stack	813	0	Center	281

DATA SHEET NO. 4... (CONTINUED)**POST-TEST DATA**Test Vehicle: 2019 Volkswagen Arteon 5-Door HatchbackNHTSA No.: C20195802Test Program: 79.3 km/h 70% Overlap Rear ImpactTest Date: 09/27/19**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

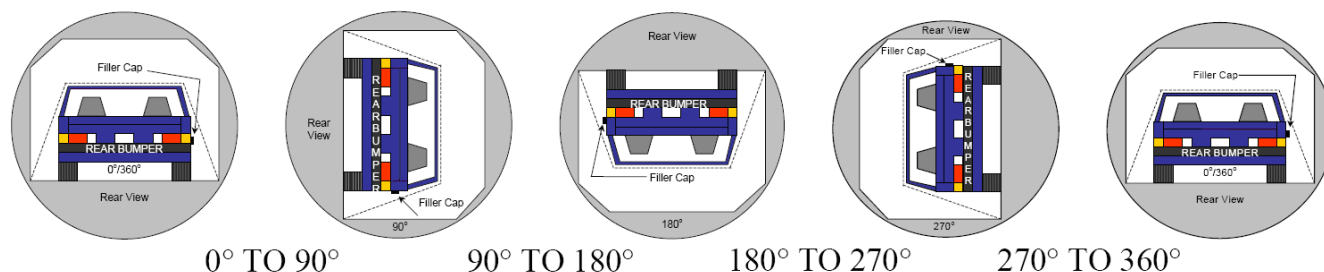
STATIC ROLLOVER TEST DATA

Test Vehicle: 2019 Volkswagen Arteon 5-Door Hatchback

NHTSA No.: C20195802

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

Test Date: 09/27/19



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°	80	300	380
90° To 180°	80	300	380
180° To 270°	79	300	379
270° To 360°	78	300	378

FMVSS 301 SPILLAGE TABLE

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° To 90°	0 g			
90° To 180°	0 g			
180° To 270°	0 g			
270° To 360°	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. As Received Right Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 2. As Received Left Rear $\frac{3}{4}$ View of Test Vehicle

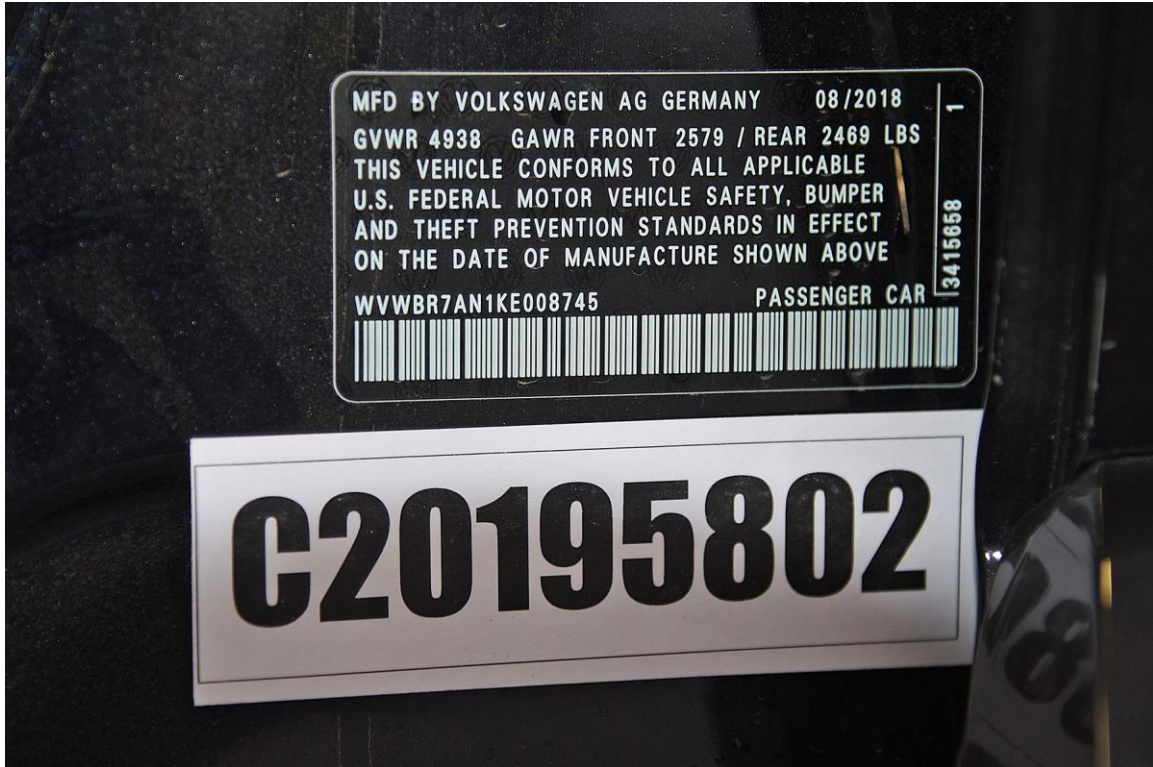


FIGURE 3. Test Vehicle Manufacturer's Label



FIGURE 4. Test Vehicle Tire Information Placard



FIGURE 5. Pre-Test Front View of Test Vehicle



FIGURE 6. Post-Test Front View of Test Vehicle



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



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



FIGURE 9. Pre-Test Left View of Test Vehicle



FIGURE 10. Post-Test Left View of Test Vehicle



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



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

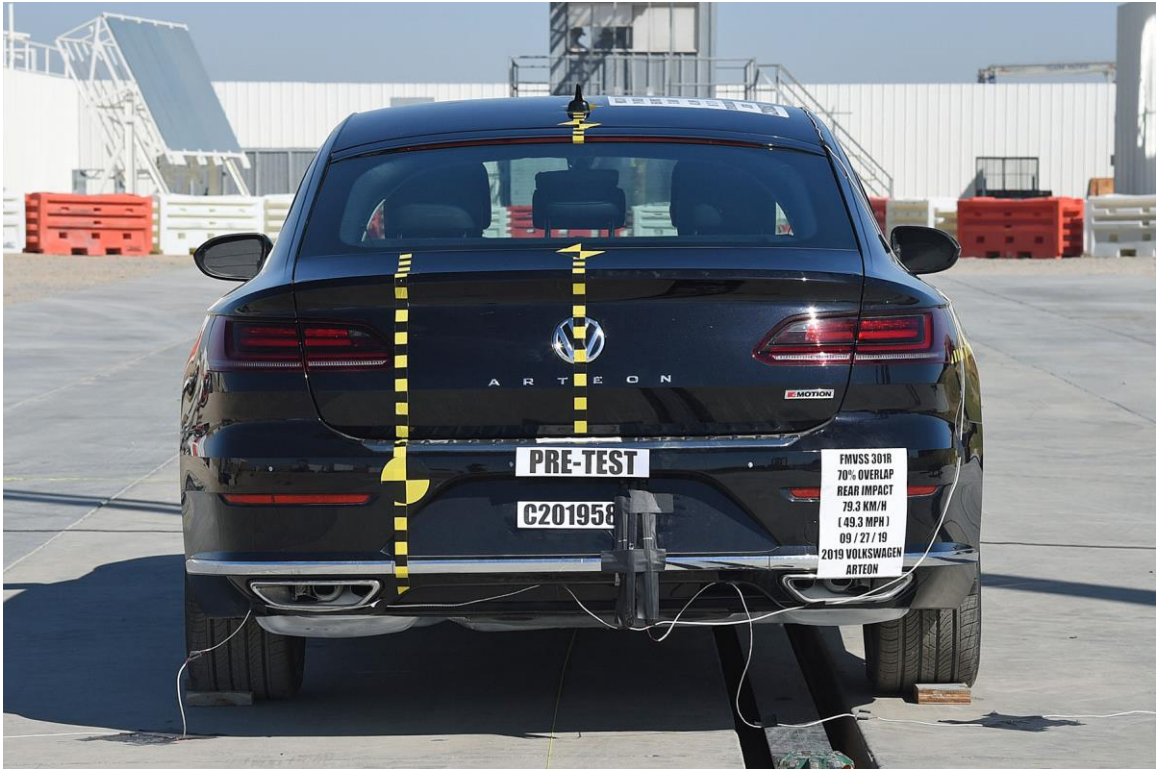


FIGURE 13. Pre-Test Rear View of Test Vehicle



FIGURE 14. Post-Test Rear View of Test Vehicle



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



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



FIGURE 17. Pre-Test Right View of Test Vehicle



FIGURE 18. Post-Test Right View of Test Vehicle



FIGURE 19. Pre-Test Right Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 20. Post-Test Right Front $\frac{3}{4}$ View of Test Vehicle



FIGURE 21. Pre-Test Close-Up View of Impact Point Target

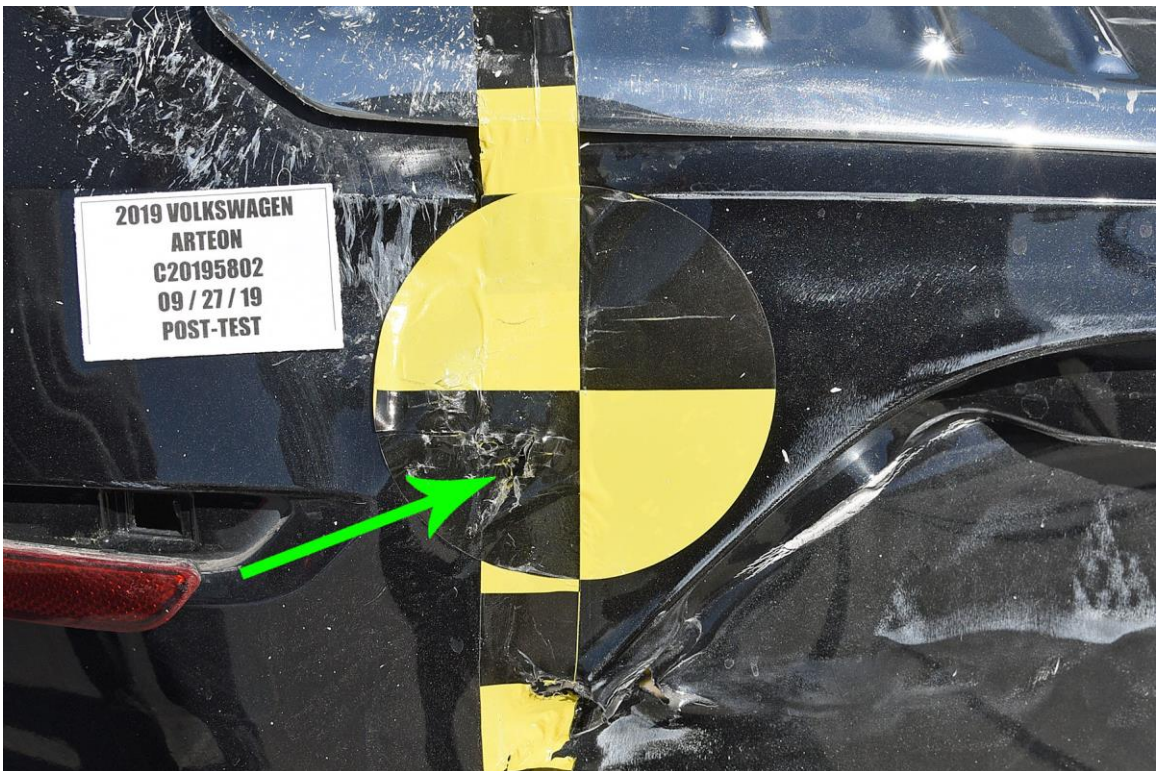


FIGURE 22. Post-Test Close-Up View of Impact Point Target



FIGURE 23. Pre-Test View of Fuel Filler Cap



FIGURE 24. Post-Test View of Fuel Filler Cap

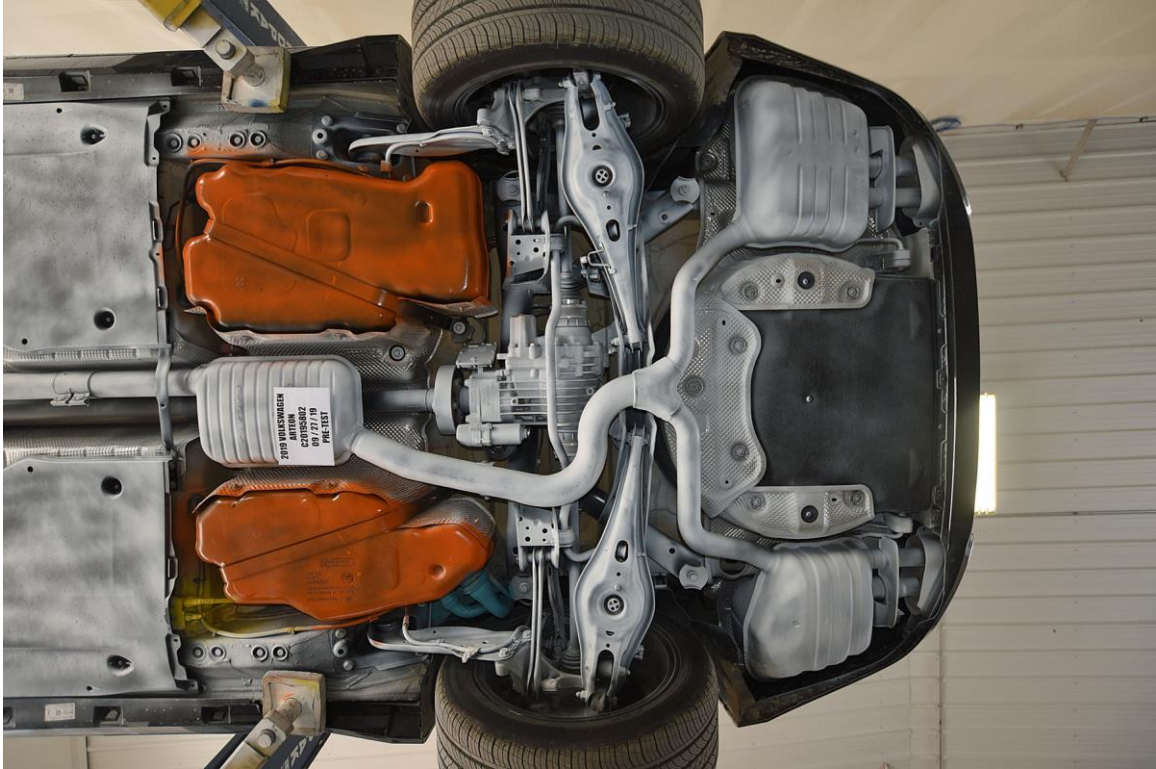


FIGURE 25. Pre-Test Rear Underbody View of Test Vehicle

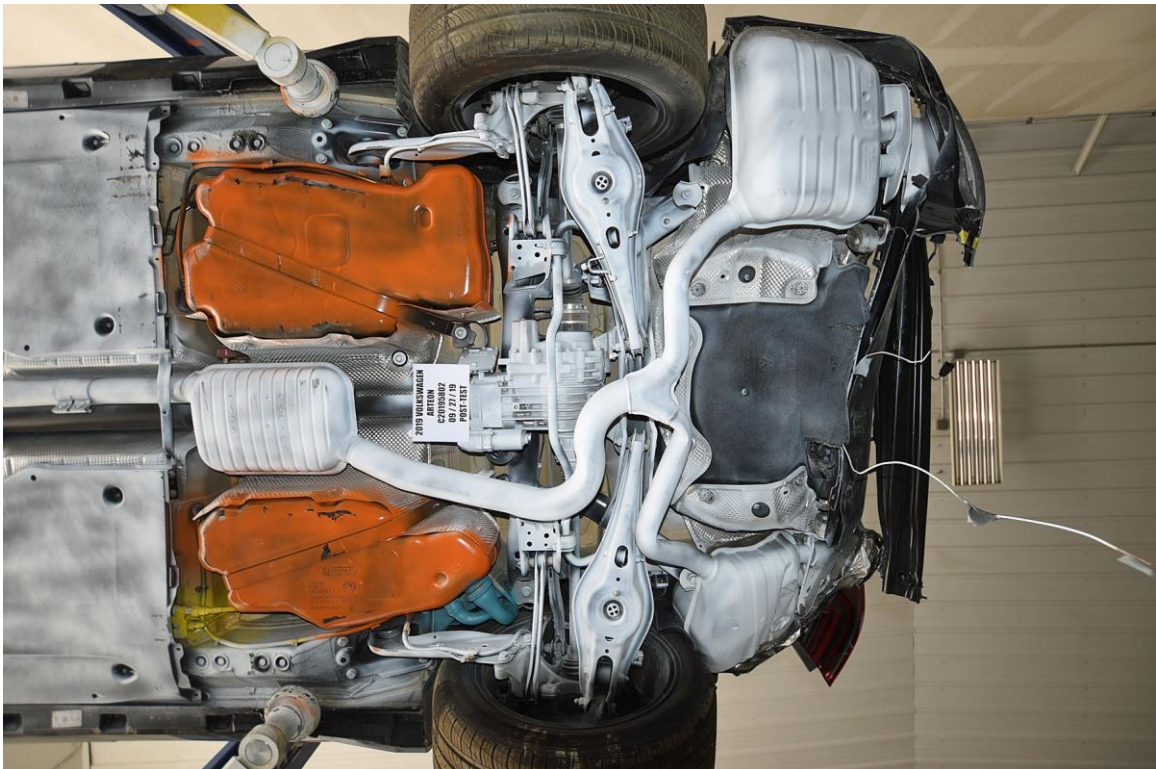


FIGURE 26. Post-Test Rear Underbody View of Test Vehicle



FIGURE 27. Test Vehicle at 0° on FMVSS 301 Static Rollover Device

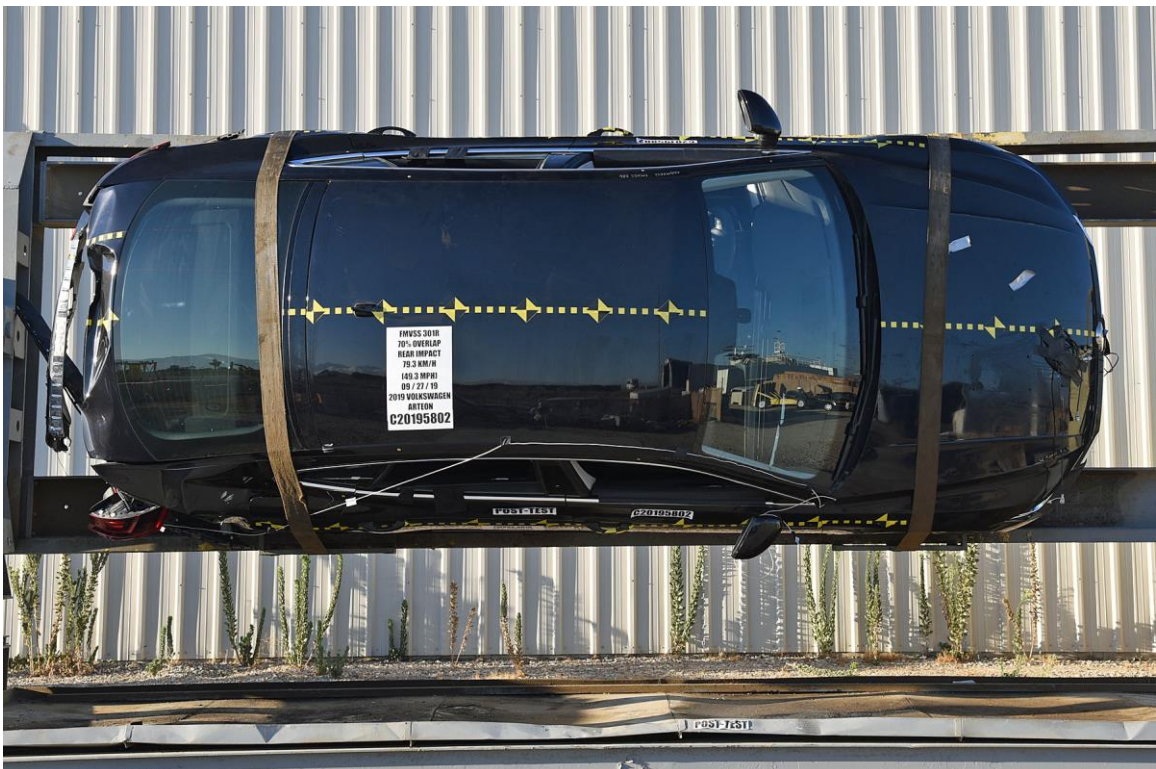


FIGURE 28. Test Vehicle at 90° on FMVSS 301 Static Rollover Device



FIGURE 29. Test Vehicle at 180° on FMVSS 301 Static Rollover Device

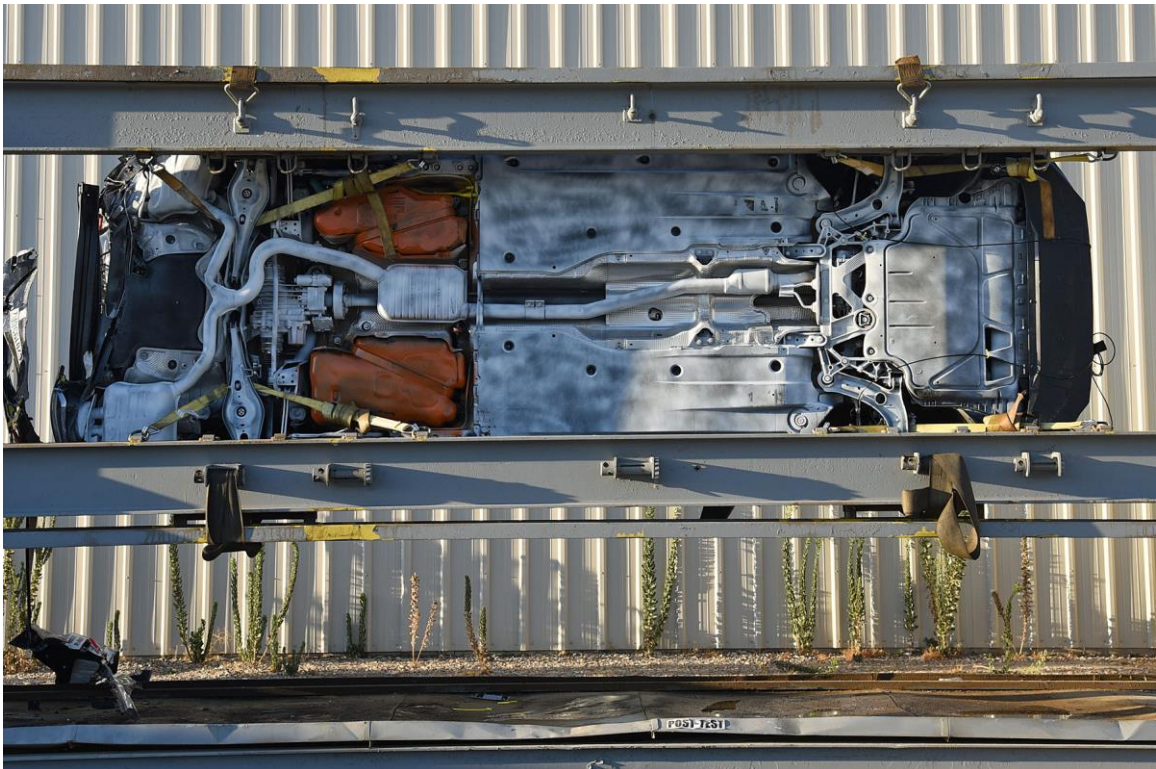


FIGURE 30. Test Vehicle at 270° on FMVSS 301 Static Rollover Device



FIGURE 31. Test Vehicle at 360° on FMVSS 301 Static Rollover Device



FIGURE 32. Impact Event