

FMVSS 301-FUEL SYSTEM INTEGRITY

VOLKSWAGEN DO BRAZIL LTDA
2005 VOLKSWAGEN GOLF
4-DOOR HATCHBACK

NHTSA NUMBER: C55801

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10/05/05

FINAL REPORT

PREPARED FOR:
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
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16. Abstract			
This 30 mph rear moving barrier impact test is a part of the Federal Motor Vehicle Safety Standard (FMVSS) 301 Compliance Test Program conducted for the National Highway Traffic Safety Administration (NHTSA) by KARCO Engineering, LLC Laboratories under Contract No. DTNH22-01-C-31025. The purpose of this test was to determine if the subject vehicle, a 2005 Volkswagen Golf 4-Door hatchback, meets the performance requirements of FMVSS No. 301, "Fuel System Integrity." The test was conducted on August 26, 2005 in accordance with the Office of Vehicle Safety Compliance Laboratory Test Procedure TP-301-03, dated February 28, 2003. The impact velocity was 47.71 Km/h. The ambient temperature at the time of impact was 37.8 degrees Celsius. The vehicle's maximum post-test static crush was 211 mm left of the vehicle's centerline			
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SECTION 1

PURPOSE OF TEST

1. PURPOSE

The purpose of this test was to determine if the subject vehicle, a 2005 Volkswagen Golf 4-Door Hatchback, meets the performance requirements of FMVSS No. 301, "Fuel System Integrity." The test was conducted in accordance with the Office of Vehicle Safety Compliance Laboratory Test Procedure TP-301-03, dated February 28, 2003.

SECTION 2

SUMMARY OF TEST

2. SUMMARY

A 1493 kg 2005 Volkswagen Golf 4-Door Hatchback was impacted from the rear by a 1799 kg moving barrier at a velocity of 47.71 Km/h (29.65 mph). The test was performed by KARCO Engineering, LLC on August 26, 2005.

The vehicle was prepared and tested following the Office of Vehicle Safety Compliance Test Procedure for Federal Motor Vehicle Safety Standard (FMVSS) 301R (OVSC TP-301-03, dated February 28., 2003).

The crash event was recorded by ten (10) high speed and two (2) real time cameras. Camera locations and other pertinent camera information are found in the data sheets. Appendix A contains Pre- and Post-Test Photographs.

There was no fuel system fluid spillage following the impact event or during any portion of the static rollover test. The maximum longitudinal crush was 211 millimeters. The vehicle appeared to comply with all the requirements of FMVSS No. 301 "Fuel System Integrity."

DATA SHEET NO. 1
GENERAL TEST AND VEHICLE PARAMETER DATA

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55801
 Test Date: 8/26/05

TEST VEHICLE INFORMATION AND OPTIONS

NHTSA No.	C55801
Make	Volkswagen
Model	Golf
Body Style	4-Door Hatchback
Vin No.	9BWFL61J354013682
Color	White
Delivery Date	6/7/05
Odometer	235
Dealer	Bozzani Volkswagen
Transmission	5 Speed Manual
Final Drive	Front
Type/No. Cyl.	4
Engine Disp. (L)	2.0
Engine Placement	Transverse
Roof Rack	No
Sunroof/T-Top	No
Tinted Glass	No
Traction Control	Yes
Power Brakes	Yes
Front Disc	Yes
Rear Disc	Yes

Anti-Lock Brakes	Yes
All Wheel Drive	No
Power Steering	Yes
Driver Front Airbag	Yes
Driver Side Airbag	Yes
Driver Head Airbag	Yes
Driver Curtain Airbag	No
Pass. Airbag	Yes
Pass. Side Airbag	Yes
Pass. Head Airbag	Yes
Pass. Curtain Airbag	No
Pre-Tensioners	
Load Limiters	
Bucket Seats	Yes
Air. Cond.	Yes
AM/FM Cassette	Yes
Tilt Steering	Yes
Automatic Door Locks	No
Power Windows	Yes
Power Seats	No
Other	

DATA FROM CERTIFICATION LABEL

Manufactured By	Volkswagen Do Brazil LTDA
Date of Manufacture	Nov-04

GVWR (kg)	1760
GAWR Front (kg)	930
GAWR Rear (kg)	840

VEHICLE SEATING AND CAPACITY WEIGHT INFORMATION

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Split Bench	None	
Number of Occupants	2	3	0	5
Capacity Weight (VCW) (kg)				405
Cargo Weight (RCLW) (kg)				65

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

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55801
 Test Date: 8/26/05

TARGET TEST WEIGHT CALCULATION

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1284
Weight of 2 P572 ATD's	kg	152
Rated Cargo/Luggage Wt. (RCLW)	kg	65
Calculated Vehicle Target Wt. (TVTW)	kg	1501

TEST VEHICLE ATTITUDE AND CG

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	684	684	703	711	1010
As Tested	mm	663	655	677	670	1094

Vehicle Wheel Base (mm) 2525

Weight of Ballast Secured in cargo area (kg) 13.6

Vehicle Components Removed None

* Ballast weight does not include cameras, instrumentation and brake abort system.

FUEL SYSTEM DATA

Fuel System Capacity From Owners Manual (L) 55.00

Usable Capacity Furnished by COTR (L) 52.01

Actual Test Volume with entire fuel System Filled (L) 51.14

1/3 of Usable Capacity (L) N/A

Test Fluid Type: Stoddard Solvent

Kinematic Viscosity: as per ASTM Standard D484-71 Purple

Is Vehicle Fuel Pump Electric or Mechanical? Electric

If electric, does pump operate with ignition switch "On" & engine "OFF" Yes

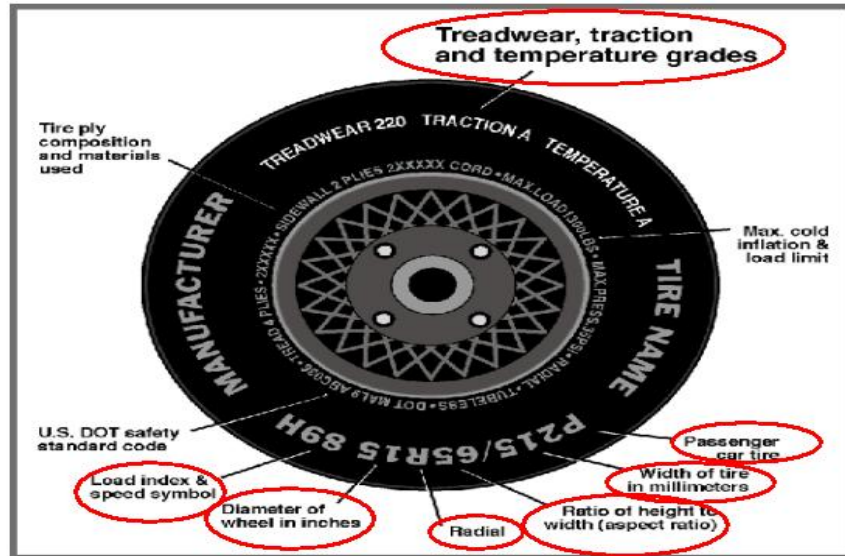
Fuel System Particulars: The fuel filler door is located on the right rear fender.
The standard fuel tank occupies the area under the rear seat.

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

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55801
 Test Date: 8/26/05

Collect year, make, model, VIN, items circled in red, and tire manufacturer and tire name.



TIRE INFORMATION

Measured Parameter	Front	Rear
Max. Tire Pressure (kpa)	310	310
Cold Pressure (kpa)	210	280
Recommended Tire Size	P195/65R15	P195/65R15
Tire Size on Vehicle	P195/65R15	P195/65R15
Tire Manufacturer	Goodyear	Goodyear
Treadwear	360	360
Traction	A	A
Temperature Grades	A	A
Tire Plies Sidewall	1 Polyester Cord	1 Polyester Cord
Tire Plies Body	1 Polyester, 2 Steel Cord, 2 Nylon Cord	1 Polyester, 2 Steel Cord, 2 Nylon Cord
Load Index/Speed Symbol	91H	91H
Tire Material	Polyester, Steel Cord, Nylon Cord	Polyester, Steel Cord, Nylon Cord
DOT Safety Code Right	Y1AE HTDR 3704	Y1AE HTDR 3704
DOT Safety Code Left	Y1AE HTDR 3704	Y1AE HTDR 3704

**DATA SHEET NO. 2
MOVING BARRIER DATA**

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback
Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55801
Test Date: 8/26/05

BARRIER SPECIFICATIONS

Measurement Description	mm
Barrier Face Height	1525
Barrier Face Width	1980
Barrier Face Ground Clearance	115
Tread Width	200
Wheelbase	3045
Tread Width	1530

LOCATION OF BARRIER CG

Measurement Description	mm
X-distance rearward of front wheel center	1372
Y-distance from longitudinal-vertical plane of symmetry	1523

BARRIER WEIGHTS

	Units	Front Axle	Rear Axle	Total
Left	kg	494	405	
Right	kg	494	406	
Ratio	%	54.9%	45.1%	
Totals	kg	988	811	1799

BARRIER TIRES

Manufacturer	Maximum II
Model	Remington
Size	205-75-R15
Pressure (kPa)	241

BARRIER IMPACT VELOCITY

Measured Parameter	Units	Requirement	Value
Trap No. 1 Velocity (Primary)	km/h	46.51 to 48.12	47.71
Trap No. 2 Velocity (Redundant)	km/h	46.51 to 48.12	47.67

DATA SHEET NO. 3
FUEL SYSTEM INTEGRITY POST- IMPACT DATA

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback

NHTSA No.: C55801

Test Program: FMVSS 301-Fuel System Integrity

Test Date: 8/26/05

Test Time: 2:27 PM

Temperature: 37.8 Deg. C.

STODDARD SOLVENT SPILLAGE MEASUREMENTS

A. From impact until vehicle motion ceases: 0.0 oz.
(Maximum Allowable = 1 ounce)

B. For the 5 minute period after motion ceases: 0.0 oz.
(Maximum Allowable = 5 ounces)

C. For the following 25 minutes: 0.0 oz.
(Maximum Allowable = 1 oz./minute)

D. Spillage Location Details: No leakage occurred

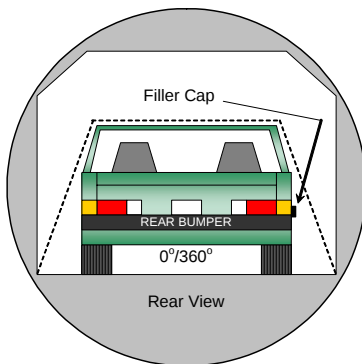
DATA SHEET NO. 4
STATIC ROLLOVER DATA

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback

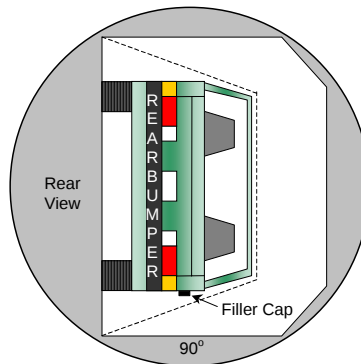
NHTSA No.: C55801

Test Program: FMVSS 301-Fuel System Integrity

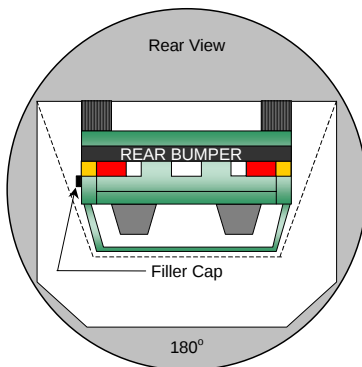
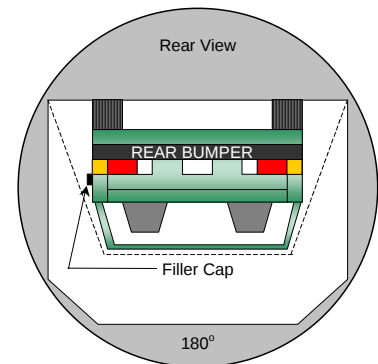
Test Date: 8/26/05



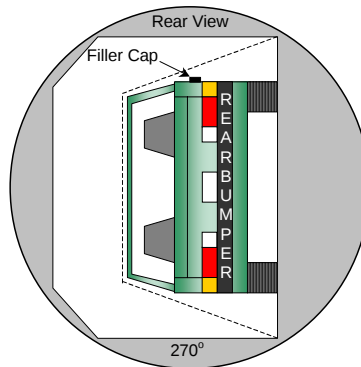
0° to 90°



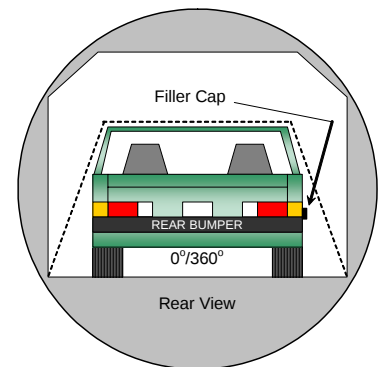
90° to 180°



180° to 270°



270° to 360°



1. The specified fixture rollover rate for each 90° of rotation is 60 to 120 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. No solvent leakage occurred during rollover.

DATA SHEET NO. 4...(CONTINUED)
STATIC ROLLOVER DATA

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55801
 Test Date: 8/26/05

SOLVENT COLLECTION TIME TABLE IN SECONDS

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	83	300	383
90° to 180°	83	300	383
180° to 270°	80	300	380
270° to 360°	83	300	383

FMVSS 301 SPILLAGE TABLE REQUIREMENT (oz.)

First 5 Minutes	5.0
Sixth Minute	1.0
Seventh Minute	1.0
Eighth Minute	1.0

ACTUAL TEST VEHICLE SOLVENT SPILLAGE TABLE (oz.)

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

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. 5
CAMERA LOCATIONS

Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback
Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55801
Test Date: 8/26/05

VEHICLE CAMERA MEASUREMENT TABLE

No.	Camera View	Location (mm)			Angle (deg.)	Lens (mm)	Speed (fps)
		X	Y	Z			
1	Real Time, Documentary	2040	1480	-1835	-7.0	Zoom	30
2	Left Side	560	-12155	1700	0.0	35mm	1000
3	Right Side	2265	-11860	1708	0.0	35mm	1000
4	Overhead	1230	2869	-5488	-90.0	20mm	1000
5	Moving Barrier	0	0	-2332	64.0	7mm	879
6	Rear Underside	635	0	1820	90.0	13mm	1000
7	Mid Underside	1845	0	1870	90.0	12mm	1000
8	Front Underside	3025	0	1865	90.0	12mm	1000
9	Underside Close-Up	760	268	1870	84.0	25mm	1000
10	Driver Side On-Board	-1630	70	-1130	-2.0	14mm	1000
11	Passenger On-Board	-1646	-74	-1130	-2.0	8mm	1000
12	Real Time Left Side	710	-12005	1542	-2.0	Zoom	30

X = Monorail Centerline Y = Impact Location Z = Ground DNR = Did Not Run NTM = No Timing Marks

DATA SHEET NO. 6
ACCIDENT INVESTIGATION DIVISION DATA

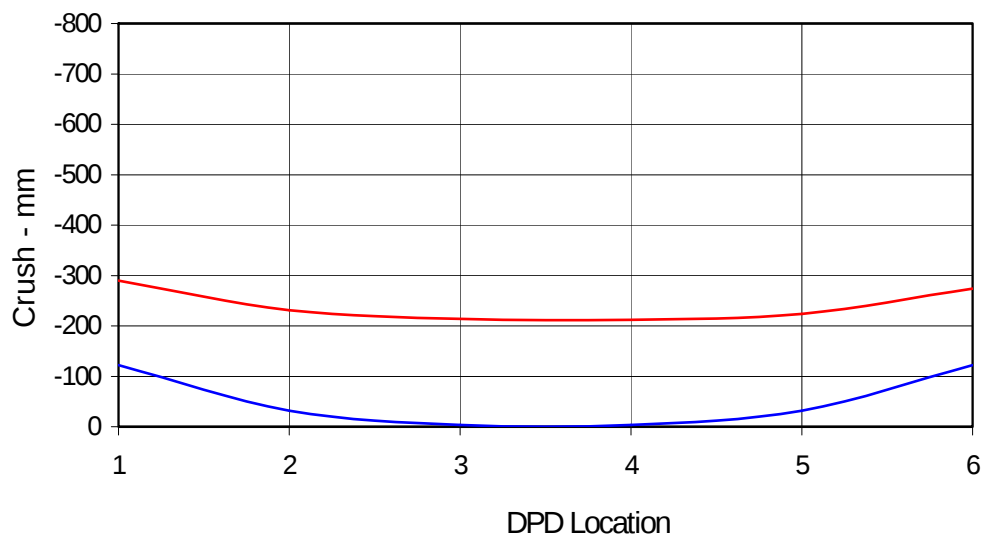
Test Vehicle: 2005 Volkswagen Golf 4-Door Hatchback
 Test Program: FMVSS 301-Fuel System Integrity

NHTSA No.: C55801
 Test Date: 8/26/05

CRUSH PROFILE

Damage Region Length (mm): 1371 Midpoint of Damage: Centerline
 Impact Mode: Rear Impact (0 Deg.)

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	-122	-290	168
C2	Crush zone 2 on left side	mm	-32	-231	199
C3	Crush zone 3 on left side	mm	-3	-214	211
C4	Crush zone 4 on right side	mm	-3	-212	209
C5	Crush zone 5 on right side	mm	-32	-224	192
C6	Crush zone 6 at right side	mm	-122	-274	152



APPENDIX A
PHOTOGRAPHS

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Figure A-1: Left Front $\frac{3}{4}$ View, As Received



Figure A-2: Right Rear $\frac{3}{4}$ View, as Received

MFD BY VOLKSWAGEN DO BRASIL LTDA 11/04
BRAZIL
GVWR 3881 GAWR FRONT 2051 / REAR 1852 LBS
THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S.
FEDERAL MOTOR VEHICLE SAFETY, BUMPER AND
THEFT PREVENTIONS STANDARDS IN EFFECT ON
THE DATE OF MANUFACTURE SHOWN ABOVE.
9BWFL61J354013682 PASSENGER CAR
4531076 57380



Figure A-3: Vehicle Certification Label



TIRE AND LOADING INFORMATION

SEATING CAPACITY | TOTAL 5 | FRONT 2 | REAR 3

THE COMBINED WEIGHT OF OCCUPANTS
AND CARGO SHOULD NEVER EXCEED 405 KG OR 893 LBS

ORIGINAL SIZE	COLD TIRE INFLATION PRESSURE	
195/65 R15 91H	FRONT	210 KPA, 30 PSI
	REAR	280 KPA, 41 PSI
SPARE TIRE	COLD TIRE INFLATION PRESSURE	
195/65 R15 91H	280 KPA, 41 PSI	

**SEE OWNER'S
MANUAL FOR
ADDITIONAL
INFORMATION**

1J0 010 364 F

Figure A-4: Vehicle Tire Label

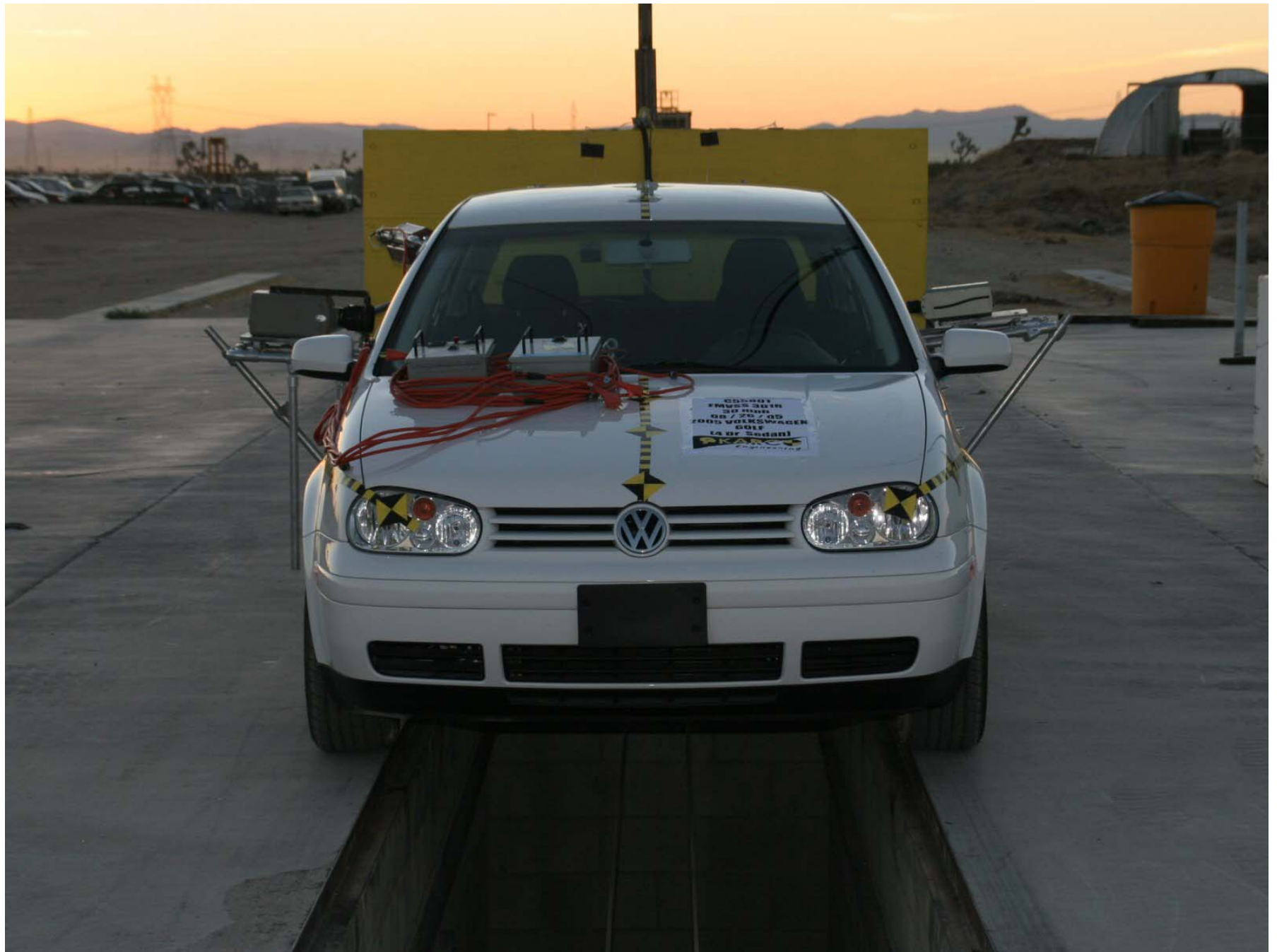


Figure A-5: Pre-Test Front View



Figure A-6: Post-Test Front View



Figure A-7: Pre-Test Left Side View



Figure A-8: Post-Test Left Side View



Figure A-9: Pre-Test Right Side View



Figure A-10: Post-Test Right Side View



Figure A-11: Pre-Test Left Front $\frac{3}{4}$ View



Figure A-12: Post-Test Left Front $\frac{3}{4}$ View (Vehicle Moved)



Figure A-13: Pre-Test Right Rear $\frac{3}{4}$ View



Figure A-14: Post-Test Right Rear $\frac{3}{4}$ View

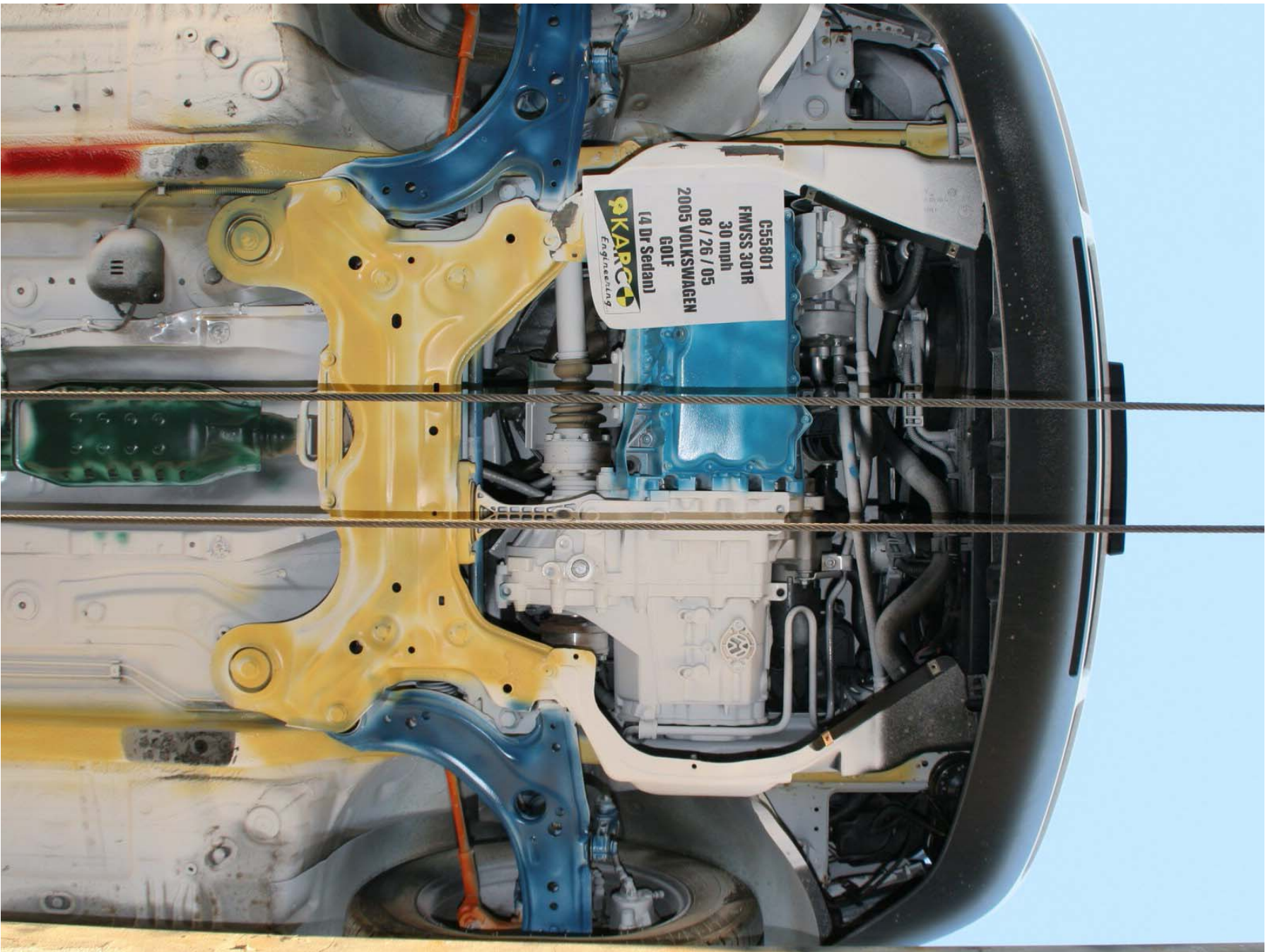


Figure A-15: Pre-Test Front Underbody

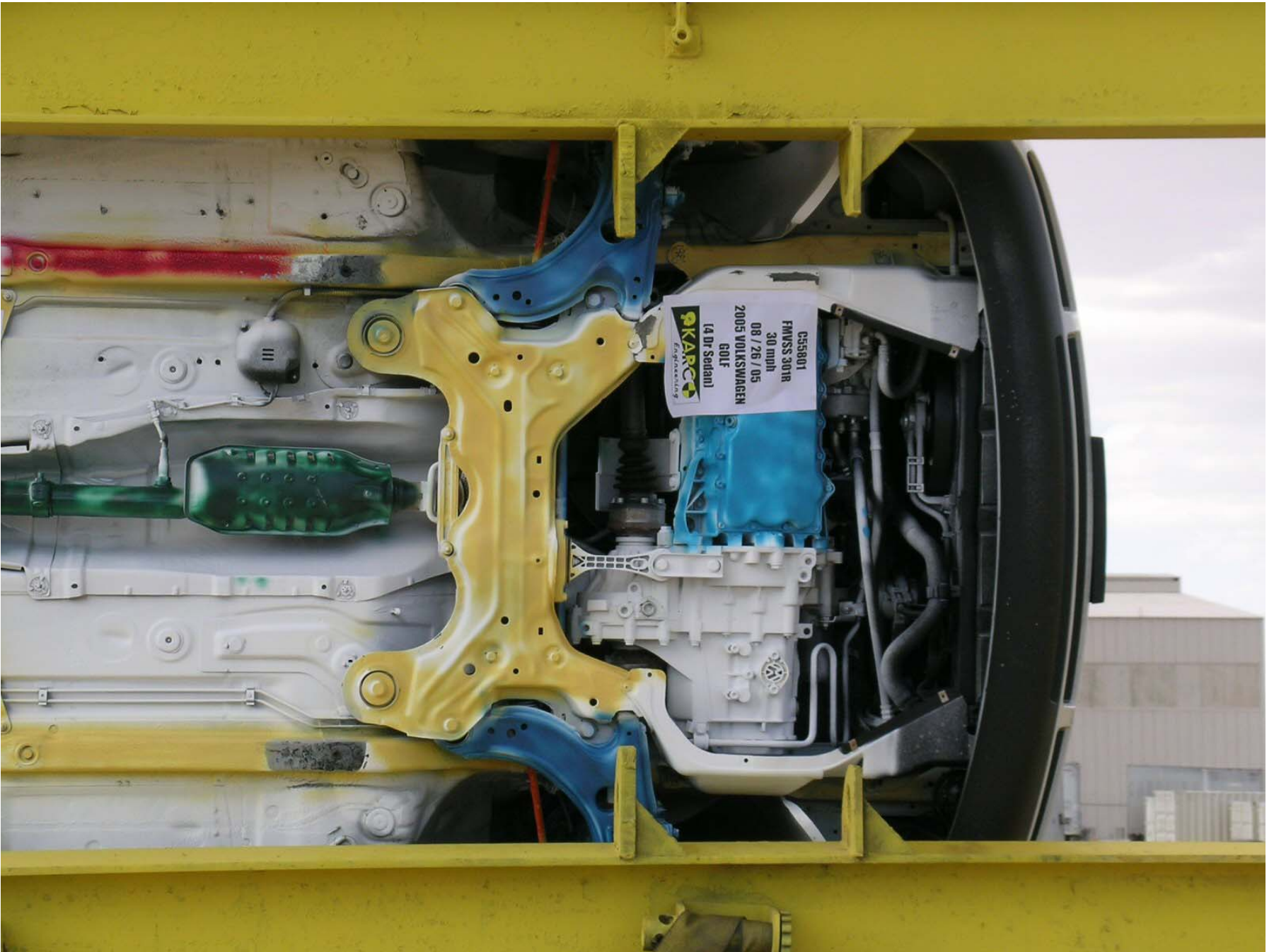


Figure A-16: Post-Test Front Underbody

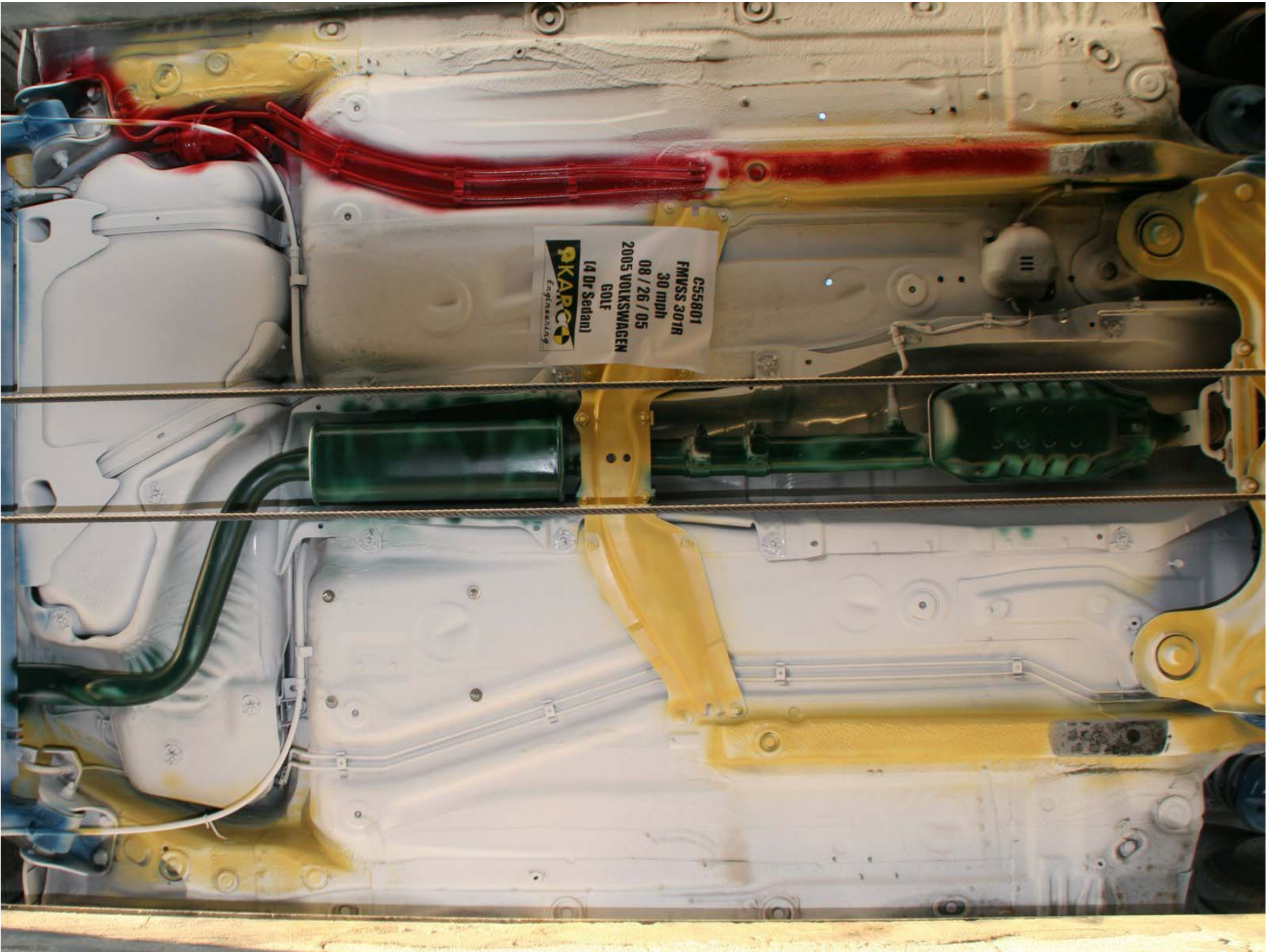


Figure A-17: Pre-Test Mid Underbody



Figure A-18: Post-Test Mid Underbody

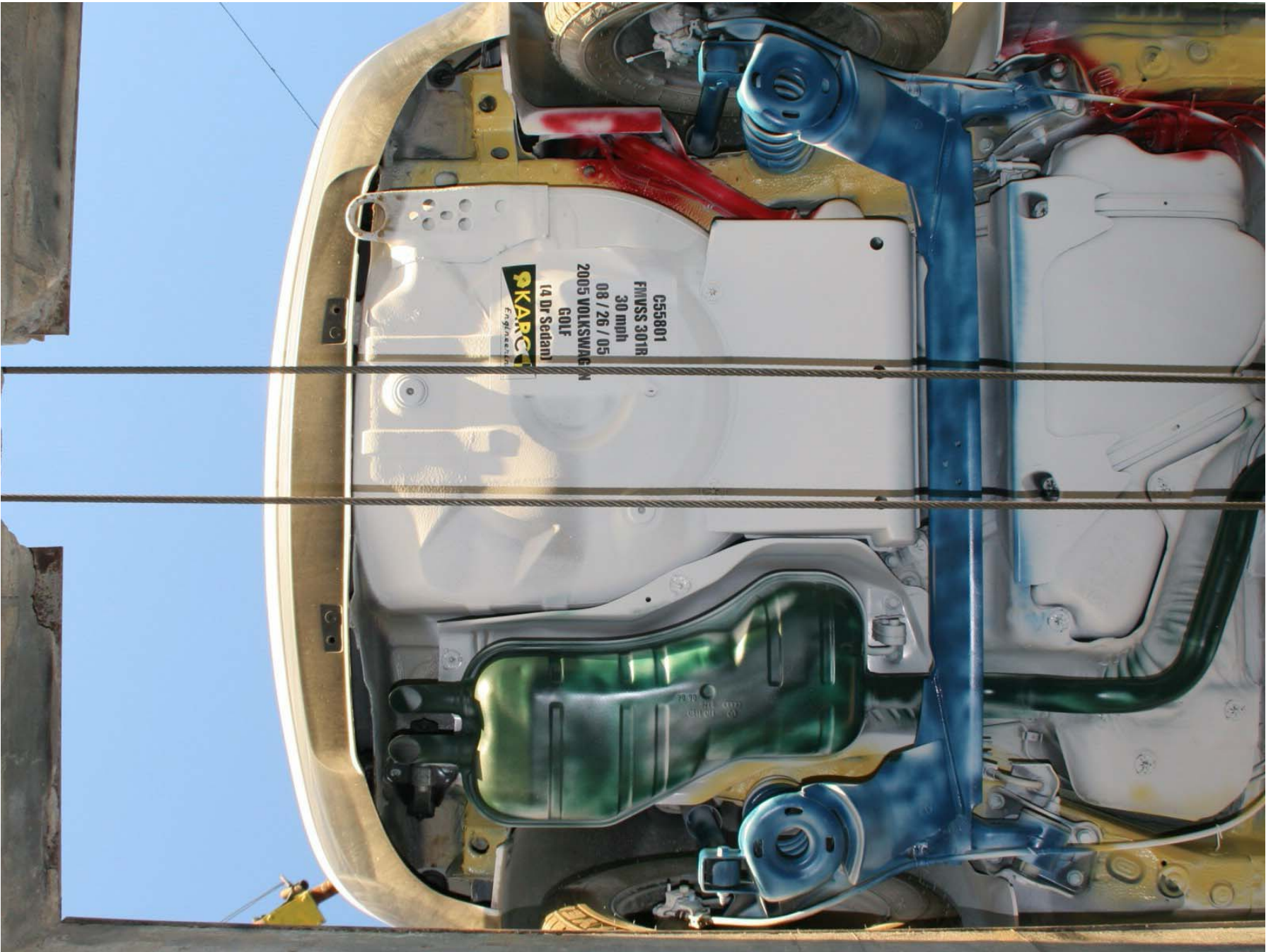


Figure A-19: Pre-Test Rear Underbody



Figure A-20: Post-Test Rear Underbody



Figure A-21: Vehicle on Rollover Device at 0°



Figure A-22: Vehicle on Rollover Device at 90°



Figure A-23: Vehicle on Rollover Device at 180°

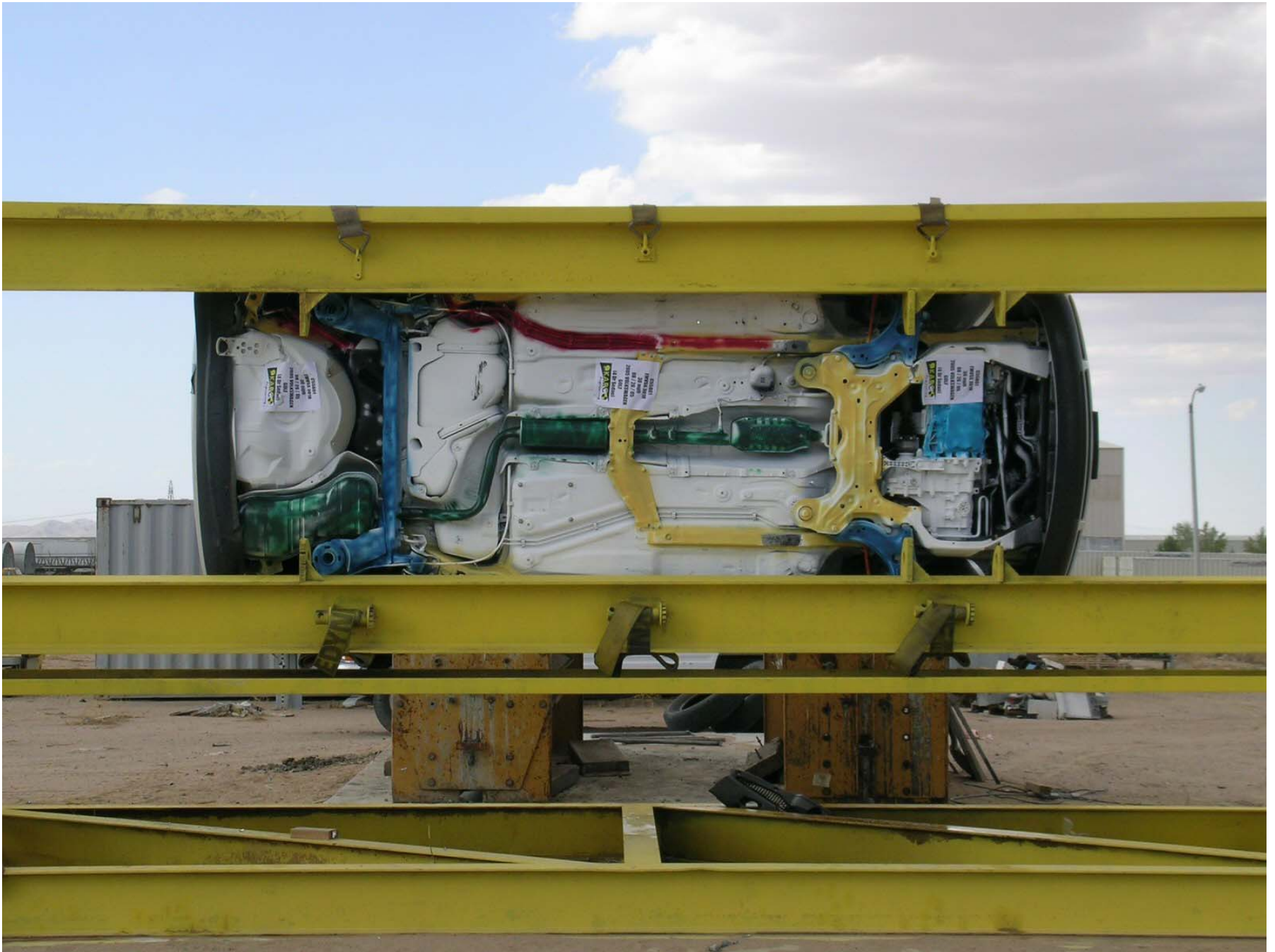


Figure A-24: Vehicle on Rollover Device at 270°



Figure A-25: Vehicle During Impact