

## Volkswagen 2018CY PEMS Report

Volkswagen Group of America  
3800 Hamlin Rd  
Auburn Hills, MI 48326

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### Background

The Volkswagen Group (VW), with its headquarters in Wolfsburg, Germany, is a large automobile manufacturer that comprises 12 brands from seven European countries: Volkswagen Passenger Cars, Audi, SEAT, ŠKODA, Bentley, Bugatti, Lamborghini, Porsche, Ducati, Volkswagen Commercial Vehicles, Scania, and MAN.

The Third Partial Consent Decree requires Volkswagen AG, Audi AG, and VWGoA to retain an independent third-party to conduct portable emissions measurement systems (PEMS) testing of Model Year (MY) 2017, 2018, and 2019 vehicles. This test program requires PEMS measurement of regulated criteria air pollutants and CO<sub>2</sub> under certain conditions as set forth in the Third Partial Consent Decree. The MY 2017 report was prepared last year and is available online. This report includes the test results of the MY 2018 vehicles in the U.S. Market.

### Approach

The test plan was approved by the U.S. EPA and carried out by a third-party, the University of California, Riverside (UCR). For 2018, the plan includes emissions testing of eleven vehicles on public roads, over a range of conditions, utilizing PEMS. Emissions measured and reported include oxides of nitrogen (NO<sub>x</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), and total hydrocarbons (THC). All vehicles were tested, configured, and operated by UCR and were independent of VW operations. Measurement quality control checks were performed with calibrated / certified gases before and after PEMS testing so the data provided in this report is valid and representative. The following three on-road cycles (City, Highway, and Mountain) were performed in the Los Angeles, CA area.

### Results<sup>1</sup>

The MY 2018 vehicles were tested between July 16, 2018 and August 19, 2018. The results are presented in the following tables. All vehicles were tested while fueled with commercially available E10 gasoline. Table 1 shows the vehicles tested, Table 2 lists the summary on-road emission results, and Tables 3, 4, and 5 list the route summary statistics.

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<sup>1</sup> The original version of this report, dated November 27, 2018, was updated on October 9, 2019, to add footnotes 3 and 5 to Tables 3 and 5, respectively. No other changes were made to the original version of this report.

**Table 1. Summary of vehicles tested for model year 2018 organized by test order (first to last)**

Test Group	Vehicle Model	Manufacturer	VIN	Emission Class	Type of drive	Nominal power [HP]	Nominal torque [Nm]	Transmission	Exhaust gas treatment	Type of fuel	Start Mileage [mi]
JVGAJ03.0AUE	A7 3.0 L	Audi		IntT3B125/ULEVII	AWD	335	440	Automatic	TWC	Gasoline	10085
JVGAV04.0NUA	A8 4.0 L	Audi		IntT3B125/ULEVII	AWD	450	600	Automatic	TWC	Gasoline	6615
JVGAT02.0AAA	Atlas 2.0 L	VW		T3B125/ULEV125	FWD	235	350	Automatic	TWC	Gasoline	3609
JVGAV03.6VUG	Passat 3.6 L	VW		IntT3B125/ULEVII	FWD	276	360	Automatic	TWC	Gasoline	7387
JVGAJ02.0A3A	Tiguan TSI 2.0 L	VW		T3B30/SULEV30	FWD	186	300	Automatic	TWC	Gasoline	2679
JVGAV01.4V3B	A3 E-Tron 1.4 L	Audi		IntT3B30/SULEV30	FWD	147	250	Automatic	TWC	Gasoline	5050
JVGAT02.0VUD	Tiguan LTD 2.0 L	VW		IntT3B125/ULEVII	AWD	197	207	Automatic	TWC	Gasoline	2679
JVGAV01.4VUP	Jetta 1.4 L	VW		IntT3B125/ULEVII	FWD	147	250	Manual	TWC	Gasoline	9546
JVGAV02.0V3R	Passat 2.0 L	VW		T3B30/SULEV30	FWD	174	250	Automatic	TWC	Gasoline	3891
JVGAV02.5NAG	RS3 2.5 L	Audi		T3B125/ULEV125	AWD	400	480	Automatic	TWC	Gasoline	4433
JVGAJ02.0AAC	Q5 2.0 L	Audi		IntT3B125/ULEV125	AWD	252	370	Automatic	TWC	Gasoline	2793

**Table 2. Summary of emission results for the on-road routes<sup>2</sup>**

Test Group	Vehicle Model	Emission Class	City g/mi					Highway g/mi					Mountain g/mi				
			CO <sub>2</sub>	THC	CO	NO <sub>x</sub>	NMOG	CO <sub>2</sub>	THC	CO	NO <sub>x</sub>	NMOG	CO <sub>2</sub>	THC	CO	NO <sub>x</sub>	NMOG
JVGAJ03.0AUE	A7 3.0 L	IntT3B125/ULEVII	558.4	0.0165	0.2306	0.0567	0.0168	353.7	0.0353	1.2081	0.0135	0.0359	395.9	0.0362	0.4750	0.0958	0.0369
JVGAV04.0NUA	A8 4.0 L	IntT3B125/ULEVII	588.8	0.0029	0.0715	0.0233	0.0029	376.2	-0.0001	0.2845	0.0080	-0.0001	482.7	0.0012	0.3533	0.0673	0.0012
JVGAT02.0AAA	Atlas 2.0 L	T3B125/ULEV125	335.9	0.0029	0.0197	0.0315	0.0029	366.0	0.0026	0.1546	0.0330	0.0027	352.0	0.0076	0.2996	0.0244	0.0077
JVGAV03.6VUG	Passat 3.6 L	IntT3B125/ULEVII	631.2	0.0041	0.1018	0.0352	0.0041	310.5	0.0114	0.1622	0.0150	0.0118	374.7	0.0388	0.9552	0.0289	0.0394
JVGAJ02.0A3A	Tiguan TSI 2.0 L	T3B30/SULEV30	407.1	0.0041	0.0619	0.0213	0.0041	334.8	-0.0001	0.3358	0.0148	-0.0001	356.6	0.0085	1.2595	0.0161	0.0087
JVGAV01.4V3B	A3 E-Tron 1.4 L	IntT3B30/SULEV30	261.8	0.0036	0.4638	0.0066	0.0037	275.0	0.0017	0.7649	0.0110	0.0017	270.9	0.0198	3.8875	0.0130	0.0201
JVGAT02.0VUD	Tiguan LTD 2.0 L	IntT3B125/ULEVII	548.3	0.0005	0.6679	0.0059	0.0005	360.6	0.0039	1.6695	0.0043	0.0040	449.2	0.0219	6.2224	0.0044	0.0223
JVGAV01.4VUP	Jetta 1.4 L	IntT3B125/ULEVII	349.9	0.0012	-0.0281	0.0396	0.0013	276.0	0.0033	0.6485	0.0120	0.0034	314.6	0.0160	2.1760	0.0229	0.0163
JVGAV02.0V3R	Passat 2.0 L	T3B30/SULEV30	389.3	0.0027	0.6011	0.0190	0.0028	278.4	-0.0010	0.7493	0.0091	-0.0010	348.1	0.0028	0.9358	0.0116	0.0028
JVGAV02.5NAG	RS3 2.5 L	T3B125/ULEV125	470.9	0.0050	0.0035	0.0613	0.0051	340.2	0.0102	1.4139	0.0360	0.0104	429.0	0.0263	5.3531	0.0720	0.0267
JVGAJ02.0AAC	Q5 2.0 L	IntT3B125/ULEV125	473.6	0.0096	0.2494	0.0253	0.0097	333.8	0.0094	0.1930	0.0194	0.0096	381.5	0.0121	0.2982	0.0213	0.0123

<sup>2</sup> NMOG was calculated using the formula  $NMOG = 1.1 * NMHC (g/mi)$ . NMHC was calculated as per 40 CFR Part 1065.660 (b)(1), using the formula  $NMHC = 0.98 * THC$ , where THC is in concentration (ppm). The A3 E-Tron 1.4L vehicle is a plug-in hybrid electric vehicle and was operated in the default EV (electric driving) mode. In this driving mode, the vehicle operated at 0% battery for all the test cycles performed. See Appendix C for more details. Negative values are not representative of less than zero emission values but may be a result of instrument zero drift that occurred during in-use testing.

Table 3. Summary trip statistics for the city route<sup>3</sup>

Test Group	Vehicle Model	Trip Duration [mm:ss]	Distance [mi]	Average speed [mph]	Maximum speed [mph]	v <sup>a</sup> a (95th percentile) [m <sup>2</sup> /s <sup>2</sup> ]	RPA [m/s <sup>2</sup> ]	Standstill proportion [%]	Constant proportion [%]	Acceleration proportion [%]	Deceleration proportion [%]	Road Gradient (95th percentile) [%]	Cumulative positive Altitude [m]	Altitude difference [m]	Average Amb Temperature [F]
JVGAJ03.0AUE	A7 3.0 L	63:59:00	15.9	14.9	-	12.3	0.24	29.7	7.1	31.5	31.6	2.7	172	9	93.9
JVGAJ04.0NUA	A8 4.0 L	56:14:00	15.9	17.0	70.2	11.9	0.21	24.2	7.4	33.9	34.5	2.4	118	8	75.1
JVGAJ02.0AAA	Atlas TSI 2.0 L	49:32:00	16.5	20.0	69.0	11.1	0.19	21.5	8.5	34.7	35.3	2.7	122	-3	77.3
JVGAJ03.6VUG	Passat SEL 3.6 L	73:52:00	16.1	13.1	57.2	11.8	0.25	31.1	5.9	32.8	30.2	2.6	173	3	104.8
JVGAJ02.0A3A	Tiguan SEL TSI 2.0 L	57:32:00	16.2	16.9	69.0	11.7	0.22	23.2	6.8	34.9	35.1	2.5	129	6	75.3
JVGAJ01.4V3B	A3 E-Tron 1.4 L	57:05:00	16.3	17.1	65.9	14.3	0.24	27.5	7.0	32.0	33.5	2.8	138	1	76.8
JVGAJ02.0VUD	Tiguan LTD 2.0 L	54:26:00	16.1	17.7	60.3	12.4	0.22	21.1	8.4	33.8	36.7	2.5	137	4	77.3
JVGAJ01.4VUP	Jetta 1.4 L	54:07:00	16.5	18.3	62.1	13.2	0.23	22.4	7.3	33.3	37.0	3.0	153	6	76.7
JVGAJ02.0V3R	Passat 2.0 L	54:03:00	15.9	17.7	65.9	10.8	0.21	24.2	6.9	34.6	34.3	2.6	142	2	80.9
JVGAJ02.5NAG	RS3 2.5 L	54:07:00	16.1	17.8	68.4	14.0	0.23	26.2	7.0	34.2	32.7	2.9	156	-1	81.7
JVGAJ02.0AAC	Q5 2.0 L	53:12:00	16.2	18.3	78.3	15.7	0.25	26.1	6.5	33.3	34.1	2.5	121	10	75.0

Table 4. Summary trip statistics for the highway route

Test Group	Vehicle Model	Trip Duration [mm:ss:00]	Distance [mi]	Average speed [mph]	Maximum speed [mph]	v <sup>a</sup> a (95th percentile) [m <sup>2</sup> /s <sup>2</sup> ]	RPA [m/s <sup>2</sup> ]	Standstill proportion [%]	Constant proportion [%]	Acceleration proportion [%]	Deceleration proportion [%]	Road Gradient (95th percentile) [%]	Cumulative positive Altitude [m]	Altitude difference [m]	Average Amb Temperature [F]
JVGAJ03.0AUE	A7 3.0 L	41:37:00	37.8	54.6	79.5	15.7	0.11	5.6	18.5	38.4	37.4	2.8	177	-4	81.8
JVGAJ04.0NUA	A8 4.0 L	43:16:00	38.3	53.1	78.9	16.0	0.13	2.6	16.8	41.0	39.6	2.8	181	-5	88.5
JVGAJ02.0AAA	Atlas TSI 2.0 L	58:35:00	39.5	40.5	75.8	14.1	0.15	3.2	15.3	43.2	38.3	2.7	204	-10	85.6
JVGAJ03.6VUG	Passat SEL 3.6 L	42:54:00	38.7	54.2	85.1	18.5	0.14	3.8	15.2	41.9	39.1	2.8	178	-14	84.7
JVGAJ02.0A3A	Tiguan SEL TSI 2.0 L	57:02:00	39.0	41.0	82.0	15.9	0.15	2.1	14.1	44.8	39.0	2.6	181	-14	85.0
JVGAJ01.4V3B	A3 E-Tron 1.4 L	78:50:00	38.8	29.5	77.1	15.1	0.15	4.4	16.2	39.8	39.6	2.7	191	-29	87.1
JVGAJ02.0VUD	Tiguan LTD 2.0 L	44:28:00	38.5	52.0	77.1	15.4	0.12	4.5	16.5	39.9	37.1	2.8	177	-16	84.9
JVGAJ01.4VUP	Jetta 1.4 L	47:17:00	39.6	50.3	81.4	18.5	0.14	3.6	14.9	41.6	40.0	2.9	187	-10	85.8
JVGAJ02.0V3R	Passat 2.0 L	46:30:00	38.3	49.4	79.5	13.5	0.12	3.7	19.2	40.6	36.4	2.8	177	-15	89.4
JVGAJ02.5NAG	RS3 2.5 L	42:26:00	38.6	54.5	80.2	17.6	0.13	3.3	17.6	41.4	37.7	2.9	170	-15	87.7
JVGAJ02.0AAC	Q5 2.0 L	56:36:00	38.8	41.1	78.9	19.1	0.14	3.2	16.3	39.1	41.4	2.8	193	-2	88.6

Table 5. Summary trip statistics for the mountain route<sup>4, 5</sup>

Test Group	Vehicle Model	Trip Duration [mm:ss]	Distance [mi]	Average speed [mph]	Maximum speed [mph]	v <sup>a</sup> a (95th percentile) [m <sup>2</sup> /s <sup>2</sup> ]	RPA [m/s <sup>2</sup> ]	Standstill proportion [%]	Constant proportion [%]	Acceleration proportion [%]	Deceleration proportion [%]	Road Gradient (95th percentile) [%]	Cumulative positive Altitude [m]	Altitude difference [m]	Average Amb Temperature [F]
JVGAJ03.0AUE	A7 3.0 L	51:35:00	28.5	33.2	-	15.2	0.18	7.2	13.5	41.8	37.4	11.3	758	0	85.7
JVGAJ04.0NUA	A8 4.0 L	53:10:00	28.7	32.4	71.5	14.8	0.16	10.8	13.4	37.8	38.0	10.4	765	3	87.3
JVGAJ02.0AAA	Atlas TSI 2.0 L	48:15:00	29.4	36.6	73.9	13.7	0.15	7.0	17.2	41.9	33.9	10.6	730	-2	88.8
JVGAJ03.6VUG	Passat SEL 3.6 L	46:31:00	28.8	37.1	78.3	19.5	0.20	9.3	11.4	41.9	37.4	10.9	724	-2	90.2
JVGAJ02.0A3A	Tiguan SEL TSI 2.0 L	49:25:00	29.0	35.2	73.3	16.0	0.16	10.6	15.0	39.4	35.0	10.7	735	2	86.1
JVGAJ01.4V3B	A3 E-Tron 1.4 L	46:08:00	29.0	37.7	75.8	18.8	0.19	9.0	12.0	41.4	37.7	-	731	1	86.0
JVGAJ02.0VUD	Tiguan LTD 2.0 L	53:12:00	28.6	32.3	71.5	18.3	0.21	13.0	10.0	41.1	35.8	10.6	729	-1	90.8
JVGAJ01.4VUP	Jetta 1.4 L	52:27:00	29.5	33.7	69.6	17.3	0.19	10.5	11.3	40.1	38.1	10.0	735	0	88.2
JVGAJ02.0V3R	Passat 2.0 L	54:21:00	28.5	31.4	68.4	15.8	0.20	11.6	10.2	41.8	36.4	10.6	719	-1	89.3
JVGAJ02.5NAG	RS3 2.5 L	53:55:00	28.6	31.9	78.9	21.3	0.23	13.6	9.4	40.7	36.3	10.4	724	-2	94.8
JVGAJ02.0AAC	Q5 2.0 L	44:48:00	28.9	38.7	75.8	19.3	0.20	6.9	10.3	43.0	39.8	10.4	724	1	88.2

<sup>3</sup> The value of the Maximum speed [mph] for the A7 3.0 L, represented with the symbol “-”, was measured to be 158.5 mph, which is an implausible value and was likely produced as a default when the CAN signal temporarily went invalid.

<sup>4</sup> The value of the Road Gradient (95th percentile) [%] for the A3 E-Tron 1.4 L, represented with the symbol “-”, was measured to be zero, which is not a reasonable value and may be a result of issues with the GPS system.

<sup>5</sup> The value of the Maximum speed [mph] for the A7 3.0 L, represented with the symbol “-”, was measured to be 158.5 mph, which is an implausible value and was likely produced as a default when the CAN signal temporarily went invalid.



Highway Route

City Route

Mountain Route

Figure 1. On-road testing on California public roads

## Summary

The emissions from the test vehicles was representative of typical in-use conditions for city, highway, and mountain driving. The conditions ranged from 75°F to 105°F, 0% to 11.3% grade, and from up to 2,500 feet from sea level. In summary, the emissions presented are representative of valid in-use testing.

Sincerely,

**Kent Johnson, Ph.D.** | Principal Investigator, Emissions and Fuels Research  
College of Engineering - Center for Environmental Research and Technology  
University of California, Riverside | 1084 Columbia Ave, Riverside, CA 92507  
Office: 951-781-5786 | Fax: 951-781-5790 | Cell: 951-313-5658 | [kjohnson@cert.ucr.edu](mailto:kjohnson@cert.ucr.edu)