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DEPARTEMENT
MOBILITEIT &
OPENBARE
WERKEN

Colfontaine, the 19th March 2021

ISC-Test Report

Customer: **Departement Mobiliteit en Openbare Werken**
Vlaams Huis voor de
Verkeersveiligheid
Koning Albert II-laan 20, bus 2
1000 Brussels, Belgium

Vehicles:
Toyota Corolla VIN : #6521
Toyota Corolla VIN : #1501
Toyota Corolla VIN : #7243
Toyota Yaris VIN : #2856
Toyota Yaris VIN : #2889
Toyota Yaris VIN : #9745

Report n° : 528/2021

Contents

1 General presentation of ISSeP

The Public Service Scientific Institute (Institut Scientifique de Service Public, ISSeP) is subject to the authority of the Walloon government, which holds the management powers therefor. Its operational ministry is the Ministry of the Environment.

The ISSeP exercises its scientific and technical activities in the environmental sector; it is also recognised as a reference laboratory in Wallonia.

ISSeP is the environmental sentinel organized around 4 major pillars:

More information is available in our website www.issep.be and in the general information part of this document.

Regarding In-Service Conformity testing, ISSeP has been designated by the “Service Public de Wallonie, SPW” as reference laboratory. The building of the facilities should start this summer in our Colfontaine site. The project is ongoing and during the construction, ISSeP will subcontract the tests by Horiba Europe Gmbh located in Hans-Mess-Straße 6, 61440 Oberusel, Germany. The test center complies with the certification ISO 17025 : 2017 and 17020 : 2012 and is designated as technical service by the Kraftfahrt-Bundesamt (KBA). An ISSeP agent monitored the on-site testing. This document and results are based on the report of Horiba Europe GmbH provided in annex (report n°2021-03_002).

Currently, ISSeP is accredited ISO 17025 and ISO 17043 by BELAC. Our ISO 17025 accreditation covers the measure of pollutants in industrial smokestacks including CO, CO2, O2, NOx, NO, PN, HC, heavy metals, … which are gases similar to automotive.

In the future when the laboratory is up and running at Colfontaine, we will comply with any necessary accreditations required by the regulation.

2 About HORIBA Technical Service

The HORIBA Europe GmbH Testcenter in 61440 Oberursel is designated as technical service category A, B and D by the Kraftfahrt-Bundesamt (KBA) and complies with EN ISO/IEC 17025:2017 and EN ISO/IEC 17020:2012. The designation is valid from 19th December 2015.

Registration number: KBA-P 00071-15

The catalogue of designated and recognized testing methods contains emission measurement complying to Regulation (EC) 715/2007, Regulation (EC) 2018/1832 including Regulation (EC) 692/2008, UN-R 83 Series 07 (Spark-ignition engine), UN-R 101 Series 01, UN-R 83 Series 07 (Compression-ignition engine) and fuel consumption measurement complying to UN-R 84.

3 Quick overview and main conclusions of the testing campaign

During the measurement campaign 6 vehicles from the manufacturer TOYOTA (3 Corolla Gasoline and 3 Yaris Gasoline) has been tested within the scope of In-Service Conformity. Detailed descriptions of the vehicles are summarized in Table 1 List of vehicles.

During the test period all vehicles performed a valid Type 1 (WLTP) as well as a valid Type 1A (RDE) test according to ISC regulations.

The tested vehicles have fulfilled all requirements to an In-Service Conformity test and the final emission results were below the Not-to-exceed limits given by ISC regulation.

Detailed description of the scope of testing as well as a summarization of the final results can be found on the following pages.

This report and results only concern the 6 vehicles tested under specific conditions.

At the time of the testing, covid -19 measures were valid.

4 ISC testing

4.1 Vehicle sample

The measurement included six vehicles. Three of them were Toyota Corolla and three of them were Toyota Yaris. All the vehicle models in this measurement were Euro 6/DG vehicles and were selected as well as sourced by MOW (Departement Mobiliteit en Openbare Werken) and more specific by the "Vlaams Huis voor de Verkeersveiligheid". The vehicles of this service request are presented in Table 1 and Figure 1.

Table 1: List of vehicles

Make	Model	Engine	Fuel	Hybrid	Country
Toyota	Corolla	1197 cc	Petrol	No	Germany
Toyota	Corolla	1197 cc	Petrol	No	Germany
Toyota	Corolla	1197 cc	Petrol	No	Germany
Toyota	Yaris	1496 cc	Petrol	No	Germany
Toyota	Yaris	1496 cc	Petrol	No	Germany
Toyota	Yaris	1496 cc	Petrol	No	Germany

Figure 1: Toyota Corolla tested vehicles

Detailed specifications of the vehicle (as given in the EC Certificate of Conformity) are presented in Table 2. For confidentiality reasons, only the 4 last numbers of VIN are shown in the table and license plates have been hidden.

Table 2: Detailed vehicle data.

Model	Toyota Corolla	Toyota Corolla	Toyota Corolla
VIN	6521	1501	7243
Vehicle category	M1	M1	M1
PEMS family code	6-JT1-22-0	6-JT1-22-0	6-JT1-22-0
PCM cal id (ECU version)	896630ZK1000 896650221000	896630ZK1000 896650221000	896630ZK1000 896650221000
Max. Power	85kW at 5200 - 5600 min^{-1}	85kW at 5200 - 5600 min^{-1}	85kW at 5200 - 5600 min^{-1}
Displacement	1197 cc	1197 cc	1197 cc
Fuel type	Petrol	Petrol	Petrol
Bodywork	Hatchback	Hatchback	Hatchback
Doors	5	5	5
Transmission	Manual	Manual	Manual
Gears	6 Gears	6 Gears	6 Gears
Tyre weather type	Winter	Winter	Winter
Tyre make	BFGoodrich	Falken	BFGoodrich
Tyre model	g-Grip All Season	Euroall Season AS210	g-Grip All Season
Tyre width	Front: 205/55 R16 Rear: 205/55 R16	Front: 205/55 R16 Rear: 205/55 R16	Front: 205/55 R16 Rear: 205/55 R16
Tyre depth	6.0mm/7.0mm	6.0mm/7.0mm	6.0mm/7.0mm
Tyre test pressure	2.5bar/2.4bar	2.5bar/2.4bar	2.5bar/2.4bar
Official low CO2	183g/km	183g/km	183g/km
Official medium CO2	142g/km	142g/km	142g/km
Official high CO2	123g/km	123g/km	123g/km
Official extra high CO2	144g/km	144g/km	144g/km
Official combined CO2	142g/km	142g/km	142g/km

Maximum laden mass	1820kg	1820kg	1820kg
Official mass in running order	1315kg	1315kg	1315kg
Weight with PEMS	1548kg	1550kg	1550kg
Mileage	19074km	23072km	15448km
Date of first registration	29/11/2019	12/12/2019	27/11/2019
Emission standard	Euro 6/DG	Euro 6/DG	Euro 6/DG
Country of registration	Germany	Germany	Germany
Engine code	8NR	8NR	8NR
Drive axle	FWD	FWD	FWD
Wheelbase	2640mm	2640mm	2640mm
Injection	Direct injection	Direct injection	Direct injection
Turbo Charged	Yes	Yes	Yes
EGR	Yes	Yes	Yes
Particulate Filter	GPF	GPF	GPF
Catalyst	3-way-catalyst	3-way-catalyst	3-way-catalyst

Figure 2: Toyota Yaris tested vehicles

Detailed specifications of the vehicle (as given in the EC Certificate of Conformity) are presented in Table 3. For confidentiality reasons, only the 4 last numbers of VIN are shown in the table and license plates have been hidden.

Table 3: Detailed vehicle data.

Model	Toyota Yaris	Toyota Yaris	Toyota Yaris
VIN	2856	2889	9745
Vehicle category	M1	M1	M1
PEMS family code	6-JT1-35-0	6-JT1-35-0	6-JT1-35-0
PCM cal id (ECU version)	30DX1100 A0202000	30DX1100 A0202000	30DX1100 A0202000
Max. Power	82kW at 6000 min^{-1}	82kW at 6000 min^{-1}	82kW at 6000 min^{-1}
Displacement	1496 cc	1496 cc	1496 cc
Fuel type	Petrol	Petrol	Petrol
Bodywork	Hatchback	Hatchback	Hatchback
Doors	5	5	5
Transmission	Manual	Manual	Manual
Gears	6 Gears	6 Gears	6 Gears
Tyre weather type	Winter	Winter	Winter
Tyre make	Goodyear	Goodyear	Goodyear
Tyre model	Vector 4 Seasons	Vector 4 Seasons	Vector 4 Seasons
Tyre width	Front: 175/65 R15 Rear: 175/65 R15	Front: 175/65 R15 Rear: 175/65 R15	Front: 175/65 R15 Rear: 175/65 R15
Tyre depth	7.0mm/8.0mm	6.5mm/7.5mm	7.0mm/7.5mm
Tyre test pressure	2.3bar/2.2bar	2.3bar/2.2bar	2.3bar/2.2bar
Official low CO2	178g/km	178g/km	178g/km
Official medium CO2	132g/km	132g/km	132g/km
Official high CO2	118g/km	118g/km	118g/km
Official extra high CO2	138g/km	138g/km	138g/km
Official combined CO2	136g/km	136g/km	136g/km
Maximum laden mass	1545kg	1545kg	1545kg

Official mass in running order	1120kg	1120kg	1120kg
Weight with PEMS	1262kg	1272kg	1266kg
Mileage	16585km	25837km	15051km
Date of first registration	18/05/2020	18/05/2020	18/05/2020
Emission standard	Euro 6/DG	Euro 6/DG	Euro 6/DG
Country of registration	Germany	Germany	Germany
Engine code	2NR	2NR	2NR
Drive axle	FWD	FWD	FWD
Wheelbase	2510mm	2510mm	2510mm
Injection	manifold injection	manifold injection	manifold injection
Turbo Charged	No	No	No
EGR	Yes	Yes	Yes
Particulate Filter	No	No	No
Catalyst	3-way-catalyst	3-way-catalyst	3-way-catalyst

4.2 Description of the measurement campaign

The measurement concerned the evaluation of emissions performance of the vehicle mentioned in this report. The service request included the following tasks performed for each vehicle:

- Vehicle Owner interview
- Vehicle inspection before testing
- WLTC (Type 1) on chassis-dyno
- PEMS installation in the vehicle
- PEMS validation
- RDE testing (Type 1A)

4.2.1 Vehicle owner interview

The physical owner of each vehicle was previously interviewed by the type approval authority (MOW) in order to understand the past usage of the vehicle under testing. The questions are taken from RDE Regulation 2018/1832.

4.2.2 Vehicle inspection

Before starting the emission measurement tests, the vehicle was inspected for damages, modifications, other incompliances and was checked for being in good running order. The exact vehicle inspection checklist which is taken from RDE Regulation 2018/1832 is presented in Table 4.

Table 4: Vehicle inspection checklist.

• Aerodynamic modifications • Fuel tank level • Warning lights activated • SCR light activated • Next scheduled maintenance • Fluid levels • Drive belt and cooler cover • Air filter and oil contamination • Ignition cables	• Injection valves/cabling • Vacuum hoses and electrical wiring • Exhaust system • Exhaust system components • EGR, Catalyst, Particle Filter • Wheels • Fuel Sample • Safety conditions • Semi-trailer • OBD error checks

The results of each check were documented with photos and/or relevant documentation. Additionally, a fuel- and oil- sample was collected and stored.

4.2.3 PEMS installation in the vehicle

A complete Horiba OBS-ONE PEMS was properly installed in the tested vehicle. The equipment included NDIR gas analyzers which measured CO and CO_2, heated CLD gas analyzers which measured NO and NO_x and a CPC counter which measured PN. Altitude, velocity and location coordinates were measured using an on-board GPS device, whereas ambient temperature, humidity and pressure, along with tailpipe exhaust gas temperature, were measured using respective sensors. In addition, various engine-related signals were recorded from the On-Board Diagnostics (OBD) port. The total exhaust flow was measured with a pitot EFM installed and properly sealed at the exhaust tailpipe of the vehicle. A lead gel battery was used to power all devices.

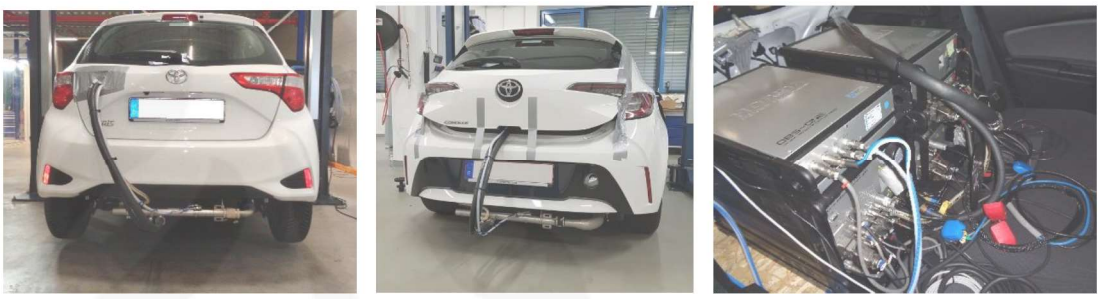

Figure 3: PEMS installation on the tested vehicles

All equipment and devices were installed on the vehicle following the prescriptions of the relevant RDE Regulations (2017/1151, 2017/1154 and 2018/1832). The installation of the PEMS equipment was done in a way to influence the vehicle emissions and performance to the minimum extent possible. Care was exercised on potential aerodynamic modifications of the test vehicle.

4.2.4 Testing schedule

The vehicles were fueled with reference fuel and the tire pressure was adjusted for the road load adjustment and the preconditioning for the WLTC emission test on chassis-dyno. After a soaking time of at least 6 hours the WLTC emission test was performed.

Subsequently the vehicles were fueled with market fuel for the RDE emission testing, and they were weighted on a weight bridge after the PEMS installation. Then an initial test was conducted with each vehicle while casually driving it for about half an hour. After that initial test, a quick check was conducted to ensure that the PEMS installation is safe and rigid, and that the PEMS is functioning without any errors/warnings.

Then, the cold start RDE test was conducted on the *RDE Oberursel route* following the prescriptions of the RDE regulation. Firstly, the vehicles were parked on a safe location to soak for a duration between 8-15 hours. After the soaking duration, the PEMS devices were started and warmed up for at least one hour. Then the gas analyzer system was checked for leaks with a vacuum leak check. After this, the gas analyzers of the PEMS were calibrated with zero and span bottled gases and the PN counter was checked for zero response. After the calibration sequence finished, the cold start RDE test started. After finishing the test, the vehicles were returned to the park location and a zero and span check and also a PN zero response check was done. In case one of the tests conducted is considered invalid, according to the RDE regulation, the whole testing sequence is repeated. The actual testing schedule of the measurement campaign, including the valid test and its test name is presented in Table 5.

After checking the results for validity, the PEMS was disassembled out of the vehicles.

Table 5: Testing schedule of the experimental campaign

Date	Test	Vehicle	Test name
28/01/2021	WLTC on Chassis-Dyno (Type 1)	Toyota Corolla 6521	H1_210128_004
01/02/2021	RDE compliant test (Type 1A)	Toyota Corolla 6521	PEMSTest_20210201_085823_392
01/02/2021	PEMS validation test	Toyota Corolla 6521	H1_210201_005 PEMSTest_20210201_124224_393
03/02/2021	WLTC on Chassis-Dyno (Type 1)	Toyota Corolla 1501	H1_210203_003
03/02/2021	PEMS validation test	Toyota Corolla 1501	H1_210203_006 PEMSTest_20210203_151920_394
04/02/2021	RDE compliant test (Type 1A)	Toyota Corolla 1501	PEMSTest_20210204_081858_395
09/02/2021	WLTC on Chassis-Dyno (Type 1)	Toyota Yaris 2856	H1_210209_003
09/02/2021	WLTC on Chassis-Dyno (Type 1)	Toyota Corolla 7243	H1_210209_004
11/02/2021	WLTC on Chassis-Dyno (Type 1)	Toyota Yaris 2889	H1_210211_004
11/02/2021	RDE compliant test (Type 1A)	Toyota Yaris 2856	PEMSTest_20210211_120955_396
12/02/2021	PEMS validation test	Toyota Yaris 2856	H1_210212_008 PEMSTest_20210212_081847_397
15/02/2021	PEMS validation test	Toyota Corolla 7243	H1_210215_004 PEMSTest_20210215_141804_398
16/02/2021	RDE compliant test (Type 1A)	Toyota Corolla 7243	PEMSTest_20210216_081754_399
22/02/2021	RDE compliant test (Type 1A)	Toyota Yaris 2889	PEMSTest_20210222_095741_406
22/02/2021	PEMS validation test	Toyota Yaris 2889	H1_210222_002 PEMSTest_20210222_144720_407
25/02/2021	WLTC on Chassis-Dyno (Type 1)	Toyota Yaris 9745	H1_210225_003
26/02/2021	PEMS validation test	Toyota Yaris 9745	H1_210226_004 PEMSTest_20210226_114945_410
02/03/2021	RDE compliant test (Type 1A)	Toyota Yaris 9745	PEMSTest_20210302_082527_412

5 Summary of Results

Following the inspections conducted on the measured vehicle, the vehicle was found in good condition and with all its components undamaged and unmodified. Photos and relevant documents of the inspection procedure as well as the results of the inspection have been delivered to the type approval authority (MOW).

5.1 WLTC on Chassis-Dyno (Type 1)

5.1.1 Toyota Corolla

Emission Result Overview

		Toyota Corolla 6521	Toyota Corolla 1501	Toyota Corolla 7243	
		Bag Result	Bag Result	Bag Result	Limit
HC	[mg/km]	16.907	21.855	14.484	100
CO	[mg/km]	151.084	240.236	145.485	1000
CO2	[g/km]	138.31*	134.76*	136.77*	
NOx	[mg/km]	20.055	16.553	13.066	60
CH4	[mg/km]	2.674	3.880	2.493	
NMHC	[mg/km]	14.448	18.320	12.249	68
PM	[mg/km]	0.3414	0.2088	0.4889	4.5
PN	[#/km]	3.3748 E+10	5.9330 E+10	6.7711 E+10	6.00 E+11
Fuel consumption	[l/100 km]	6.09	5.94	6.03	

*RCB correction / SDC correction applied if criteria fulfilled.

The emissions of the three Toyota Corolla comply with the limits of the regulation and vehicles are in good working order. Compared values of the three vehicles are very close. Combined CO_2 emissions and fuel consumption are slightly lower or almost the same as to those in the COC.

The results are based on a diluted gas analysis (bag result) and not on a raw gas analysis.

The WLTC class 3b test cycle includes 4 phases. A low speed phase, a medium speed phase, a high speed phase and an extra high speed phase. Emissions and fuel consumption by phase can be found in detailed results.

Fuel Information

Fuel type	Gasoline E10	-
NHV	17666	btu/lb
CWF	83.32	%
HWF	13.10	%
OWF	3.59	%
Density	0.7488	kg/l
Batch #	Euro6_Cert2	-

Dyno Information

Vehicle	Toyota Corolla 6521	Toyota Corolla 1501	Toyota Corolla 7243	
Inertia	1497	1497	1497	kg
Dyno Mode	Front	Front	Front	-
Road Load F0	76.0	76.0	76.0	N
Road Load F1	0.966	0.966	0.966	N/(km/h)
Road Load F2	0.0271	0.0271	0.0271	N/(km/h)²
Dyno Load F0	22.9	8.6	21.4	N
Dyno Load F1	0.453	0.400	0.458	N/(km/h)
Dyno Load F2	0.0277	0.0284	0.0277	N/(km/h)²

Dyno Load is the dynamometer load which is determined through the road load adjustment with fixed-run method as described in legislation.

The dynamometer shall perform 4 coastdowns in total. The dynamometer drives the vehicle to 130 km/h and calculate the deceleration time by 10 km/h steps.

IWR / RMSSE Validation

The inertial work ratio (IWR) and the root mean squared speed error (RMSSE) are two calculated drive trace indices which have to be within the respective limits. In the table below, the IWR and RMSSE values of the emission tests with the three TOYOTA Corolla vehicles are shown and all of them are below the limits, so the results are valid.

	Toyota Corolla 6521	**Toyota Corolla 1501**	**Toyota Corolla 7243**				
	Total	**Total**	**Total**	**Unit**	**Lower Limit**	**Upper Limit**	**Result**
IWR	-0.91	-0.10	1.34	%	-2.00	4.00	Valid
RMSSE	0.99	0.89	0.86	km/h	-	1.30	Valid

RCB correction

The rechargeable electric energy storage system (REESS) Charge Balance correction (RCB correction) is just applied if the relative energy balance is higher than the correction criterion of 0.5%. For all three TOYOTA Corolla vehicles the relative energy balance was below this criterion, so there was no RCB correction needed.

	Toyota Corolla 6521	Toyota Corolla 1501	Toyota Corolla 7243	
	Total	Total	Total	Unit
RCB correction applied if Rel. Energy Balance ΔE > 0.50%	NO	NO	NO	
Total El. Energy Balance ΔE	27.27	42.23	16.65	Wh
Rel. Energy Balance ΔE	0.23	0.36	0.14	%
Total CO2 REESS correction	-	-	-	g/km

SDC correction

The speed distance correction (SDC) is calculated and applied for every WLTC emission test driven by a pure internal combustion engine (ICE) vehicle as described in legislation. All three measured TOYOTA Corolla vehicles were pure ICE vehicles, so the SDC correction was applied.

SDC correction applied: **YES**

	Toyota Corolla 6521	Toyota Corolla 1501	Toyota Corolla 7243	
	Total	Total	Total	Unit
Total CO2 (not corrected)	137.29	133.96	135.73	g/km
Total CO2 (SDC corrected)	138.31	134.76	136.77	g/km
Total CO2 SDC correction	1.01	0.81	1.04	g/km

Remark: No driving violations occurred during the WLTC emission tests. Driving violations are the differences between the theoretical WLTC curve and the performed WLTC curve.

5.1.2 Toyota Yaris

Emission Result Overview

		Toyota Yaris 2856	Toyota Yaris 2889	Toyota Yaris 9745	
		Bag Result	Bag Result	Bag Result	Limit
HC	[mg/km]	29.971	38.094	29.137	100
CO	[mg/km]	379.771	397.459	384.795	1000
CO2	[g/km]	124.51*	123.79*	126.16*	
NOx	[mg/km]	5.805	5.448	5.759	60
CH4	[mg/km]	2.967	3.046	2.707	
NMHC	[mg/km]	27.348	35.349	26.687	68
PM	[mg/km]	0.1788	0.4430	0.1278	4.5
PN	[#/km]	1.8210 E+11	1.8673 E+11	1.5024 E+11	6.00 E+11
Fuel consumption	[l/100 km]	5.50	5.48	5.58	

*RCB correction / SDC correction applied if criteria fulfilled.

The emissions of the three Toyota Yaris comply with the limits of the regulation and vehicles are in good working order. Compared values of the three vehicles are very close. Combined CO_2 emissions and fuel consumption are slightly lower or almost the same as to those in the COC.

The results are based on a diluted gas analysis (bag result) and not on a raw gas analysis.

The WLTC class 3b test cycle includes 4 phases. A low speed phase, a medium speed phase, a high speed phase and an extra high speed phase. Emissions and fuel consumption by phase can be found in detailed results.

Fuel Information

Fuel type	Gasoline E10	-
NHV	17666	btu/lb
CWF	83.32	%
HWF	13.10	%
OWF	3.59	%
Density	0.7488	kg/l
Batch #	Euro6_Cert2	-

Dyno Information

Vehicle	Toyota Yaris 2856	Toyota Yaris 2889	Toyota Yaris 9745	
Inertia	1229	1229	1229	kg
Dyno Mode	Front	Front	Front	-
Road Load F0	91.3	91.3	91.3	N
Road Load F1	0.966	0.966	0.966	N/(km/h)
Road Load F2	0.0287	0.0287	0.0287	N/(km/h)²
Dyno Load F0	48.0	47.9	43.2	N
Dyno Load F1	0.543	0.551	0.493	N/(km/h)
Dyno Load F2	0.0294	0.0292	0.0295	N/(km/h)²

Dyno Load is the dynamometer load which is determined through the road load adjustment with fixed-run method as described in legislation.

The dynamometer shall perform 4 coastdowns in total. The dynamometer drives the vehicle to 130 km/h and calculate the deceleration time by 10 km/h steps.

IWR / RMSSE Validation

The inertial work ratio (IWR) and the root mean squared speed error (RMSSE) are two calculated drive trace indices which have to be within the respective limits. In the table below, the IWR and RMSSE values of the emission tests with the three TOYOTA Yaris vehicles are shown and all of them are below the limits, so the results are valid.

	Toyota Yaris 2856	Toyota Yaris 2889	Toyota Yaris 9745				
	Total	**Total**	**Total**	**Unit**	**Lower Limit**	**Upper Limit**	**Result**
IWR	3.53	1.74	2.80	%	-2.00	4.00	Valid
RMSSE	1.29	1.12	0.99	km/h	-	1.30	Valid

RCB correction

The rechargeable electric energy storage system (REESS) Charge Balance correction (RCB correction) is just applied if the relative energy balance is higher than the correction criterion of 0.5%. For two TOYOTA Yaris vehicles the relative energy balance was above this criterion, so there was the RCB correction applied. For the third TOYOTA Yaris vehicle the relative energy balance was below this criterion, so there was no RCB correction needed.

	Toyota Yaris 2856	Toyota Yaris 2889	Toyota Yaris 9745	
	Total	Total	Total	Unit
RCB correction applied if Rel. Energy Balance ΔE > 0.50%	YES	YES	NO	
Total El. Energy Balance ΔE	61.26	70.87	5.80	Wh
Rel. Energy Balance ΔE	0.54	0.63	0.05	%
Total CO2 REESS correction	2.60	3.01	-	g/km

SDC correction

The speed distance correction (SDC) is calculated and applied for every WLTC emission test driven by a pure internal combustion engine (ICE) vehicle as described in legislation. All three measured TOYOTA Yaris vehicles were pure ICE vehicles, so the SDC correction was applied.

SDC correction applied: **YES**

	Toyota Yaris 2856	Toyota Yaris 2889	Toyota Yaris 9745	
	Total	Total	Total	Unit
Total CO2 (not corrected)	126.63	126.64	126.78	g/km
Total CO2 (SDC corrected)	127.12	126.80	126.16	g/km
Total CO2 SDC correction	0.48	0.16	-0.62	g/km

Remark: No driving violations occurred during the WLTC emission tests. Driving violations are the differences between the theoretical WLTC curve and the performed WLTC curve.

5.2 PEMS validation on Chassis-Dyno

Prior or after the RDE test a PEMS validation test has been performed on Chassis-Dyno in Testcenter Oberursel to make sure the PEMS is working properly. All the differences measured for each combination PEMS-Vehicle comply with the limits of the regulation. Note that the PEMS validation is not compulsory but only recommended by the regulation.

The CO limit is 150 mg/km or 15 % of the laboratory reference, whichever is larger.

The CO_2 limit is 10 g/km or 10 % of the laboratory reference, whichever is larger.

The NO_x limit is 15 mg/km or 15 % of the laboratory reference, whichever is larger.

The PN limit is 1 E+11 p/km or 50 % of the laboratory reference, whichever is larger.

Toyota Corolla 6521

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	154.9	166.515	11.615	7%	Pass
CO2	[g/km]	132.8	134.15	1.35	1%	Pass
NOx	[mg/km]	13.800	14.324	0.524	4%	Pass
PN	[#/km]	3.30 E+10	3.45 E+10	1.54 E+09	4%	Pass

Toyota Corolla 1501

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	196.8	159.808	36.992	23%	Pass
CO2	[g/km]	134.6	133.61	0.99	1%	Pass
NOx	[mg/km]	12.080	12.558	0.478	4%	Pass
PN	[#/km]	5.36 E+10	4.87 E+10	4.89 E+09	10%	Pass

Toyota Corolla 7243

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	122.4	152.546	30.146	20%	Pass
CO2	[g/km]	135.8	138.44	2.64	2%	Pass
NOx	[mg/km]	11.580	12.630	1.05	8%	Pass
PN	[#/km]	4.97 E+10	7.88 E+10	2.91 E+10	37%	Pass

Toyota Yaris 2856

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	255.8	308.708	52.908	17%	Pass
CO2	[g/km]	127.3	130.21	2.91	2%	Pass
NOx	[mg/km]	5.662	7.180	1.518	21%	Pass
PN	[#/km]	2.33 E+11	2.29 E+11	4.24 E+09	2%	Pass

Toyota Yaris 2889

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	239.8	294.035	54.235	18%	Pass
CO2	[g/km]	127.3	132.10	4.8	4%	Pass
NOx	[mg/km]	5.646	5.981	0.335	6%	Pass
PN	[#/km]	1.17 E+11	1.11 E+11	6.45 E+09	6%	Pass

Toyota Yaris 9745

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	260.07	324.668	64.598	20%	Pass
CO2	[g/km]	124.5	128.07	3.57	3%	Pass
NOx	[mg/km]	5.508	5.898	0.39	7%	Pass
PN	[#/km]	1.14 E+11	1.78 E+11	6.37 E+10	36%	Pass

5.3 Real Driving Emissions (Type 1A)

The measured vehicle was tested in the *RDE Oberursel route*. The recorded data was processed using an inhouse developed and validated software, in order to calculate the instantaneous emissions mass flow, the aggregated emissions and the validity parameters as prescribed by the EU regulation 2018/1832.

5.3.1 RDE Testing route (characteristics and driving dynamics)

The vehicle was driven on the *RDE Oberursel route* which complies to RDE-regulation. The *RDE Oberursel route* is shown in Figure 4, designed with start and end in Oberursel, Germany. The figure designates the urban / rural / highway parts of the route.

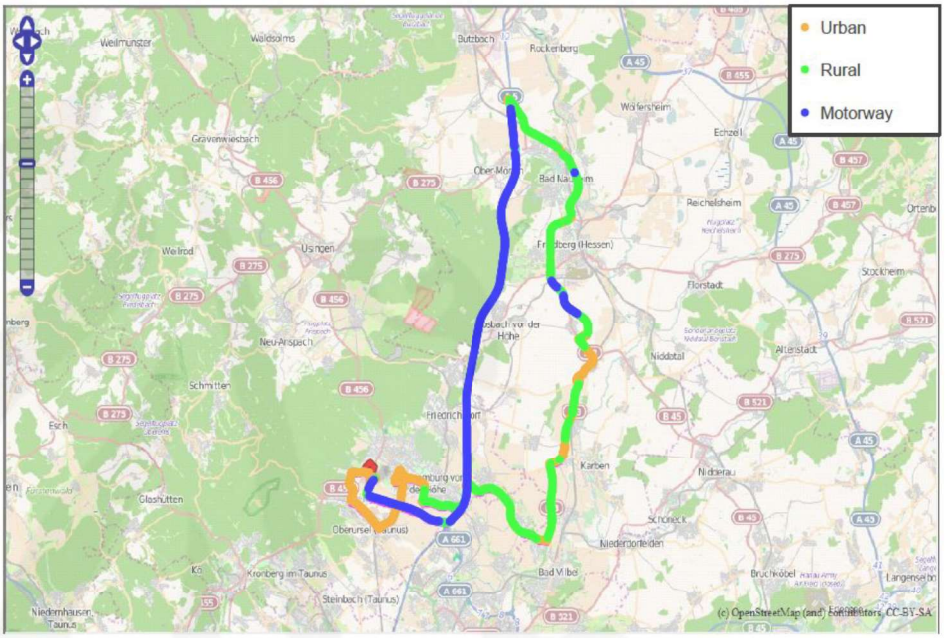

Figure 4: RDE Oberursel route, compliant with RDE regulation in the greater area of Oberursel

The RDE trip always begin with the urban part. Then, come the rural part and motorway part.

Rural operation may be interrupted by short periods of urban operation when driving through urban areas. Motorway operation may be interrupted by short periods of urban or rural operation, e.g., when passing toll stations or sections of road works.

Table 6 provides trip details of the *RDE Oberursel route* for the RDE compliant tests which were performed with the three Toyota Corolla and the respective RDE regulatory boundary conditions.

Table 6: Typical characteristics of the RDE Oberursel route

Parameter		Toyota Corolla 6521	Toyota Corolla 1501	Toyota Corolla 7243	Legislation boundaries
Trip duration [min:s]		99:06	96:41	97:07	90 – 120
Trip distance [km]		88.7	88.7	88.7	> 46
Stop duration [% of urban]		20.3	17.1	16.4	6-30
Distance share [%] (and typical km-distance)	**Urban**	30.7 (27.2 km)	30.2 (26.8 km)	31.9 (28.3 km)	29 – 44
	Rural	37.1 (32.9 km)	38.0 (33.7 km)	33.8 (30.0 km)	23 – 43
	Motorway	32.2 (28.6 km)	31.9 (28.3 km)	34.3 (30.4 km)	23 – 43
Average speed [km/h]	**Urban**	28.1	29.1	29.7	15 – 40
	Rural	75.8	75.0	73.0	60 – 90
	Motorway	114.3	116.3	119.2	100 – 145
Motorway (> 100 km/h) [min:s]		12:42	13:14	13:06	5min ≥100 km/h
Max altitude [m]		279.7	278.2	277.8	< 700
Altitude difference (end–start) [m]		-1.2	4.4	-10.6	± 100
Min. Temperature [°C]		[1.9]	6.9	3.4	3°C [-2°C-3°C]
Max. Temperature [°C]		6.4	13.0	12.5	30°C [30-35°C]

Table 7 provides trip details of the *RDE Oberursel route* for the RDE compliant tests which were performed with the three Toyota Yaris and the respective RDE regulatory boundary conditions.

Table 7: Typical characteristics of the RDE Oberursel route

Parameter		Toyota Yaris 2856	Toyota Yaris 2889	Toyota Yaris 9745	Legislation boundaries
Trip duration [min:s]		98:24	102:37	101:10	90 – 120
Trip distance [km]		88.7	88.7	88.7	> 46
Stop duration [% of urban]		17.3	20.5	17.9	6-30
Distance share [%] (and typical km-distance)	**Urban**	29.6 (26.3 km)	31.2 (27.6 km)	32.7 (29.0 km)	29 – 44
	Rural	37.2 (33.0 km)	34.9 (31.0 km)	31.9 (28.3 km)	23 – 43
	Motorway	33.2 (29.5 km)	33.9 (30.1 km)	35.4 (31.4 km)	23 – 43
Average speed [km/h]	**Urban**	27.7	26.9	28.1	15 – 40
	Rural	75.2	74.4	74.1	60 – 90
	Motorway	116.5	113.3	114.8	100 – 145
Motorway (> 100 km/h) [min:s]		12:24	12:19	12:21	5min ≥100 km/h
Max altitude [m]		278.1	277.0	279.8	< 700
Altitude difference (end–start) [m]		-3.5	-0.3	-1.7	± 100
Min. Temperature [°C]		[-1.9]	7.4	7.3	3°C [-2°C-3°C]
Max. Temperature [°C]		6.8	16.0	16.1	30°C [30-35°C]

Table 8 to 10 provide some details regarding the driving dynamics of the RDE trips performed with the three Toyota Corolla on the route designed in the greater area of Oberursel.

V*Apos_95% is the 95th percentile of the product of vehicle speed and positive acceleration greater than 0.1 m/s2. RPA is the relative positive acceleration. For RPA there is a lower limit criterion and for V*Apos_95% there is an upper limit criterion. For all RDE emission tests with the three TOYOTA Corolla vehicles the driving dynamic values were within the limit criteria, so the measurements are valid.

Table 8: Average driving dynamics of the RDE trip with the Toyota Corolla 6521 on the route designed in the greater area of Oberursel, Germany.

Parameter		Toyota Corolla 6521	Criteria
V*Apos_95% [W/kg]	Urban	14.814	<= 18.266
	Rural	16.250	<=24.592
	Motorway	16.612	<= 27.451
RPA [m/s²]	Urban	0.212	>= 0.130
	Rural	0.092	>= 0.054
	Motorway	0.061	>= 0.025

Table 9: Average driving dynamics of the RDE trip with the Toyota Corolla 1501 on the route designed in the greater area of Oberursel, Germany.

Parameter		Toyota Corolla 1501	Criteria
V*Apos_95% [W/kg]	Urban	14.142	<= 18.398
	Rural	16.436	<= 24.532
	Motorway	15.224	<= 27.593
RPA [m/s²]	Urban	0.214	>= 0.129
	Rural	0.086	>= 0.055
	Motorway	0.058	>= 0.025

Table 10: Average driving dynamics of the RDE trip with the Toyota Corolla 7243 on the route designed in the greater area of Oberursel, Germany.

Parameter		Toyota Corolla 7243	Criteria
V*Apos_95% [W/kg]	Urban	13.403	<= 18.478
	Rural	17.232	<= 24.364
	Motorway	15.456	<= 27.809
RPA [m/s²]	Urban	0.183	>= 0.128
	Rural	0.094	>= 0.059
	Motorway	0.059	>= 0.025

Table 11 to 13 provide some details regarding the driving dynamics of the RDE trips performed with the three Toyota Yaris on the route designed in the greater area of Oberursel.

V*Apos_95% is the 95th percentile of the product of vehicle speed and positive acceleration greater than 0.1 m/s^2. RPA is the relative positive acceleration. For RPA there is a lower limit criterion and for V*Apos_95% there is an upper limit criterion. For all RDE emission tests with the three TOYOTA Yaris vehicles the driving dynamic values were within the limit criteria, so the measurements are valid.

Table 11: Average driving dynamics of the RDE trip with the Toyota Yaris 2856 on the route designed in the greater area of Oberursel, Germany.

Parameter		Toyota Yaris 2856	Criteria
V*Apos_95% [W/kg]	Urban	13,137	<= 18.203
	Rural	14.388	<= 24.548
	Motorway	16.461	<= 27.608
RPA [m/s²]	Urban	0.200	>= 0.131
	Rural	0.091	>= 0.055
	Motorway	0.053	>= 0.025

Table 12: Average driving dynamics of the RDE trip with the Toyota Yaris 2889 on the route designed in the greater area of Oberursel, Germany.

Parameter		Toyota Yaris 2889	Criteria
V*Apos_95% [W/kg]	Urban	12.235	<= 18.092
	Rural	14.816	<= 24.559
	Motorway	16.804	<= 27.373
RPA [m/s²]	Urban	0.220	>= 0.133
	Rural	0.091	>= 0.056
	Motorway	0.079	>= 0.025

Table 13: Average driving dynamics of the RDE trip with the Toyota Yaris 9745 on the route designed in the greater area of Oberursel, Germany.

Parameter		Toyota Yaris 9745	Criteria
V*Apos_95% [W/kg]	Urban	12.809	<= 18.266
	Rural	15.379	<= 24.513
	Motorway	14.241	<= 27.481
RPA [m/s²]	Urban	0.199	>= 0.130
	Rural	0.102	>= 0.057
	Motorway	0.078	>= 0.025

5.3.2 RDE Final Emission Results

The aggregated emissions of the three Toyota Corolla are presented in Tables 14 to 16.

The aggregated emissions of the three Toyota Yaris are presented in Tables 17 to 19.

The CO, NO_x and PN emissions presented are the final emissions calculated following the RDE regulation. The urban/total CO_2 emissions presented are calculated by simply dividing the urban/total emitted CO2 mass by the urban/total trip distance travelled, respectively.

Table 14: Final emission results of the Toyota Corolla 6521.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	175.047	107.469	-
CO2	[g/km]	179.293	155.068	-
NOx	[mg/km]	18.026	7.255	126.000*
NO	[mg/km]	18.062	7.381	-
NO2	[mg/km]	0.341	0.145	-
PN	[#/km]	5.32E+10	3.13E+10	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 15: Final emission results of the Toyota Corolla 1501.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	169.676	119.936	-
CO2	[g/km]	172.617	146.576	-
NOx	[mg/km]	21.138	10.052	126.000*
NO	[mg/km]	21.418	10.573	-
NO2	[mg/km]	0.378	0.153	-
PN	[#/km]	6.75E+10	3.95E+10	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 16: Final emission results of the Toyota Corolla 7243.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	116.033	105.484	-
CO2	[g/km]	159.114	150.247	-
NOx	[mg/km]	19.345	8.564	126.000*
NO	[mg/km]	19.427	9.038	-
NO2	[mg/km]	0.484	0.203	-
PN	[#/km]	5.83E+10	3.64E+10	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 17: Final emission results of the Toyota Yaris 2856.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	195.602	160.392	-
CO2	[g/km]	152.017	132.860	-
NOx	[mg/km]	5.826	2.795	126.000*
NO	[mg/km]	5.791	2.844	-
NO2	[mg/km]	0.222	0.096	-
PN	[#/km]	2.82E+11	1.37E+11	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 18: Final emission results of the Toyota Yaris 2889.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	177.740	254.643	-
CO2	[g/km]	154.197	130.175	-
NOx	[mg/km]	10.927	7.182	126.000*
NO	[mg/km]	10.911	7.100	-
NO2	[mg/km]	0.396	0.264	-
PN	[#/km]	4.16E+11	1.73E+11	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 19: Final emission results of the Toyota Yaris 9745.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	195.877	255.984	-
CO2	[g/km]	151.280	132.850	-
NOx	[mg/km]	6.427	4.147	126.000*
NO	[mg/km]	6.408	4.012	-
NO2	[mg/km]	0.267	0.256	-
PN	[#/km]	3.25E+11	1.41E+11	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

6 Detailed results

6.1 WTLC on chassis dyno (Type1)

Toyota Corolla 6521

HORIBA Automotive Test Systems

ABGASROLLE HORIBA TestCenter
ISSEP_TOYOTA_COROLLA_ 6521

WHOR__210125_001 / 6
H1_210128_004

WLTCv53 CLASS3b

Summary

Total Results

Bag Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]
Bag	**16,907**	**151,084**	**138,31**	**20,055**	**2,674**	**6,09**
Limit	100,000	1000,000		60,000		
	OK	**OK**		**OK**		

	NMHC [mg/km]	HC+NOx [mg/km]	NMHC+NOx [mg/km]	Particulate [mg/km]	Part. Count [1/km]
Bag	**14,448**	**36,962**		**0,3414**	**3,3748E+10**
Limit	68,000			5,0000	
	OK			**OK**	

Modal Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	NMHC [mg/km]	O2 [g/km]
Conti	16,347	153,712	141,117	19,475			
Pre							
Post							

Cat. Eff (%)

WLTP REESS corrections

Total Electric Balance Q	2,27	Ah
Total El. Energy Balance Δ E	27,27	Wh
Rel. Energy Balance Δ E	0,23	%
RCB Correction Criterion	0,50	%
RCB Correction applied	**No**	
Total CO2 (non-balanced)	137,29	g/km
Total CO2	138,31	g/km
Total CO2 REESS Correctior		g/km
Total FE (non-balanced)	6,05	l/100km
Total FE	6,09	l/100km
Total FE RREESS Correctior		l/100km

WLTP stage 2
(CO2 correction for target speed/distance)

SDC Correction applied	**Yes**	
Total CO2 (non-balanced)	137,29	g/km
Total CO2 (SDC-corrected)	138,31	g/km
Total CO2 SDC Correction	1,01	g/km

ATCT

ATCT procedure	No	
Soak move time		min

RDE WLTC Veline (Power Binning)

Veline slope k	g/kWh
Veline intercept D	g/h

Time Control

Test date : 2021-01-28

Start of test 09:58:35
End of test 11:09:26

Start of trace 10:01:50
End of trace 10:31:50

Phase Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	NMHC [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]	Particulate [mg/km]
Phase 1								
Bag	121,000	616,000	181,650	115,000	106,000	16,000	8,05	
Conti	120,000	625,000	185,156	114,000			8,20	
Post								
Phase 2								
Bag	3,000	39,000	138,674	10,000	1,000	2,000	6,10	
Conti	2,000	39,000	141,154	9,000			6,21	
Post								
Phase 3								
Bag	1,000	88,000	119,919	6,000	0,000	0,000	5,28	
Conti	0,000	90,000	122,214	5,000			5,38	
Post								
Phase 4								
Bag	1,000	97,000	137,915	3,000	0,000	0,000	6,07	
Conti	0,000	100,000	141,101	2,000			6,21	
Post								
Bag								
Conti								
Post								

Bag/Modal Compare

	HC [%]	COH [%]	CO2 [%]	NOx [%]
Phase 1				
Conti/Bag	-0,52	1,57	1,93	-0,53
Raw/Bag				
Phase 2				
Conti/Bag	-40,76	-2,07	1,79	-11,33
Raw/Bag				
Phase 3				
Conti/Bag	-63,20	1,72	1,91	-5,33
Raw/Bag				
Phase 4				
Conti/Bag	-64,93	3,04	2,31	-16,69
Raw/Bag				
Conti/Bag				
Raw/Bag				

WLTP REESS corrections

	Q diff [Ah]	Δ E [Wh]	CO2 (nb) [g/km]	CO2 [g/km]	Δ CO2 [g/km]	FE (nb) [l/100km]	FE [l/100km]	Δ FE [l/100km]
Phase 1	0,84	10,10	179,51	181,65		7,95	8,05	
Phase 2	0,51	6,12	137,69	138,67		6,06	6,10	
Phase 3	0,53	6,40	117,85	119,92		5,19	5,28	
Phase 4	0,39	4,66	138,22	137,92		6,08	6,07	

Time Control

Test date : 2021-01-28

Start of test 09:58:35
End of test 11:09:26

Start of trace 10:01:50
End of trace 10:31:50

Toyota Corolla 7243

HORIBA Automotive Test Systems

ABGASROLLE HORIBA TestCenter
ISSEP_TOYOTA_COROLLA_ 7243

WHOR__210205_002 / 6
H1_210209_004

WLTCv53_CLASS3b

Summary

Total Results

Bag Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]
Bag	14,484	145,485	136,77	13,066	2,493	6,03
Limit	100,000	1000,000		60,000		
	OK	OK		OK		

	NMHC [mg/km]	HC+NOx [mg/km]	NMHC+NOx [mg/km]	Particulate [mg/km]	Part. Count [1/km]
Bag	12,249	27,550		0,4889	6,7711E+10
Limit	68,000			5,0000	
	OK			OK	

Modal Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	NMHC [mg/km]	O2 [g/km]
Conti	12,336	146,758	139,652	9,517			
Pre							
Post							

Cat. Eff (%)

WLTP REESS corrections

Total Electric Balance Q	1,39	Ah
Total El. Energy Balance Δ E	16,65	Wh
Rel. Energy Balance Δ E	0,14	%
RCB Correction Criterion	0,50	%
RCB Correction applied	No	
Total CO2 (non-balanced)	135,73	g/km
Total CO2	136,77	g/km
Total CO2 REESS Correctior		g/km
Total FE (non-balanced)	5,98	l/100km
Total FE	6,03	l/100km
Total FE RREESS Correctior		l/100km

WLTP stage 2

(CO2 correction for target speed/distance)

SDC Correction applied	Yes	
Total CO2 (non-balanced)	135,73	g/km
Total CO2 (SDC-corrected)	136,77	g/km
Total CO2 SDC Correction	1,04	g/km

ATCT

ATCT procedure	No	
Soak move time		min

RDE WLTC Veline (Power Binning)

Veline slope k	g/kWh
Veline intercept D	g/h

Time Control

Test date : 2021-02-09

Start of test 11:57:54
End of test 13:09:29

Start of trace 12:02:01
End of trace 12:32:01

Phase Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	NMHC [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]	Particulate [mg/km]
Phase 1								
Bag	105,000	489,000	183,449	58,000	92,000	15,000	8,11	
Conti	93,000	491,000	187,051	46,000			8,27	
Post								
Phase 2								
Bag	2,000	42,000	135,112	13,000	0,000	2,000	5,94	
Conti	0,000	40,000	137,696	8,000			6,06	
Post								
Phase 3								
Bag	0,000	114,000	117,385	7,000	0,000	0,000	5,17	
Conti	0,000	115,000	120,000	5,000			5,28	
Post								
Phase 4								
Bag	0,000	104,000	137,174	2,000	0,000	0,000	6,04	
Conti	0,000	107,000	140,192	1,000			6,17	
Post								
Bag								
Conti								
Post								

Bag/Modal Compare

	HC [%]	COH [%]	CO2 [%]	NOx [%]
Phase 1				
Conti/Bag	-11,70	0,46	1,96	-20,43
Raw/Bag				
Phase 2				
Conti/Bag	89,61	3,42	1,91	38,63
Raw/Bag				
Phase 3				
Conti/Bag	-100,00	1,05	2,23	-30,14
Raw/Bag				
Phase 4				
Conti/Bag	-100,00	2,43	2,20	-54,95
Raw/Bag				
Conti/Bag				
Raw/Bag				

WLTP REESS corrections

	Q diff [Ah]	Δ E [Wh]	CO2 (nb) [g/km]	CO2 [g/km]	Δ CO2 [g/km]	FE (nb) [l/100km]	FE [l/100km]	Δ FE [l/100km]
Phase 1	0,83	9,91	183,17	183,45		8,10	8,11	
Phase 2	0,23	2,81	133,93	135,11		5,89	5,94	
Phase 3	0,20	2,34	115,78	117,39		5,10	5,17	
Phase 4	0,13	1,58	136,42	137,17		6,01	6,04	

Time Control

Test date : 2021-02-09

Start of test 11:57:54
End of test 13:09:29

Start of trace 12:02:01
End of trace 12:32:01

Toyota Corolla 1501

HORIBA Automotive Test Systems

ABGASROLLE HORIBA TestCenter
ISSEP_TOYOTA_COROLLA_ 1501

WHOR__210125_003 / 9
H1_210203_003

WLTCv53_CLASS3b

Summary

Total Results

Bag Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]
Bag	21,855	240,236	134,76	16,553	3,880	5,94
Limit	100,000	1000,000		60,000		
	OK	OK		OK		

	NMHC [mg/km]	HC+NOx [mg/km]	NMHC+NOx [mg/km]	Particulate [mg/km]	Part. Count [1/km]
Bag	18,320	38,408		0,2088	5,9330E+10
Limit	68,000			5,0000	
	OK			OK	

Modal Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	NMHC [mg/km]	O2 [g/km]
Conti	20,949	247,627	137,623	15,969			
Pre							
Post							

Cat. Eff (%)

WLTP REESS corrections

Total Electric Balance Q	3,52	Ah
Total El. Energy Balance Δ E	42,23	Wh
Rel. Energy Balance Δ E	0,36	%
RCB Correction Criterion	0,50	%
RCB Correction applied	No	
Total CO2 (non-balanced)	133,96	g/km
Total CO2	134,76	g/km
Total CO2 REESS Correctior		g/km
Total FE (non-balanced)	5,91	l/100km
Total FE	5,94	l/100km
Total FE RREESS Correctior		l/100km

WLTP stage 2

(CO2 correction for target speed/distance)

SDC Correction applied	Yes	
Total CO2 (non-balanced)	133,96	g/km
Total CO2 (SDC-corrected)	134,76	g/km
Total CO2 SDC Correction	0,81	g/km

ATCT

ATCT procedure	No	
Soak move time		min

RDE WLTC Veline (Power Binning)

Veline slope k	g/kWh
Veline intercept D	g/h

Time Control

Test date : 2021-02-03

Start of test 10:07:26
End of test 11:32:17

Start of trace 10:23:06
End of trace 10:53:06

Phase Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	NMHC [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]	Particulate [mg/km]
Phase 1								
Bag	144,000	1075,000	178,155	81,000	127,000	19,000	7,93	
Conti	143,000	1086,000	181,498	80,000			8,07	
Post								
Phase 2								
Bag	4,000	138,000	134,529	9,000	1,000	3,000	5,93	
Conti	3,000	147,000	137,357	8,000			6,05	
Post								
Phase 3								
Bag	1,000	95,000	115,252	9,000	0,000	1,000	5,07	
Conti	0,000	101,000	117,628	8,000			5,18	
Post								
Phase 4								
Bag	4,000	114,000	135,652	4,000	3,000	1,000	5,97	
Conti	4,000	120,000	138,775	4,000			6,11	
Post								
Bag								
Conti								
Post								

Bag/Modal Compare

	HC [%]	COH [%]	CO2 [%]	NOx [%]
Phase 1				
Conti/Bag	-0,79	1,08	1,88	-0,67
Raw/Bag				
Phase 2				
Conti/Bag	-33,56	6,41	2,10	-10,44
Raw/Bag				
Phase 3				
Conti/Bag	-73,59	6,48	2,06	-7,55
Raw/Bag				
Phase 4				
Conti/Bag	-15,75	5,33	2,30	-8,80
Raw/Bag				
Conti/Bag				
Raw/Bag				

WLTP REESS corrections

	Q diff [Ah]	Δ E [Wh]	CO2 (nb) [g/km]	CO2 [g/km]	Δ CO2 [g/km]	FE (nb) [l/100km]	FE [l/100km]	Δ FE [l/100km]
Phase 1	1,26	15,17	179,06	178,16		7,97	7,93	
Phase 2	0,85	10,17	133,00	134,53		5,86	5,93	
Phase 3	0,84	10,09	113,93	115,25		5,02	5,07	
Phase 4	0,57	6,79	135,07	135,65		5,95	5,97	

Time Control

Test date : 2021-02-03

Start of test 10:07:26
End of test 11:32:17

Start of trace 10:23:06
End of trace 10:53:06

Toyota Yaris 2856

HORIBA Automotive Test Systems

ABGASROLLE HORIBA TestCenter
ISSEP_TOYOTA_YARIS_ 2856

WHOR__210205_001 / 6
H1_210209_003

WLTCv53_CLASS3b

Summary

Total Results

Bag Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]
Bag	29,971	379,771	124,51	5,805	2,967	5,50
Limit	100,000	1000,000		60,000		
	OK	OK		OK		

	NMHC [mg/km]	HC+NOx [mg/km]	NMHC+NOx [mg/km]	Particulate [mg/km]	Part. Count [1/km]
Bag	27,348	35,776		0,1788	1,8210E+11
Limit	68,000			5,0000	
	OK			OK	

Modal Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	NMHC [mg/km]	O2 [g/km]
Conti	29,144	378,238	127,377	5,532			
Pre							
Post							

Cat. Eff (%)

WLTP REESS corrections

Total Electric Balance Q	5,10	Ah
Total El. Energy Balance Δ E	61,26	Wh
Rel. Energy Balance Δ E	0,54	%
RCB Correction Criterion	0,50	%
RCB Correction applied	Yes	
Total CO2 (non-balanced)	126,63	g/km
Total CO2	124,51	g/km
Total CO2 REESS Correctior	2,60	g/km
Total FE (non-balanced)	5,60	l/100km
Total FE	5,50	l/100km
Total FE RREESS Correctior	0,09	l/100km

WLTP stage 2

(CO2 correction for target speed/distance)

SDC Correction applied	Yes	
Total CO2 (non-balanced)	126,63	g/km
Total CO2 (SDC-corrected)	127,12	g/km
Total CO2 SDC Correction	0,48	g/km

ATCT

ATCT procedure	No	
Soak move time		min

RDE WLTC Veline (Power Binning)

Veline slope k	g/kWh
Veline intercept D	g/h

Time Control

Test date : 2021-02-09

Start of test 10:22:18
End of test 11:34:16

Start of trace 10:26:38
End of trace 10:56:38

Phase Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	NMHC [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]	Particulate [mg/km]
Phase 1								
Bag	169,000	1997,000	158,340	27,000	156,000	15,000	7,12	
Conti	167,000	1959,000	161,413	26,000			7,25	
Post								
Phase 2								
Bag	2,000	26,000	117,822	4,000	1,000	1,000	5,18	
Conti	1,000	24,000	120,525	4,000			5,30	
Post								
Phase 3								
Bag	1,000	35,000	107,031	3,000	0,000	0,000	4,71	
Conti	0,000	34,000	109,599	2,000			4,82	
Post								
Phase 4								
Bag	19,000	278,000	130,845	2,000	18,000	2,000	5,77	
Conti	19,000	289,000	133,981	2,000			5,91	
Post								
Bag								
Conti								
Post								

Bag/Modal Compare

	HC [%]	COH [%]	CO2 [%]	NOx [%]
Phase 1				
Conti/Bag	-1,52	-1,92	1,94	-2,43
Raw/Bag				
Phase 2				
Conti/Bag	-45,54	-5,87	2,29	-5,30
Raw/Bag				
Phase 3				
Conti/Bag	-59,13	-0,82	2,40	-7,91
Raw/Bag				
Phase 4				
Conti/Bag	-2,37	4,00	2,40	-12,48
Raw/Bag				
Conti/Bag				
Raw/Bag				

WLTP REESS corrections

	Q diff [Ah]	Δ E [Wh]	CO2 (nb) [g/km]	CO2 [g/km]	Δ CO2 [g/km]	FE (nb) [l/100km]	FE [l/100km]	Δ FE [l/100km]
Phase 1	1,66	19,96	162,95	158,34	**6,39**	7,33	7,12	**0,20**
Phase 2	1,26	15,12	119,06	117,82	**3,13**	5,24	5,18	**0,05**
Phase 3	1,30	15,58	109,00	107,03	**2,16**	4,80	4,71	**0,09**
Phase 4	0,88	10,60	132,68	130,85	**1,27**	5,86	5,77	**0,08**

Time Control

Test date : 2021-02-09

Start of test 10:22:18
End of test 11:34:16

Start of trace 10:26:38
End of trace 10:56:38

Toyota Yaris 2889

HORIBA Automotive Test Systems

ABGASROLLE HORIBA TestCenter
ISSEP_TOYOTA_YARIS_ 2889

WHOR__210205_003 / 6
H1_210211_004

WLTCv53_CLASS3b

Summary

Total Results

Bag Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]
Bag	38,094	397,459	123,79	5,448	3,046	5,48
Limit	100,000	1000,000		60,000		
	OK	OK		OK		

	NMHC [mg/km]	HC+NOx [mg/km]	NMHC+NOx [mg/km]	Particulate [mg/km]	Part. Count [1/km]
Bag	35,349	43,542		0,4430	1,8673E+11
Limit	68,000			5,0000	
	OK			OK	

Modal Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	NMHC [mg/km]	O2 [g/km]
Conti	37,600	389,224	126,239	4,416			
Pre							
Post							
Cat. Eff (%)							

WLTP REESS corrections

Total Electric Balance Q	5,91	Ah
Total El. Energy Balance Δ E	70,87	Wh
Rel. Energy Balance Δ E	0,63	%
RCB Correction Criterion	0,50	%
RCB Correction applied	Yes	
Total CO2 (non-balanced)	126,64	g/km
Total CO2	123,79	g/km
Total CO2 REESS Correctior	3,01	g/km
Total FE (non-balanced)	5,60	l/100km
Total FE	5,48	l/100km
Total FE RREESS Correctior	0,13	l/100km

WLTP stage 2

(CO2 correction for target speed/distance)

SDC Correction applied	Yes	
Total CO2 (non-balanced)	126,64	g/km
Total CO2 (SDC-corrected)	126,80	g/km
Total CO2 SDC Correction	0,16	g/km

ATCT

ATCT procedure	No	
Soak move time		min

RDE WLTC Veline (Power Binning)

Veline slope k	g/kWh
Veline intercept D	g/h

Time Control

Test date : 2021-02-11

Start of test 09:30:11
End of test 10:43:00

Start of trace 09:34:31
End of trace 10:04:32

Phase Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	NMHC [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]	Particulate [mg/km]
Phase 1								
Bag	210,000	2084,000	155,868	18,000	196,000	15,000	7,03	
Conti	209,000	2023,000	158,574	16,000			7,14	
Post								
Phase 2								
Bag	2,000	9,000	116,957	5,000	1,000	1,000	5,14	
Conti	1,000	6,000	119,038	4,000			5,23	
Post								
Phase 3								
Bag	1,000	36,000	107,476	3,000	0,000	1,000	4,73	
Conti	0,000	34,000	109,953	3,000			4,84	
Post								
Phase 4								
Bag	28,000	312,000	130,043	3,000	26,000	2,000	5,74	
Conti	28,000	316,000	132,579	2,000			5,85	
Post								
Bag								
Conti								
Post								

Bag/Modal Compare

	HC [%]	COH [%]	CO2 [%]	NOx [%]
Phase 1				
Conti/Bag	-0,08	-2,95	1,74	-11,55
Raw/Bag				
Phase 2				
Conti/Bag	-47,02	-39,11	1,78	-31,15
Raw/Bag				
Phase 3				
Conti/Bag	-65,70	-4,99	2,30	-23,15
Raw/Bag				
Phase 4				
Conti/Bag	-1,21	1,01	1,95	-19,33
Raw/Bag				
Conti/Bag				
Raw/Bag				

WLTP REESS corrections

	Q diff [Ah]	Δ E [Wh]	CO2 (nb) [g/km]	CO2 [g/km]	Δ CO2 [g/km]	FE (nb) [l/100km]	FE [l/100km]	Δ FE [l/100km]
Phase 1	1,61	19,35	163,70	155,87	**6,25**	7,37	7,03	**0,34**
Phase 2	1,27	15,19	118,88	116,96	**3,14**	5,23	5,14	**0,08**
Phase 3	1,93	23,11	110,34	107,48	**3,18**	4,85	4,73	**0,13**
Phase 4	1,10	13,21	131,56	130,04	**1,58**	5,81	5,74	**0,07**

Time Control

Test date : 2021-02-11

Start of test 09:30:11
End of test 10:43:00

Start of trace 09:34:31
End of trace 10:04:32

Toyota Yaris 9745

HORIBA Automotive Test Systems

ABGASROLLE HORIBA TestCenter
ISSEP_TOYOTA_YARIS_ 9745

WHOR__210224_001 / 6
H1_210225_003

WLTCv53_CLASS3b

Summary

Total Results

Bag Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]		Fuel cons. [l/100km]	
Bag	29,137	384,795	126,16	5,759	2,707		5,58	
Limit								

	NMHC [mg/km]	HC+NOx [mg/km]	NMHC+NOx [mg/km]				Particulate [mg/km]	Part. Count [1/km]
Bag	26,687	34,895					0,1278	1,5024E+11
Limit								

Modal Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	CH4 [mg/km]	NMHC [mg/km]	O2 [g/km]	
Conti	25,891	385,877	128,258	2,380				
Pre								
Post								

Cat. Eff (%)

WLTP REESS corrections

Total Electric Balance Q	0,48	Ah
Total El. Energy Balance Δ E	5,80	Wh
Rel. Energy Balance Δ E	0,05	%
RCB Correction Criterion	0,50	%
RCB Correction applied	No	
Total CO2 (non-balanced)	126,78	g/km
Total CO2	126,16	g/km
Total CO2 REESS Correctior		g/km
Total FE (non-balanced)	5,60	l/100km
Total FE	5,58	l/100km
Total FE RREESS Correctior		l/100km

WLTP stage 2

(CO2 correction for target speed/distance)

SDC Correction applied	Yes	
Total CO2 (non-balanced)	126,78	g/km
Total CO2 (SDC-corrected)	126,16	g/km
Total CO2 SDC Correction	-0,62	g/km

ATCT

ATCT procedure	No	
Soak move time		min

RDE WLTC Veline (Power Binning)

Veline slope k	g/kWh
Veline intercept D	g/h

Time Control

Test date : 2021-02-25

Start of test 13:50:25
End of test 15:00:26

Start of trace 13:53:06
End of trace 14:23:06

Phase Results

	HC [mg/km]	CO [mg/km]	CO2 [g/km]	NOx [mg/km]	NMHC [mg/km]	CH4 [mg/km]	Fuel cons. [l/100km]	Particulate [mg/km]
Phase 1								
Bag	183,000	2169,000	158,560	23,000	170,000	15,000	7,15	
Conti	175,000	2125,000	161,127	15,000			7,25	
Post								
Phase 2								
Bag	2,000	10,000	121,767	5,000	1,000	1,000	5,35	
Conti	0,000	14,000	123,502	0,000			5,43	
Post								
Phase 3								
Bag	1,000	40,000	110,657	3,000	1,000	0,000	4,87	
Conti	0,000	45,000	112,329	0,000			4,94	
Post								
Phase 4								
Bag	12,000	236,000	130,095	2,000	11,000	1,000	5,74	
Conti	8,000	248,000	132,587	0,000			5,85	
Post								
Bag								
Conti								
Post								

Bag/Modal Compare

	HC [%]	COH [%]	CO2 [%]	NOx [%]
Phase 1				
Conti/Bag	-4,24	-2,01	1,62	-34,54
Raw/Bag				
Phase 2				
Conti/Bag	-91,86	43,83	1,43	-90,53
Raw/Bag				
Phase 3				
Conti/Bag	-100,00	13,61	1,51	-85,51
Raw/Bag				
Phase 4				
Conti/Bag	-36,73	5,13	1,92	-81,83
Raw/Bag				
Conti/Bag				
Raw/Bag				

WLTP REESS corrections

	Q diff [Ah]	Δ E [Wh]	CO2 (nb) [g/km]	CO2 [g/km]	Δ CO2 [g/km]	FE (nb) [l/100km]	FE [l/100km]	Δ FE [l/100km]
Phase 1	0,35	4,18	162,93	158,56		7,34	7,15	
Phase 2	0,09	1,04	120,14	121,77		5,28	5,35	
Phase 3	0,04	0,50	110,39	110,66		4,86	4,87	
Phase 4	0,01	0,07	131,37	130,10		5,79	5,74	

Time Control

Test date : 2021-02-25

Start of test 13:50:25
End of test 15:00:26

Start of trace 13:53:06
End of trace 14:23:06

6.2 RDE (Real Driving Emissions) (Type 1A)

Toyota Corolla 6521

HORIBA Automotive Test Systems

EU-LDV 4th

RDE Summary Report

Test		Vehicle		Device	
Test ID	: 392	Vehicle Name	: I8SeP_Toyota_Corolla_ 6521	Cell Name	: OBS-ONE
Test Date	: 2021/02/01	Vehicle Category	: M1	Cell Description	:
Test Start	: 09:58:23	Vehicle Class	: —		
Test End	: 12:41:14	Vehicle Type	: ICE		
Driver	: MK	Fuel Type	: Gasoline		
Comment	: valid RDE	Description	: 6521		

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	279.7	Moderate
Min. Temp.	degC	[1.9]	Extended
Max. Temp.	degC	6.4	

[ ] : Extended

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.2
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Stop

	Unit	Value
First Idling Duration	s	5
Longest Stop Duration	s	57
Total Stop Duration	s	709
Stop Ratio in Urban	%	20.3

Motorway

	Unit	Value
Maximum Speed	km/h	129.6
Duration (> 100 km/h)	min:s	12:42
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	-1.2
Altitude Diff. (GPS - MAP)	m	6.4
CPE Gain (Total Trip)	m/100km	634.1
CPE Gain (Urban)	m/100km	505.0

Cold Start

	Unit	Value
Total Stop Duration	s	5
Average Speed	km/h	31.9
Maximum Speed	km/h	46.7

Analyzer Check

	Drift Check		Span Check		
	Zero	Span	99th x0.9	Max. Meas.	> Span
CO	Pass	Pass	580.7 ppm	32392.6 ppm	0.0 %
CO2	Pass	Pass	133318.0 ppm	149766.9 ppm	0.0 %
NOx	Pass	Pass	81.6 ppm	532.2 ppm	0.0 %
NO	—	—	83.9 ppm	541.9 ppm	0.0 %
THC	—	—	—	—	—
CH4	—	—	—	—	—

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	58:05	26:01	15:00
Distance	km	27.2	32.9	28.6
Dist. Share	%	30.7	37.1	32.2
Ave. Speed	km/h	28.1	75.8	114.3

Total Duration	min:s	99:06

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1081	391	221
v*apos_[95]	m2/s3	14.814	16.250	16.612
RPA	m/s2	0.212	0.092	0.061

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	92.1

Final Emission

		w/o Ki		w/ Ki	
	Unit	Urban	Total Trip	Urban	Total Trip
CO	mg/km	175.047	107.469	175.047	107.469
NOx	mg/km	18.026	7.255	18.026	7.255
PN	#/km	5.32E10	3.13E10	5.32E10	3.13E10

Green : Pass
Red : Fail

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Summary_ENG.TDR

Report ID : 20210201131050_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (1)

Test		Vehicle		Device	
Test ID	: 392	Vehicle Name	: ISSeP_Toyota_Corolla_I 6521	Cell Name	: OBS-ONE
Test Date	: 2021/02/01	Vehicle Category	: M1	Cell Description	:
Test Start	: 09:58:23	Vehicle Class	: —		
Test End	: 12:41:14	Vehicle Type	: ICE		
Driver	: MK	Fuel Type	: Gasoline		
Comment	: valid RDE	Description	: 6521		

Total Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	g	4.768	1.292	3.473	9.533
CO2	kg	4.883	4.360	4.511	13.75
NOx	g	0.4910	0.08740	0.06521	0.6436
NO	g	0.4919	0.09071	0.07206	0.6547
NO2	g	0.009287	0.002501	0.001108	0.01290
THC	g	—	—	—	—
CH4	g	—	—	—	—
NMHC	g	—	—	—	—
PN	#	1.45E12	5.47E11	7.77E11	2.77E12

Distance Specific Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	mg/km	175.0	39.29	121.5	107.5
CO2	g/km	179.3	132.6	157.8	155.1
NOx	mg/km	18.03	2.658	2.281	7.255
NO	mg/km	18.06	2.759	2.521	7.381
NO2	mg/km	0.3410	0.07608	0.03877	0.1454
THC	mg/km	—	—	—	—
CH4	mg/km	—	—	—	—
NMHC	mg/km	—	—	—	—
PN	#/km	5.32E10	1.66E10	2.72E10	3.13E10

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210201131050_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (2)

Test			Vehicle			Device		
Test ID	:	392	Vehicle Name	:	I83eP_Toyota_Corolla_ 6521	Cell Name	:	OBS-ONE
Test Date	:	2021/02/01	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	09:58:23	Vehicle Class	:	—			
Test End	:	12:41:14	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	6521			

Evaluation Factor

	Urban	Total Trip
rk	1.13	1.09
ICk	—	—
RFk	1.00	1.00

Final Emission

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	175.047	107.469	—
CO2	g/km	179.293	155.068	—
NOx	mg/km	18.026	7.255	126.00
NO	mg/km	18.062	7.381	—
NO2	mg/km	0.341	0.145	—
THC	mg/km	—	—	—
CH4	mg/km	—	—	—
NMHC	mg/km	—	—	—
PN	#/km	5.32E10	3.13E10	9.00E11

Final Emission (w/ Ki)

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	175.047	107.469	—
NOx	mg/km	18.026	7.255	126.00
PN	#/km	5.32E10	3.13E10	9.00E11

Judge Pass : Green Fail : Red

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210201131050_A

Toyota Corolla 1501

HORIBA
Automotive Test Systems

EU-LDV 4th

RDE Summary Report

Test

Test ID	:	395
Test Date	:	2021/02/04
Test Start	:	09:18:58
Test End	:	11:55:12
Driver	:	MK
Comment	:	valid RDE

Vehicle

Vehicle Name	:	I8SeP_Toyota_Corolla_ 1501
Vehicle Category	:	M1
Vehicle Class	:	—
Vehicle Type	:	ICE
Fuel Type	:	Gasoline
Description	:	1501

Device

Cell Name	:	OBS-ONE
Cell Description	:	

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	278.2	Moderate
Min. Temp.	degC	6.9	Moderate
Max. Temp.	degC	13.0	

[ ] : Extended

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.7
GPS Invalid Longest Time	s	1
GPS Invalid Total Time	s	2

Stop

	Unit	Value
First Idling Duration	s	4
Longest Stop Duration	s	66
Total Stop Duration	s	567
Stop Ratio in Urban	%	17.1

Motorway

	Unit	Value
Maximum Speed	km/h	133.7
Duration (> 100 km/h)	min:s	13:14
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	4.4
Altitude Diff. (GPS - MAP)	m	2.8
CPE Gain (Total Trip)	m/100km	627.9
CPE Gain (Urban)	m/100km	513.8

Cold Start

	Unit	Value
Total Stop Duration	s	4
Average Speed	km/h	31.5
Maximum Speed	km/h	47.8

Analyzer Check

	Drift Check		Span Check		
	Zero	Span	99th x0.9	Max. Meas.	> Span
CO	Pass	Pass	1086.3 ppm	26982.1 ppm	0.0 %
CO2	Pass	Pass	133244.5 ppm	151199.2 ppm	0.0 %
NOx	Pass	Pass	97.8 ppm	738.2 ppm	0.0 %
NO	—	—	99.8 ppm	744.0 ppm	0.0 %
THC	—	—	—	—	—
CH4	—	—	—	—	—

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	55:09	26:57	14:35
Distance	km	26.8	33.7	28.3
Dist. Share	%	30.2	38.0	31.9
Ave. Speed	km/h	29.1	75.0	116.3

Total Duration	min:s	96:41

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1067	426	225
v*apos_[95]	m2/s3	14.142	16.436	15.224
RPA	m/s2	0.214	0.086	0.058

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	100.0

Final Emission

		w/o Ki		w/ Ki	
	Unit	Urban	Total Trip	Urban	Total Trip
CO	mg/km	169.676	119.936	169.676	119.936
NOx	mg/km	21.138	10.052	21.138	10.052
PN	#/km	6.75E10	3.95E10	6.75E10	3.95E10

Green : Pass
Red : Fail

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Summary_ENG.TDR
Report ID : 20210205093153_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (1)

Test			Vehicle			Device		
Test ID	:	395	Vehicle Name	:	I83eP_Toyota_Corolla_ 1501	Cell Name	:	OBS-ONE
Test Date	:	2021/02/04	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	09:18:58	Vehicle Class	:	—			
Test End	:	11:55:12	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	1501			

Total Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	g	4.539	1.796	4.304	10.64
CO2	kg	4.618	3.937	4.448	13.00
NOx	g	0.5654	0.1111	0.2151	0.8916
NO	g	0.5729	0.1272	0.2378	0.9379
NO2	g	0.01012	0.002206	0.001218	0.01355
THC	g	—	—	—	—
CH4	g	—	—	—	—
NMHC	g	—	—	—	—
PN	#	1.80E12	8.71E11	8.30E11	3.51E12

Distance Specific Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	mg/km	169.7	53.30	152.3	119.9
CO2	g/km	172.6	116.8	157.4	146.6
NOx	mg/km	21.14	3.296	7.612	10.05
NO	mg/km	21.42	3.774	8.414	10.57
NO2	mg/km	0.3785	0.06548	0.04309	0.1527
THC	mg/km	—	—	—	—
CH4	mg/km	—	—	—	—
NMHC	mg/km	—	—	—	—
PN	#/km	6.75E10	2.58E10	2.94E10	3.95E10

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210205093153_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (2)

Test			Vehicle			Device		
Test ID	:	395	Vehicle Name	:	I83eP_Toyota_Corolla_011501	Cell Name	:	OBS-ONE
Test Date	:	2021/02/04	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	09:18:58	Vehicle Class	:	—			
Test End	:	11:55:12	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	SB1KA3BEX0E011501			

Evaluation Factor

	Urban	Total Trip
rk	1.09	1.03
ICk	—	—
RFk	1.00	1.00

Final Emission

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	169.676	119.936	—
CO2	g/km	172.617	146.576	—
NOx	mg/km	21.138	10.052	126.00
NO	mg/km	21.418	10.573	—
NO2	mg/km	0.378	0.153	—
THC	mg/km	—	—	—
CH4	mg/km	—	—	—
NMHC	mg/km	—	—	—
PN	#/km	6.75E10	3.95E10	9.00E11

Final Emission (w/ Ki)

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	169.676	119.936	—
NOx	mg/km	21.138	10.052	126.00
PN	#/km	6.75E10	3.95E10	9.00E11

Judge Pass : Green Fail : Red

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210205093153_A

Toyota Corolla 7243

HORIBA
Automotive Test Systems

EU-LDV 4th

RDE Summary Report

Test		Vehicle		Device	
Test ID	: 399	Vehicle Name	: I83eP_Toyota_Corolla_ 7243	Cell Name	: OBS-ONE
Test Date	: 2021/02/16	Vehicle Category	: M1	Cell Description	:
Test Start	: 09:17:54	Vehicle Class	: —		
Test End	: 11:38:21	Vehicle Type	: ICE		
Driver	: MK	Fuel Type	: Gasoline		
Comment	: valid RDE	Description	: 7243		

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	277.8	Moderate
Min. Temp.	degC	3.4	Moderate
Max. Temp.	degC	12.5	

[ ] : Extended

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.1
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Stop

	Unit	Value
First Idling Duration	s	4
Longest Stop Duration	s	56
Total Stop Duration	s	563
Stop Ratio in Urban	%	16.4

Motorway

	Unit	Value
Maximum Speed	km/h	145.2
Duration (> 100 km/h)	min:s	13:06
Duration Share (> 145 km/h)	%	0.2

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	-10.6
Altitude Diff. (GPS - MAP)	m	16.1
CPE Gain (Total Trip)	m/100km	637.1
CPE Gain (Urban)	m/100km	464.6

Cold Start

	Unit	Value
Total Stop Duration	s	4
Average Speed	km/h	28.9
Maximum Speed	km/h	44.8

Analyzer Check

	Drift Check		Span Check		
	Zero	Span	99th x0.9	Max. Meas.	> Span
CO	Pass	Pass	828.6 ppm	17004.3 ppm	0.0 %
CO2	Pass	Pass	133862.3 ppm	152262.1 ppm	0.0 %
NOx	Pass	Pass	87.5 ppm	559.5 ppm	0.0 %
NO	—	—	87.3 ppm	569.8 ppm	0.0 %
THC	—	—	—	—	—
CH4	—	—	—	—	—

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	57:10	24:38	15:19
Distance	km	28.3	30.0	30.4
Dist. Share	%	31.9	33.8	34.3
Ave. Speed	km/h	29.7	73.0	119.2

Total Duration	min:s	97:07

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1047	426	227
v*apos_[95]	m2/s3	13.403	17.232	15.456
RPA	m/s2	0.183	0.094	0.059

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	88.1

Final Emission

	Unit	w/o Ki		w/ Ki	
		Urban	Total Trip	Urban	Total Trip
CO	mg/km	116.033	105.484	116.033	105.484
NOx	mg/km	19.345	8.564	19.345	8.564
PN	#/km	5.83E10	3.64E10	5.83E10	3.64E10

Green : Pass
Red : Fail

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Summary_ENG.TDR

Report ID : 20210216122831_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (1)

Test			Vehicle			Device		
Test ID	:	399	Vehicle Name	:	I83eP_Toyota_Corolla_ 7243	Cell Name	:	OBS-ONE
Test Date	:	2021/02/16	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	09:17:54	Vehicle Class	:	—			
Test End	:	11:38:21	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	7243			

Total Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	g	3.282	1.231	4.841	9.354
CO2	kg	4.501	3.568	5.253	13.32
NOx	g	0.5472	0.1047	0.1074	0.7594
NO	g	0.5496	0.1160	0.1359	0.8015
NO2	g	0.01369	0.003289	0.001018	0.01799
THC	g	—	—	—	—
CH4	g	—	—	—	—
NMHC	g	—	—	—	—
PN	#	1.65E12	6.94E11	8.86E11	3.23E12

Distance Specific Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	mg/km	116.0	41.07	159.1	105.5
CO2	g/km	159.1	119.1	172.7	150.2
NOx	mg/km	19.35	3.496	3.531	8.564
NO	mg/km	19.43	3.873	4.466	9.038
NO2	mg/km	0.4839	0.1098	0.03345	0.2029
THC	mg/km	—	—	—	—
CH4	mg/km	—	—	—	—
NMHC	mg/km	—	—	—	—
PN	#/km	5.83E10	2.32E10	2.91E10	3.64E10

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210216122831_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (2)

Test			Vehicle			Device		
Test ID	:	399	Vehicle Name	:	I8SeP_Toyota_Corolla_ 7243	Cell Name	:	OBS-ONE
Test Date	:	2021/02/16	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	09:17:54	Vehicle Class	:	—			
Test End	:	11:38:21	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	7243			

Evaluation Factor

	Urban	Total Trip
rk	1.01	1.06
ICk	—	—
RFk	1.00	1.00

Final Emission

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	116.033	105.484	—
CO2	g/km	150.114	150.247	—
NOx	mg/km	19.345	8.564	126.00
NO	mg/km	19.427	9.038	—
NO2	mg/km	0.484	0.203	—
THC	mg/km	—	—	—
CH4	mg/km	—	—	—
NMHC	mg/km	—	—	—
PN	#/km	5.83E10	3.64E10	9.00E11

Final Emission (w/ Ki)

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	116.033	105.484	—
NOx	mg/km	19.345	8.564	126.00
PN	#/km	5.83E10	3.64E10	9.00E11

Judge Pass : Green Fail : Red

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210216122831_A

Toyota Yaris 2856

HORIBA
Automotive Test Systems

EU-LDV 4th

RDE Summary Report

Test		Vehicle		Device	
Test ID	: 396	Vehicle Name	: I83eP_Toyota_Yaris_ 2856	Cell Name	: OBS-ONE
Test Date	: 2021/02/11	Vehicle Category	: M1	Cell Description	:
Test Start	: 13:09:55	Vehicle Class	: —		
Test End	: 15:49:23	Vehicle Type	: ICE		
Driver	: MK	Fuel Type	: Gasoline		
Comment	: valid RDE	Description	: 2856		

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	278.1	Moderate
Min. Temp.	degC	[-1.9]	Extended
Max. Temp.	degC	6.8	

[ ] : Extended

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.8
GPS Invalid Longest Time	s	1
GPS Invalid Total Time	s	1

Stop

	Unit	Value
First Idling Duration	s	3
Longest Stop Duration	s	54
Total Stop Duration	s	591
Stop Ratio in Urban	%	17.3

Motorway

	Unit	Value
Maximum Speed	km/h	138.3
Duration (> 100 km/h)	min:s	12:24
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	-3.5
Altitude Diff. (GPS - MAP)	m	7.7
CPE Gain (Total Trip)	m/100km	639.2
CPE Gain (Urban)	m/100km	530.8

Cold Start

	Unit	Value
Total Stop Duration	s	10
Average Speed	km/h	25.4
Maximum Speed	km/h	45.8

Analyzer Check

	Drift Check		Span Check		
	Zero	Span	99th x0.9	Max. Meas.	> Span
CO	Pass	Pass	1485.5 ppm	73533.9 ppm	0.1 %
CO2	Pass	Pass	134987.1 ppm	156719.3 ppm	0.0 %
NOx	Pass	Pass	23.6 ppm	403.7 ppm	0.0 %
NO	—	—	24.7 ppm	420.2 ppm	0.0 %
THC	—	—	—	—	—
CH4	—	—	—	—	—

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	56:56	26:17	15:11
Distance	km	26.3	33.0	29.5
Dist. Share	%	29.6	37.2	33.2
Ave. Speed	km/h	27.7	75.2	116.5

	Unit	
Total Duration	min:s	98:24

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1074	444	216
v*apos_[95]	m2/s3	13.137	14.388	16.461
RPA	m/s2	0.200	0.091	0.053

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	100.0

Final Emission

		w/o Ki		w/ Ki	
	Unit	Urban	Total Trip	Urban	Total Trip
CO	mg/km	195.602	160.392	195.602	160.392
NOx	mg/km	5.826	2.795	5.826	2.795
PN	#/km	2.82E11	1.37E11	2.82E11	1.37E11

Green : Pass
Red : Fail

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Summary_ENG.TDR
Report ID : 20210223154048_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (1)

Test			Vehicle			Device		
Test ID	:	396	Vehicle Name	:	I88eP_Toyota_Yaris_ 2856	Cell Name	:	OBS-ONE
Test Date	:	2021/02/11	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	13:09:55	Vehicle Class	:	—			
Test End	:	15:49:23	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	2856			

Total Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	g	5.136	1.619	7.469	14.22
CO2	kg	3.991	3.644	4.147	11.78
NOx	g	0.1530	0.02956	0.06533	0.2478
NO	g	0.1520	0.03195	0.06821	0.2522
NO2	g	0.005835	0.001258	0.001453	0.008546
THC	g	—	—	—	—
CH4	g	—	—	—	—
NMHC	g	—	—	—	—
PN	#	7.40E12	3.34E12	1.44E12	1.22E13

Distance Specific Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	mg/km	195.6	49.13	253.4	160.4
CO2	g/km	152.0	110.6	140.7	132.9
NOx	mg/km	5.826	0.8971	2.216	2.795
NO	mg/km	5.791	0.9696	2.314	2.844
NO2	mg/km	0.2222	0.03819	0.04930	0.09637
THC	mg/km	—	—	—	—
CH4	mg/km	—	—	—	—
NMHC	mg/km	—	—	—	—
PN	#/km	2.82E11	1.01E11	4.90E10	1.37E11

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210223154048_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (2)

Test			Vehicle			Device		
Test ID	:	396	Vehicle Name	:	I8SeP_Toyota_Yaris_ 2856	Cell Name	:	OBS-ONE
Test Date	:	2021/02/11	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	13:09:55	Vehicle Class	:	—			
Test End	:	15:49:23	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	2856			

Evaluation Factor

	Urban	Total Trip
rk	1.01	0.98
ICk	—	—
RFk	1.00	1.00

Final Emission

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	195.602	160.392	—
CO2	g/km	152.017	132.860	—
NOx	mg/km	5.826	2.795	126.00
NO	mg/km	5.791	2.844	—
NO2	mg/km	0.222	0.096	—
THC	mg/km	—	—	—
CH4	mg/km	—	—	—
NMHC	mg/km	—	—	—
PN	#/km	2.82E11	1.37E11	9.00E11

Final Emission (w/ Ki)

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	195.602	160.392	—
NOx	mg/km	5.826	2.795	126.00
PN	#/km	2.82E11	1.37E11	9.00E11

Judge Pass : Green Fail : Red

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210223154048_A

Toyota Yaris 2889

HORIBA
Automotive Test Systems

EU-LDV 4th

RDE Summary Report

Test			Vehicle			Device		
Test ID	:	406	Vehicle Name	:	ISSeP_Toyota_Yaris_ 2889	Cell Name	:	OBS-ONE
Test Date	:	2021/02/22	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	10:57:41	Vehicle Class	:	—			
Test End	:	13:25:20	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	2889			

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	277.0	Moderate
Min. Temp.	degC	7.4	Moderate
Max. Temp.	degC	16.0	

[ ] : Extended

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.8
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Stop

	Unit	Value
First Idling Duration	s	4
Longest Stop Duration	s	95
Total Stop Duration	s	760
Stop Ratio in Urban	%	20.5

Motorway

	Unit	Value
Maximum Speed	km/h	135.4
Duration (> 100 km/h)	min:s	12:19
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	-0.3
Altitude Diff. (GPS - MAP)	m	3.2
CPE Gain (Total Trip)	m/100km	628.5
CPE Gain (Urban)	m/100km	464.3

Cold Start

	Unit	Value
Total Stop Duration	s	4
Average Speed	km/h	29.9
Maximum Speed	km/h	47.2

Analyzer Check

	Drift Check		Span Check		
	Zero	Span	99th x0.9	Max. Meas.	> Span
CO	Pass	Pass	1407.7 ppm	46889.5 ppm	0.0 %
CO2	Pass	Pass	132528.3 ppm	153871.5 ppm	0.0 %
NOx	Pass	Pass	34.9 ppm	1359.6 ppm	0.0 %
NO	—	—	35.1 ppm	1416.0 ppm	0.0 %
THC	—	—	—	—	—
CH4	—	—	—	—	—

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	61:43	24:59	15:55
Distance	km	27.6	31.0	30.1
Dist. Share	%	31.2	34.9	33.9
Ave. Speed	km/h	26.9	74.4	113.3

	Unit	
Total Duration	min:s	102:37

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1212	438	288
v*apos_[95]	m2/s3	12.235	14.816	16.804
RPA	m/s2	0.220	0.091	0.079

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	94.1

Final Emission

		w/o Ki		w/ Ki	
	Unit	Urban	Total Trip	Urban	Total Trip
CO	mg/km	177.740	254.043	177.740	254.043
NOx	mg/km	10.927	7.182	10.927	7.182
PN	#/km	4.16E11	1.73E11	4.16E11	1.73E11

Green : Pass
Red : Fail

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Summary_ENG.TDR

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HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (1)

Test		Vehicle		Device	
Test ID	: 406	Vehicle Name	: I3SeP_Toyota_Yaris_ 2889	Cell Name	: OBS-ONE
Test Date	: 2021/02/22	Vehicle Category	: M1	Cell Description	:
Test Start	: 10:57:41	Vehicle Class	: —		
Test End	: 13:25:20	Vehicle Type	: ICE		
Driver	: MK	Fuel Type	: Gasoline		
Comment	: valid RDE	Description	: 2889		

Total Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	g	4.909	2.454	15.21	22.58
CO2	kg	4.250	3.180	4.103	11.54
NOx	g	0.3018	0.04983	0.2851	0.6367
NO	g	0.3013	0.04778	0.2804	0.6295
NO2	g	0.01093	0.004547	0.007918	0.02339
THC	g	—	—	—	—
CH4	g	—	—	—	—
NMHC	g	—	—	—	—
PN	#	1.15E13	2.15E12	1.65E12	1.53E13

Distance Specific Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	mg/km	177.7	79.20	506.1	254.6
CO2	g/km	154.2	102.6	136.5	130.2
NOx	mg/km	10.93	1.608	9.486	7.182
NO	mg/km	10.91	1.542	9.328	7.100
NO2	mg/km	0.3956	0.1468	0.2634	0.2638
THC	mg/km	—	—	—	—
CH4	mg/km	—	—	—	—
NMHC	mg/km	—	—	—	—
PN	#/km	4.16E11	6.94E10	5.48E10	1.73E11

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210223153034_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (2)

Test			Vehicle			Device		
Test ID	:	406	Vehicle Name	:	I3SeP_Toyota_Yaris_ 2889	Cell Name	:	OBS-ONE
Test Date	:	2021/02/22	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	10:57:41	Vehicle Class	:	—			
Test End	:	13:25:20	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	2889			

Evaluation Factor

	Urban	Total Trip
rk	1.03	0.96
ICk	—	—
RFk	1.00	1.00

Final Emission

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	177.740	254.643	—
CO2	g/km	154.197	130.175	—
NOx	mg/km	10.927	7.182	126.00
NO	mg/km	10.911	7.100	—
NO2	mg/km	0.396	0.264	—
THC	mg/km	—	—	—
CH4	mg/km	—	—	—
NMHC	mg/km	—	—	—
PN	#/km	4.16E11	1.73E11	9.00E11

Final Emission (w/ Ki)

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	177.740	254.643	—
NOx	mg/km	10.927	7.182	126.00
PN	#/km	4.16E11	1.73E11	9.00E11

Judge Pass : Green Fail : Red

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210223153034_A

Toyota Yaris 2745

HORIBA
Automotive Test Systems

EU-LDV 4th

RDE Summary Report

Test		Vehicle		Device	
Test ID	: 412	Vehicle Name	: IBSeP_Toyota_Yaris_ 9745	Cell Name	: OBS-ONE
Test Date	: 2021/03/02	Vehicle Category	: M1	Cell Description	:
Test Start	: 09:25:27	Vehicle Class	: —		
Test End	: 12:02:41	Vehicle Type	: ICE		
Driver	: MK	Fuel Type	: Gasoline		
Comment	: valid RDE	Description	: 9745		

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	279.8	Moderate
Min. Temp.	degC	7.3	Moderate
Max. Temp.	degC	16.1	

[ ] : Extended

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.8
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Stop

	Unit	Value
First Idling Duration	s	5
Longest Stop Duration	s	80
Total Stop Duration	s	664
Stop Ratio in Urban	%	17.9

Motorway

	Unit	Value
Maximum Speed	km/h	135.3
Duration (> 100 km/h)	min:s	12:21
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	-1.7
Altitude Diff. (GPS - MAP)	m	4.9
CPE Gain (Total Trip)	m/100km	644.0
CPE Gain (Urban)	m/100km	511.7

Cold Start

	Unit	Value
Total Stop Duration	s	7
Average Speed	km/h	29.1
Maximum Speed	km/h	45.0

Analyzer Check

	Drift Check		Span Check		
	Zero	Span	99th x0.9	Max. Meas.	> Span
CO	Pass	Pass	1978.2 ppm	39352.2 ppm	0.0 %
CO2	Pass	Pass	132898.5 ppm	151673.3 ppm	0.0 %
NOx	Pass	Pass	23.5 ppm	381.9 ppm	0.0 %
NO	—	—	23.9 ppm	404.8 ppm	0.0 %
THC	—	—	—	—	—
CH4	—	—	—	—	—

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	61:51	22:54	16:25
Distance	km	29.0	28.3	31.4
Dist. Share	%	32.7	31.9	35.4
Ave. Speed	km/h	28.1	74.1	114.8

	Unit	
Total Duration	min:s	101:10

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1206	399	310
v*apos_[95]	m2/s3	12.809	15.379	14.241
RPA	m/s2	0.199	0.102	0.078

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	100.0

Final Emission

		w/o Ki		w/ Ki	
	Unit	Urban	Total Trip	Urban	Total Trip
CO	mg/km	195.877	255.984	195.877	255.984
NOx	mg/km	6.427	4.147	6.427	4.147
PN	#/km	3.25E11	1.41E11	3.25E11	1.41E11

Green : Pass
Red : Fail

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Summary_ENG.TDR

Report ID : 20210303152750_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (1)

Test			Vehicle			Device		
Test ID	:	412	Vehicle Name	:	I8SeP_Toyota_Yaris_ 9745	Cell Name	:	OBS-ONE
Test Date	:	2021/03/02	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	09:25:27	Vehicle Class	:	—			
Test End	:	12:02:41	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	9745			

Total Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	g	5.680	2.443	14.57	22.70
CO2	kg	4.387	3.063	4.329	11.78
NOx	g	0.1864	0.03487	0.1464	0.3677
NO	g	0.1858	0.03168	0.1382	0.3557
NO2	g	0.007744	0.005013	0.009925	0.02268
THC	g	—	—	—	—
CH4	g	—	—	—	—
NMHC	g	—	—	—	—
PN	#	9.44E12	2.04E12	1.02E12	1.25E13

Distance Specific Mass

	Unit	Urban	Rural	Motorway	Total Trip
CO	mg/km	195.9	86.44	464.1	256.0
CO2	g/km	151.3	108.4	137.9	132.9
NOx	mg/km	6.427	1.234	4.664	4.147
NO	mg/km	6.408	1.121	4.402	4.012
NO2	mg/km	0.2670	0.1773	0.3161	0.2558
THC	mg/km	—	—	—	—
CH4	mg/km	—	—	—	—
NMHC	mg/km	—	—	—	—
PN	#/km	3.25E11	7.21E10	3.25E10	1.41E11

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210303152750_A

HORIBA
Automotive Test Systems

EU-LDV 4th

Final Emission Report (2)

Test			Vehicle			Device		
Test ID	:	412	Vehicle Name	:	IBSeP_Toyota_Yaris_ 9745	Cell Name	:	OBS-ONE
Test Date	:	2021/03/02	Vehicle Category	:	M1	Cell Description	:	
Test Start	:	09:25:27	Vehicle Class	:	—			
Test End	:	12:02:41	Vehicle Type	:	ICE			
Driver	:	MK	Fuel Type	:	Gasoline			
Comment	:	valid RDE	Description	:	9745			

Evaluation Factor

	Urban	Total Trip
rk	1.01	0.98
ICk	—	—
RFk	1.00	1.00

Final Emission

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	195.877	255.984	—
CO2	g/km	151.280	132.850	—
NOx	mg/km	6.427	4.147	126.00
NO	mg/km	6.408	4.012	—
NO2	mg/km	0.267	0.256	—
THC	mg/km	—	—	—
CH4	mg/km	—	—	—
NMHC	mg/km	—	—	—
PN	#/km	3.25E11	1.41E11	9.00E11

Final Emission (w/ Ki)

	Unit	Final Emission		NTE Pollutant
		Urban	Total Trip	
CO	mg/km	195.877	255.984	—
NOx	mg/km	6.427	4.147	126.00
PN	#/km	3.25E11	1.41E11	9.00E11

Judge Pass : Green Fail : Red

OBS-ONE Post Processing v3.1.1

Template ID : EU-LDV 4th Calculation_ENG.TDR

Report ID : 20210303152750_A

7 Lessons learned during the testing campaign

It results from the testing campaign that all vehicles comply with the regulation and are in good working order.

All measuring instruments work properly and are calibrated and standardised according to the manufacturer's requirements.

In order to be even more efficient and anticipate an issue as quickly as possible, it is recommendable to do the inspections on the vehicles as soon as they are delivered at the laboratory to be sure that they comply with the regulation and are suitable to ISC testing (km, maintenance, …).

8 General information

As presented at the beginning of the report, ISSeP is the environmental sentinel organized around 4 major pillars:

- Environment monitoring
- Risks and nuisances prevention
- Reference laboratory
- Research and development

Environmental metrology is of vital importance for understanding changes to the earth and its climate. The well-being and safety of future generations depends on the decisions made concerned environmental policies. To define the best actions, decision-makers, companies, and citizens must receive reliable and regular information. Thanks to its experience and efficiency in the environmental sector and in risk management, the ISSeP contributes to improving our environment.

It has a workforce of approx. 300 people distributed over two sites: Liège, where its head office is located, and Colfontaine.

ISSeP is the Walloon reference laboratory specialized in environmental monitoring (i.e. water, air, soil, sediments and waste) and risk assessment and prevention. ISSeP draws on the scientific expertise from various area of expertise, from field sampling, lab analysis, numerical modelling, geostatistical analysis to Earth observation.

Environmental monitoring activities rely on a 30-person team for samples collection and on 4 analytical laboratories in mineral chemistry, organic chemistry, microbiology and ecotoxicology. These monitoring activities cover ambient air quality network, 53 industrial facilities pollutants emissions control, the physicochemical, microbiological and ecotoxicological analysis of surface and groundwater as well as sediments, contaminated sites analysis and landfill sites monitoring.

Whilst ISSeP's missions were firstly confined to providing environmental characterization data, its missions now have evolved to run forecasts and assess accidental and chronic risks (i.e. asbestos, electromagnetic fields...). Our risk assessment studies tackle impact assessment on ecosystems, with for instance fish and invertebrates monitored in the BIOTE network, as well as human health exposure through biomonitoring projects and geostatistical approaches. ISSeP skills have also evolved, with for instance land use change monitoring by earth observation methods. ISSeP experts are also supporting the sectors in which waste is destined to become a resource.

These different missions are based on extensive scientific research which enables us to build our expertise in environmental characterisation as well as in risk assessment and management. We are currently involved in 52 research projects, 14 of which focus on the links between health and the environment - a hot topic especially in times of health crisis. Moreover, ISSeP is incorporating more and more citizen science projects. These are most likely to raise environmental awareness since participants will both benefit from and contribute to science education.

9 Report from HORIBA GmbH (24 pages)

	First name / Name	Profession	Signature
Author	M. MOTTA	Attaché analysis cell.	
Approval	G. ORTEGAT	Responsible for analysis cell.	
Authorisation	R. DETAILLE	Managing Director	

Signature numérique de Rose Detaille (Signature)
DN : c=BE, cn=Rose Detaille (Signature), sn=Detaille, givenName=Rose Georgette, serialNumber=69021405221
Date : 2021.03.30 20:28:21 +02'00'

HORIBA
Automotive

KBA
Benannter TD
KBA-P 00071-15

ISC-Test Report

(2021-03_002)

Customer:	**Institut Scientifique de Service Public (ISSeP)** 200, rue du Chera 4000 Liege Belgium
Technical Service:	**HORIBA Europe GmbH Testcenter** Hans-Mess-Straße 6 61440 Oberursel / Taunus Germany
Vehicle:	TOYOTA Corolla #6521 TOYOTA Corolla #1501 TOYOTA Corolla #7243 TOYOTA Yaris #2856 TOYOTA Yaris #2889 TOYOTA Yaris #9745

Date: 19.03.2021

Date / Signature (Authorized Signatory): _____

HORIBA Europe GmbH
Hans-Mess-Straße
61440 Oberursel
Deutschland

Contents

1 About HORIBA Technical Service

The HORIBA Europe GmbH Testcenter in 61440 Oberursel is designated as technical service category A, B and D by the Kraftfahrt-Bundesamt (KBA) and complies with EN ISO/IEC 17025:2017 and EN ISO/IEC 17020:2012. The designation is valid from 19th December 2015.

Registration number: KBA-P 00071-15

The catalogue of designated and recognized testing methods contains emission measurement complying to Regulation (EC) 715/2007, Regulation (EC) 2018/1832 including Regulation (EC) 692/2008, UN-R 83 Series 07 (Spark-ignition engine), UN-R 101 Series 01, UN-R 83 Series 07 (Compression-ignition engine) and fuel consumption measurement complying to UN-R 84.

2 Summary / Lessons learned

During the measurement campaign six vehicles from the manufacturer TOYOTA (Corolla Gasoline and Yaris Gasoline) have been tested within the scope of In-Service Conformity. Detailed descriptions of the vehicles are summarized in Table 1 List of vehicles.

During the test period all vehicles performed a valid Type 1 (WLTP) as well as a valid Type 1A (RDE) test according to ISC regulations.

The tested vehicles have fulfilled all requirements to an In-Service Conformity test and the final emission results were below the Not-to-exceed limits given by ISC regulation.

Detailed description of the scope of testing as well as a summarization of the final results can be found on the following pages.

3 Scope of testing

3.1 Vehicle sample

The measurement included six vehicles. Three of them were TOYOTA Corolla and three of them were TOYOTA Yaris. All the vehicle models in this measurement were Euro 6/DG vehicles and were selected as well as sourced by MOW. The vehicles of this service request are presented in Table 1 and Figure 1.

Table 1: List of vehicles

Make	Model	Engine	Fuel	Hybrid	Country
TOYOTA	Corolla	1197 cc	Petrol	No	Germany
TOYOTA	Corolla	1197 cc	Petrol	No	Germany
TOYOTA	Corolla	1197 cc	Petrol	No	Germany
TOYOTA	Yaris	1496 cc	Petrol	No	Germany

TOYOTA	Yaris	1496 cc	Petrol	No	Germany
TOYOTA	Yaris	1496 cc	Petrol	No	Germany

Figure 1: TOYOTA Corolla tested vehicles

Detailed specifications of the vehicle (as given in the EC Certificate of Conformity) are presented in Table 2.

Table 2: Detailed vehicle data.

Model	TOYOTA Corolla	TOYOTA Corolla	TOYOTA Corolla
VIN	6521	1501	7243
Vehicle category	M1	M1	M1
PEMS family code	6-JT1-22-0	6-JT1-22-0	6-JT1-22-0
PCM cal id	896630ZK1000 896650221000	896630ZK1000 896650221000	896630ZK1000 896650221000
Max. Power	85kW at 5200 - 5600 min^{-1}	85kW at 5200 - 5600 min^{-1}	85kW at 5200 - 5600 min^{-1}
Displacement	1197 cc	1197 cc	1197 cc
Fuel type	Petrol	Petrol	Petrol
Bodywork	Hatchback	Hatchback	Hatchback
Doors	5	5	5
Transmission	Manual	Manual	Manual
Gears	6 Gears	6 Gears	6 Gears
Tyre weather type	Winter	Winter	Winter

Tyre make	BFGoodrich	Falken	BFGoodrich
Tyre model	g-Grip All Season	Euroall Season AS210	g-Grip All Season
Tyre width	Front: 205/55 R16 Rear: 205/55 R16	Front: 205/55 R16 Rear: 205/55 R16	Front: 205/55 R16 Rear: 205/55 R16
Tyre depth	6.0mm/7.0mm	6.0mm/7.0mm	6.0mm/7.0mm
Tyre test pressure	2.5bar/2.4bar	2.5bar/2.4bar	2.5bar/2.4bar
Official low CO2	183g/km	183g/km	183g/km
Official medium CO2	142g/km	142g/km	142g/km
Official high CO2	123g/km	123g/km	123g/km
Official extra high CO2	144g/km	144g/km	144g/km
Official combined CO2	142g/km	142g/km	142g/km
Maximum laden mass	1820kg	1820kg	1820kg
Official mass in running order	1315kg	1315kg	1315kg
Weight with PEMS	1548kg	1550kg	1550kg
Mileage	19074km	23072km	15448km
Date of first registration	29/11/2019	12/12/2019	27/11/2019
Emission standard	Euro 6/DG	Euro 6/DG	Euro 6/DG
Country of registration	Germany	Germany	Germany
Engine code	8NR	8NR	8NR
Drive axle	FWD	FWD	FWD
Wheelbase	2640mm	2640mm	2640mm
Injection	Direct injection	Direct injection	Direct injection
Turbo Charged	Yes	Yes	Yes
EGR	Yes	Yes	Yes
Particulate Filter	GPF	GPF	GPF
Catalyst	3-way-catalyst	3-way-catalyst	3-way-catalyst

Figure 2: TOYOTA Yaris tested vehicles

Detailed specifications of the vehicle (as given in the EC Certificate of Conformity) are presented in Table 3.

Table 3: Detailed vehicle data.

Model	TOYOTA Yaris	TOYOTA Yaris	TOYOTA Yaris
VIN	2856	2889	9745
Vehicle category	M1	M1	M1
PEMS family code	6-JT1-35-0	6-JT1-35-0	6-JT1-35-0
PCM cal id	30DX1100 A0202000	30DX1100 A0202000	30DX1100 A0202000
Max. Power	82kW at 6000 min^{-1}	82kW at 6000 min^{-1}	82kW at 6000 min^{-1}
Displacement	1496 cc	1496 cc	1496 cc
Fuel type	Petrol	Petrol	Petrol
Bodywork	Hatchback	Hatchback	Hatchback
Doors	5	5	5
Transmission	Manual	Manual	Manual
Gears	6 Gears	6 Gears	6 Gears
Tyre weather type	Winter	Winter	Winter
Tyre make	Goodyear	Goodyear	Goodyear
Tyre model	Vector 4 Seasons	Vector 4 Seasons	Vector 4 Seasons
Tyre width	Front: 175/65 R15 Rear: 175/65 R15	Front: 175/65 R15 Rear: 175/65 R15	Front: 175/65 R15 Rear: 175/65 R15
Tyre depth	7.0mm/8.0mm	6.5mm/7.5mm	7.0mm/7.5mm

Tyre test pressure	2.3bar/2.2bar	2.3bar/2.2bar	2.3bar/2.2bar
Official low CO2	178g/km	178g/km	178g/km
Official medium CO2	132g/km	132g/km	132g/km
Official high CO2	118g/km	118g/km	118g/km
Official extra high CO2	138g/km	138g/km	138g/km
Official combined CO2	136g/km	136g/km	136g/km
Maximum laden mass	1545kg	1545kg	1545kg
Official mass in running order	1120kg	1120kg	1120kg
Weight with PEMS	1262kg	1272kg	1266kg
Mileage	16585km	25837km	15051km
Date of first registration	18/05/2020	18/05/2020	18/05/2020
Emission standard	Euro 6/DG	Euro 6/DG	Euro 6/DG
Country of registration	Germany	Germany	Germany
Engine code	2NR	2NR	2NR
Drive axle	FWD	FWD	FWD
Wheelbase	2510mm	2510mm	2510mm
Injection	manifold injection	manifold injection	manifold injection
Turbo Charged	No	No	No
EGR	Yes	Yes	Yes
Particulate Filter	No	No	No
Catalyst	3-way-catalyst	3-way-catalyst	3-way-catalyst

3.2 Description of the measurement campaign

The measurement concerned the evaluation of emissions performance of the vehicle mentioned above. The service request included the following tasks performed for this vehicle:

- Vehicle inspection before testing
- Vehicle Owner interview
- WLTC (Type 1) on chassis-dyno

- PEMS installation in the vehicle
- PEMS validation
- RDE testing (Type 1A)

3.2.1 Vehicle inspection

Before starting the emission measurement tests, the vehicle was inspected for damages, modifications, other incompliances and was checked for being in good running order. The exact vehicle inspection checklist which is taken from RDE Regulation 2018/1832 is presented in Table 4.

Table 4: Vehicle inspection checklist.

• Aerodynamic modifications • Fuel tank level • Warning lights activated • SCR light activated • Next scheduled maintenance • Fluid levels • Drive belt and cooler cover • Air filter and oil contamination • Ignition cables	• Injection valves/cabling • Vacuum hoses and electrical wiring • Exhaust system • Exhaust system components • EGR, Catalyst, Particle Filter • Wheels • Fuel Sample • Safety conditions • Semi-trailer • OBD error checks

The results of each check were documented with photos and/or relevant documentation. Additionally a fuel- and oil- sample was collected and stored.

3.2.2 Vehicle owner interview

The physical owner of each vehicle was interviewed in order to understand the past usage of the vehicle under testing. The questions are taken from RDE Regulation 2018/1832.

3.2.3 PEMS installation in the vehicle

A complete Horiba OBS-ONE PEMS was properly installed in the tested vehicle. The equipment included NDIR gas analyzers which measured CO and CO_2, heated CLD gas analyzers which measured NO and NO_x and a CPC counter which measured PN. Altitude, velocity and location coordinates were measured using an on-board GPS device, whereas ambient temperature, humidity and pressure, along with tailpipe exhaust gas temperature, were measured using respective sensors. In addition, various engine-related signals were recorded from the On-Board Diagnostics (OBD) port. The total exhaust flow was measured with a pitot EFM installed and properly sealed at the exhaust tailpipe of the vehicle. A lead gel battery was used to power all devices.

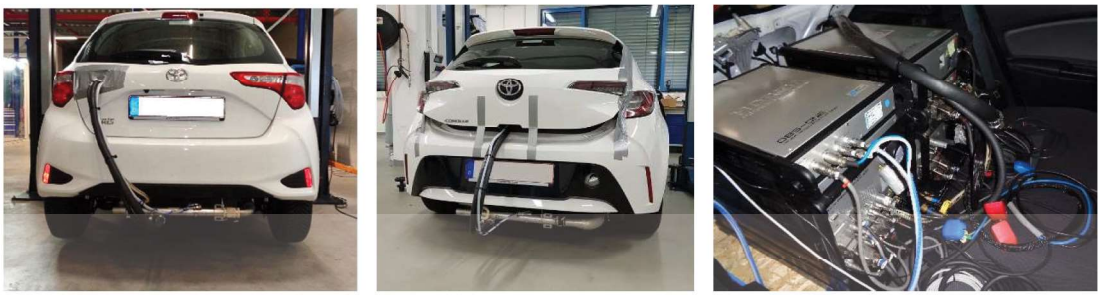

Figure 3: PEMS installation on the tested vehicles

All equipment and devices were installed on the vehicle following the prescriptions of the relevant RDE Regulations (2017/1151, 2017/1154 and 2018/1832). The installation of the PEMS equipment was done in a way to influence the vehicle emissions and performance to the minimum extent possible. Care was exercised on potential aerodynamic modifications of the test vehicle.

3.2.4 Testing schedule

The vehicles were fueled with reference fuel and the tire pressure was adjusted for the road load adjustment and the preconditioning for the WLTC emission test on chassis-dyno. After a soaking time of at least 6 hours the WLTC emission test was performed.

Subsequently the vehicles were fueled with market fuel for the RDE emission testing, and they were weighted on a weight bridge after the PEMS installation. Then an initial test was conducted with each vehicle while casually driving it for about half an hour. After that initial test, a quick check was conducted to ensure that the PEMS installation is safe and rigid, and that the PEMS is functioning without any errors/warnings.

Then, the cold start RDE test was conducted on the *RDE Oberursel route* following the prescriptions of the RDE regulation. Firstly, the vehicles were parked on a safe location to soak for a duration between 8-15 hours. After the soaking duration, the PEMS devices were started and warmed up for at least one hour. Then the gas analyzer system was checked for leaks with a vacuum leak check. After this, the gas analyzers of the PEMS were calibrated with zero and span bottled gases and the PN counter was checked for zero response. After the calibration sequence finished, the cold start RDE test started. After finishing the test, the vehicles were returned to the park location and a zero and span check and also a PN zero response check was done. In case one of the tests conducted is considered invalid, according to the RDE regulation, the whole testing sequence is repeated. The actual testing schedule of the measurement campaign, including the valid test and its test name is presented in Table 5.

After checking the results for validity, the PEMS was disassembled out of the vehicles.

Table 5: Testing schedule of the experimental campaign

Date	Test	Vehicle	Test name
28/01/2021	WLTC on Chassis-Dyno (Type 1)	TOYOTA Corolla 6521	H1_210128_004
01/02/2021	RDE compliant test (Type 1A)	TOYOTA Corolla 6521	PEMSTest_20210201_085823_392
01/02/2021	PEMS validation test	TOYOTA Corolla 6521	H1_210201_005 PEMSTest_20210201_124224_393
03/02/2021	WLTC on Chassis-Dyno (Type 1)	TOYOTA Corolla 1501	H1_210203_003
03/02/2021	PEMS validation test	TOYOTA Corolla 1501	H1_210203_006 PEMSTest_20210203_151920_394
04/02/2021	RDE compliant test (Type 1A)	TOYOTA Corolla 1501	PEMSTest_20210204_081858_395
09/02/2021	WLTC on Chassis-Dyno (Type 1)	TOYOTA Yaris 2856	H1_210209_003
09/02/2021	WLTC on Chassis-Dyno (Type 1)	TOYOTA Corolla 7243	H1_210209_004
11/02/2021	WLTC on Chassis-Dyno (Type 1)	TOYOTA Yaris 2889	H1_210211_004
11/02/2021	RDE compliant test (Type 1A)	TOYOTA Yaris 2856	PEMSTest_20210211_120955_396
12/02/2021	PEMS validation test	TOYOTA Yaris 2856	H1_210212_008 PEMSTest_20210212_081847_397
15/02/2021	PEMS validation test	TOYOTA Corolla 7243	H1_210215_004 PEMSTest_20210215_141804_398
16/02/2021	RDE compliant test (Type 1A)	TOYOTA Corolla 7243	PEMSTest_20210216_081754_399
22/02/2021	RDE compliant test (Type 1A)	TOYOTA Yaris 2889	PEMSTest_20210222_095741_406
22/02/2021	PEMS validation test	TOYOTA Yaris 2889	H1_210222_002 PEMSTest_20210222_144720_407
25/02/2021	WLTC on Chassis-Dyno (Type 1)	TOYOTA Yaris 9745	H1_210225_003
26/02/2021	PEMS validation test	TOYOTA Yaris 9745	H1_210226_004 PEMSTest_20210226_114945_410
02/03/2021	RDE compliant test (Type 1A)	TOYOTA Yaris 9745	PEMSTest_20210302_082527_412

4 Summary of Results

Following the inspections conducted on the measured vehicle, the vehicle was found in good condition and with all its components undamaged and unmodified. Photos and relevant documents of the inspection procedure as well as the results of the inspection have been delivered to the customer.

4.1 WLTC on Chassis-Dyno (Type 1)

4.1.1 TOYOTA Corolla

Emission Result Overview

		TOYOTA Corolla 6521	TOYOTA Corolla 1501	TOYOTA Corolla 7243	
		Bag Result	Bag Result	Bag Result	Limit
HC	[mg/km]	16.907	21.855	14.484	100
CO	[mg/km]	151.084	240.236	145.485	1000
CO2	[g/km]	138.31*	134.76*	136.77*	
NOx	[mg/km]	20.055	16.553	13.066	60
CH4	[mg/km]	2.674	3.880	2.493	
NMHC	[mg/km]	14.448	18.320	12.249	68
PM	[mg/km]	0.3414	0.2088	0.4889	4.5
PN	[#/km]	3.3748 E+10	5.9330 E+10	6.7711 E+10	6.00 E+11
Fuel consumption	[l/100 km]	6.09	5.94	6.03	

*RCB correction / SDC correction applied if criteria fulfilled.

Fuel Information

Fuel type	Gasoline E10	-
NHV	17666	btu/lb
CWF	83.32	%
HWF	13.10	%
OWF	3.59	%
Density	0.7488	kg/l
Batch #	Euro6_Cert2	-

Dyno Information

Vehicle	TOYOTA Corolla 6521	TOYOTA Corolla 1501	TOYOTA Corolla 7243	
Inertia	1497	1497	1497	kg

Dyno Mode	Front	Front	Front	-
Road Load F0	76.0	76.0	76.0	N
Road Load F1	0.966	0.966	0.966	N/(km/h)
Road Load F2	0.0271	0.0271	0.0271	N/(km/h)²
Dyno Load F0	22.9	8.6	21.4	N
Dyno Load F1	0.453	0.400	0.458	N/(km/h)
Dyno Load F2	0.0277	0.0284	0.0277	N/(km/h)²

Dyno Load is the dynamometer load which is determined through the road load adjustment with fixed-run method as described in legislation.

IWR / RMSSE Validation

The inertial work ratio (IWR) and the root mean squared speed error (RMSSE) are two calculated drive trace indices which have to be within the respective limits. In the table below, the IWR and RMSSE values of the emission tests with the three TOYOTA Corolla vehicles are shown and all of them are below the limits, so the results are valid.

	TOYOTA Corolla 6521	TOYOTA Corolla 1501	TOYOTA Corolla 7243				
	Total	Total	Total	Unit	Lower Limit	Upper Limit	Result
IWR	-0.91	-0.10	1.34	%	-2.00	4.00	Valid
RMSSE	0.99	0.89	0.86	km/h	-	1.30	Valid

RCB correction

The rechargeable electric energy storage system (REESS) Charge Balance correction (RCB correction) is just applied if the relative energy balance is higher than the correction criterion of 0.5%. For all three TOYOTA Corolla vehicles the relative energy balance was below this criterion, so there was no RCB correction needed.

	TOYOTA Corolla 6521	TOYOTA Corolla 1501	TOYOTA Corolla 7243	
	Total	Total	Total	Unit
RCB correction applied if Rel. Energy Balance ΔE > 0.50%	NO	NO	NO	
Total El. Energy Balance ΔE	27.27	42.23	16.65	Wh
Rel. Energy Balance ΔE	0.23	0.36	0.14	%
Total CO2 REESS correction	-	-	-	g/km

SDC correction

The speed distance correction (SDC) is calculated and applied for every WLTC emission test driven by a pure internal combustion engine (ICE) vehicle as described in legislation. All three measured TOYOTA Corolla vehicles were pure ICE vehicles, so the SDC correction was applied.

SDC correction applied: **YES**

	TOYOTA Corolla 6521	TOYOTA Corolla 1501	TOYOTA Corolla 7243	
	Total	Total	Total	Unit
Total CO2 (not corrected)	137.29	133.96	135.73	g/km
Total CO2 (SDC corrected)	138.31	134.76	136.77	g/km
Total CO2 SDC correction	1.01	0.81	1.04	g/km

Remark: No driving violations occurred during the WLTC emission tests.

4.1.2 TOYOTA Yaris

Emission Result Overview

		TOYOTA Yaris 2856	TOYOTA Yaris 2889	TOYOTA Yaris 9745	
		Bag Result	Bag Result	Bag Result	Limit
HC	[mg/km]	29.971	38.094	29.137	100
CO	[mg/km]	379.771	397.459	384.795	1000
CO2	[g/km]	124.51*	123.79*	126.16*	
NOx	[mg/km]	5.805	5.448	5.759	60
CH4	[mg/km]	2.967	3.046	2.707	
NMHC	[mg/km]	27.348	35.349	26.687	68
PM	[mg/km]	0.1788	0.4430	0.1278	4.5
PN	[#/km]	1.8210 E+11	1.8673 E+11	1.5024 E+11	6.00 E+11
Fuel consumption	[l/100 km]	5.50	5.48	5.58	

*RCB correction / SDC correction applied if criteria fulfilled.

Fuel Information

Fuel type	Gasoline E10	-
NHV	17666	btu/lb
CWF	83.32	%
HWF	13.10	%
OWF	3.59	%
Density	0.7488	kg/l
Batch #	Euro6_Cert2	-

Dyno Information

Vehicle	TOYOTA Yaris 2856	TOYOTA Yaris 2889	TOYOTA Yaris 9745	
Inertia	1229	1229	1229	kg
Dyno Mode	Front	Front	Front	-
Road Load F0	91.3	91.3	91.3	N
Road Load F1	0.966	0.966	0.966	N/(km/h)
Road Load F2	0.0287	0.0287	0.0287	N/(km/h)²
Dyno Load F0	48.0	47.9	43.2	N
Dyno Load F1	0.543	0.551	0.493	N/(km/h)
Dyno Load F2	0.0294	0.0292	0.0295	N/(km/h)²

Dyno Load is the dynamometer load which is determined through the road load adjustment with fixed-run method as described in legislation.

IWR / RMSSE Validation

The inertial work ratio (IWR) and the root mean squared speed error (RMSSE) are two calculated drive trace indices which have to be within the respective limits. In the table below, the IWR and RMSSE values of the emission tests with the three TOYOTA Yaris vehicles are shown and all of them are below the limits, so the results are valid.

	TOYOTA Yaris 2856	TOYOTA Yaris 2889	TOYOTA Yaris 9745				
	Total	Total	Total	Unit	Lower Limit	Upper Limit	Result
IWR	3.53	1.74	2.80	%	-2.00	4.00	Valid
RMSSE	1.29	1.12	0.99	km/h	-	1.30	Valid

RCB correction

The rechargeable electric energy storage system (REESS) Charge Balance correction (RCB correction) is just applied if the relative energy balance is higher than the correction criterion of 0.5%. For two TOYOTA Yaris vehicles the relative energy balance was above this criterion, so there was the RCB correction applied. For the third TOYOTA Yaris vehicle the relative energy balance was below this criterion, so there was no RCB correction needed.

	TOYOTA Yaris 2856	TOYOTA Yaris 2889	TOYOTA Yaris 9745	
	Total	**Total**	**Total**	**Unit**
RCB correction applied if Rel. Energy Balance ΔE > 0.50%	YES	YES	NO	
Total El. Energy Balance ΔE	61.26	70.87	5.80	Wh
Rel. Energy Balance ΔE	0.54	0.63	0.05	%
Total CO2 REESS correction	2.60	3.01	-	g/km

SDC correction

The speed distance correction (SDC) is calculated and applied for every WLTC emission test driven by a pure internal combustion engine (ICE) vehicle as described in legislation. All three measured TOYOTA Yaris vehicles were pure ICE vehicles, so the SDC correction was applied.

SDC correction applied: YES

	TOYOTA Yaris 2856	TOYOTA Yaris 2889	TOYOTA Yaris 9745	
	Total	**Total**	**Total**	**Unit**
Total CO2 (not corrected)	126.63	126.64	126.78	g/km
Total CO2 (SDC corrected)	127.12	126.80	126.16	g/km
Total CO2 SDC correction	0.48	0.16	-0.62	g/km

Remark: No driving violations occurred during the WLTC emission tests.

4.2 PEMS validation on Chassis-Dyno

Prior to the RDE test a PEMS validation test has been performed on Chassis-Dyno in Testcenter Oberursel to make sure the PEMS is working properly.

TOYOTA Corolla 6521

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	154.9	166.515	11.615	7%	Pass
CO2	[g/km]	132.8	134.15	1.35	1%	Pass
NOx	[mg/km]	13.800	14.324	0.524	4%	Pass
PN	[#/km]	3.30 E+10	3.45 E+10	1.54 E+09	4%	Pass

TOYOTA Corolla 1501

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	196.8	159.808	36.992	23%	Pass
CO2	[g/km]	134.6	133.61	0.99	1%	Pass
NOx	[mg/km]	12.080	12.558	0.478	4%	Pass
PN	[#/km]	5.36 E+10	4.87 E+10	4.89 E+09	10%	Pass

TOYOTA Corolla 7243

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	122.4	152.546	30.146	20%	Pass
CO2	[g/km]	135.8	138.44	2.64	2%	Pass
NOx	[mg/km]	11.580	12.630	1.05	8%	Pass
PN	[#/km]	4.97 E+10	7.88 E+10	2.91 E+10	37%	Pass

TOYOTA Yaris 2856

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	255.8	308.708	52.908	17%	Pass
CO2	[g/km]	127.3	130.21	2.91	2%	Pass
NOx	[mg/km]	5.662	7.180	1.518	21%	Pass
PN	[#/km]	2.33 E+11	2.29 E+11	4.24 E+09	2%	Pass

TOYOTA Yaris 2889

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	239.8	294.035	54.235	18%	Pass
CO2	[g/km]	127.3	132.10	4.8	4%	Pass
NOx	[mg/km]	5.646	5.981	0.335	6%	Pass
PN	[#/km]	1.17 E+11	1.11 E+11	6.45 E+09	6%	Pass

TOYOTA Yaris 9745

		PEMS	Laboratory	Abs. Diff.	Abs. %RS	Result
CO	[mg/km]	260.07	324.668	64.598	20%	Pass
CO2	[g/km]	124.5	128.07	3.57	3%	Pass
NOx	[mg/km]	5.508	5.898	0.39	7%	Pass
PN	[#/km]	1.14 E+11	1.78 E+11	6.37 E+10	36%	Pass

4.3 Real Driving Emissions (Type 1A)

The measured vehicle was tested in the *RDE Oberursel route*. The recorded data was processed using an inhouse developed and validated software, in order to calculate the instantaneous emissions mass flow, the aggregated emissions and the validity parameters as prescribed by the EU RDE regulation 2018/1832.

4.3.1 RDE Testing route (characteristics and driving dynamics)

The vehicle was driven on the *RDE Oberursel route* which complies to RDE-regulation. The *RDE Oberursel route* is shown in Figure 4, designed with start and end in Oberursel, Germany. The figure designates the urban / rural / highway parts of the route.

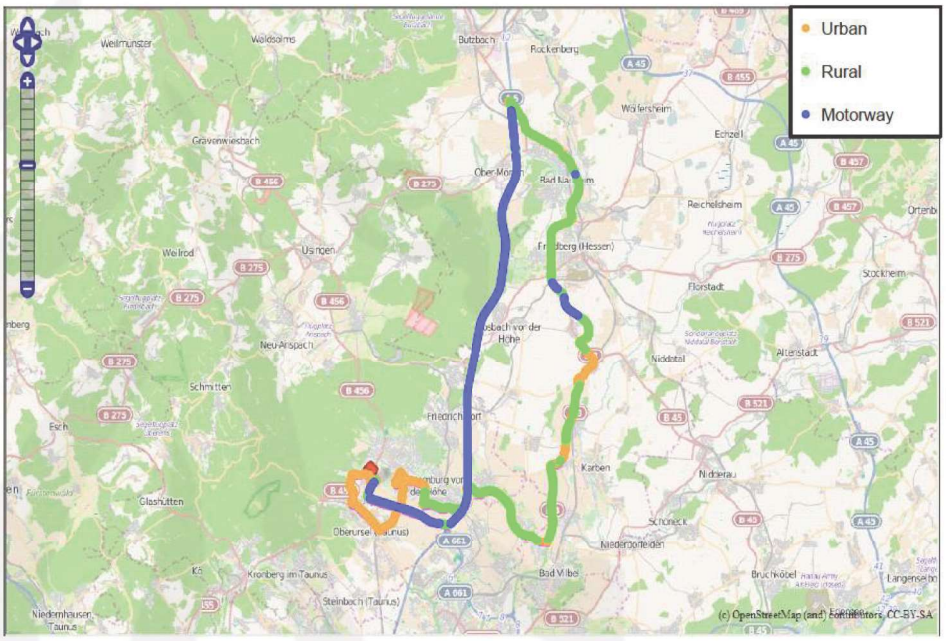

Figure 4: RDE Oberursel route, compliant with RDE regulation in the greater area of Oberursel

Table 6 provides trip details of the *RDE Oberursel route* for the RDE compliant tests which were performed with the three TOYOTA Corolla and the respective RDE regulatory boundary conditions.

Table 6: Typical characteristics of the RDE Oberursel route

Parameter		TOYOTA Corolla 6521	TOYOTA Corolla 1501	TOYOTA Corolla 7243	Legislation boundaries
Trip duration [min:s]		99:06	96:41	97:07	90 – 120
Trip distance [km]		88.7	88.7	88.7	> 46
Stop duration [% of urban]		20.3	17.1	16.4	6-30
Distance share [%] (and typical km-distance)	**Urban**	30.7 (27.2 km)	30.2 (26.8 km)	31.9 (28.3 km)	29 – 44
	Rural	37.1 (32.9 km)	38.0 (33.7 km)	33.8 (30.0 km)	23 – 43
	Motorway	32.2 (28.6 km)	31.9 (28.3 km)	34.3 (30.4 km)	23 – 43
Average speed [km/h]	**Urban**	28.1	29.1	29.7	15 – 40
	Rural	75.8	75.0	73.0	60 – 90
	Motorway	114.3	116.3	119.2	100 – 145
Motorway (> 100 km/h) [min:s]		12:42	13:14	13:06	5min ≥100 km/h
Max altitude [m]		279.7	278.2	277.8	< 700
Altitude difference (end–start) [m]		-1.2	4.4	-10.6	± 100
Min. Temperature [°C]		[1.9]	6.9	3.4	3°C [-2°C-3°C]
Max. Temperature [°C]		6.4	13.0	12.5	30°C [30-35°C]

Table 7 provides trip details of the *RDE Oberursel route* for the RDE compliant tests which were performed with the three TOYOTA Yaris and the respective RDE regulatory boundary conditions.

Table 7: Typical characteristics of the RDE Oberursel route

Parameter		TOYOTA Yaris 2856	TOYOTA Yaris 2889	TOYOTA Yaris 9745	Legislation boundaries
Trip duration [min:s]		98:24	102:37	101:10	90 – 120
Trip distance [km]		88.7	88.7	88.7	> 46
Stop duration [% of urban]		17.3	20.5	17.9	6-30
Distance share [%] (and typical km-distance)	**Urban**	29.6 (26.3 km)	31.2 (27.6 km)	32.7 (29.0 km)	29 – 44
	Rural	37.2 (33.0 km)	34.9 (31.0 km)	31.9 (28.3 km)	23 – 43
	Motorway	33.2 (29.5 km)	33.9 (30.1 km)	35.4 (31.4 km)	23 – 43
Average speed [km/h]	**Urban**	27.7	26.9	28.1	15 – 40
	Rural	75.2	74.4	74.1	60 – 90
	Motorway	116.5	113.3	114.8	100 – 145
Motorway (> 100 km/h) [min:s]		12:24	12:19	12:21	5min ≥100 km/h
Max altitude [m]		278.1	277.0	279.8	< 700
Altitude difference (end–start) [m]		-3.5	-0.3	-1.7	± 100
Min. Temperature [°C]		[-1.9]	7.4	7.3	3°C [-2°C-3°C]
Max. Temperature [°C]		6.8	16.0	16.1	30°C [30-35°C]

Table 8 to 10 provide some details regarding the driving dynamics of the RDE trips performed with the three TOYOTA Corolla on the route designed in the greater area of Oberursel. V*Apos_95% is the 95th percentile of the product of vehicle speed and positive acceleration greater than 0.1 m/s^2. RPA is the relative positive acceleration. For RPA there is a lower limit criterion and for V*Apos_95% there is an upper limit criterion. For all RDE emission tests with the three TOYOTA Corolla vehicles the driving dynamic values were within the limit criteria, so the measurements are valid.

Table 8: Average driving dynamics of the RDE trip with the TOYOTA Corolla 6521 on the route designed in the greater area of Oberursel, Germany.

Parameter		TOYOTA Corolla 6521	Criteria
V*Apos_95% [W/kg]	Urban	14.814	<= 18.266
	Rural	16.250	<=24.592
	Motorway	16.612	<= 27.451
RPA [m/s²]	Urban	0.212	>= 0.130
	Rural	0.092	>= 0.054
	Motorway	0.061	>= 0.025

Table 9: Average driving dynamics of the RDE trip with the TOYOTA Corolla 1501 on the route designed in the greater area of Oberursel, Germany.

Parameter		TOYOTA Corolla 1501	Criteria
V*Apos_95% [W/kg]	Urban	14.142	<= 18.398
	Rural	16.436	<= 24.532
	Motorway	15.224	<= 27.593
RPA [m/s²]	Urban	0.214	>= 0.129
	Rural	0.086	>= 0.055
	Motorway	0.058	>= 0.025

Table 10: Average driving dynamics of the RDE trip with the TOYOTA Corolla 7243 on the route designed in the greater area of Oberursel, Germany.

Parameter		TOYOTA Corolla 7243	Criteria
V*Apos_95% [W/kg]	Urban	13.403	<= 18.478
	Rural	17.232	<= 24.364
	Motorway	15.456	<= 27.809
RPA [m/s²]	Urban	0.183	>= 0.128
	Rural	0.094	>= 0.059
	Motorway	0.059	>= 0.025

Table 11 to 13 provide some details regarding the driving dynamics of the RDE trips performed with the three TOYOTA Corolla on the route designed in the greater area of Oberursel. V*Apos_95% is the 95th percentile of the product of vehicle speed and positive acceleration greater than 0.1 m/s^2. RPA is the relative positive acceleration. For RPA there is a lower limit criterion and for V*Apos_95% there is an upper limit criterion. For all RDE emission tests with the three TOYOTA Yaris vehicles the driving dynamic values were within the limit criteria, so the measurements are valid.

Table 11: Average driving dynamics of the RDE trip with the TOYOTA Yaris 2856 on the route designed in the greater area of Oberursel, Germany.

Parameter		TOYOTA Yaris 2856	Criteria
V*Apos_95% [W/kg]	Urban	13,137	<= 18.203
	Rural	14.388	<= 24.548
	Motorway	16.461	<= 27.608
RPA [m/s²]	Urban	0.200	>= 0.131
	Rural	0.091	>= 0.055
	Motorway	0.053	>= 0.025

Table 12: Average driving dynamics of the RDE trip with the TOYOTA Yaris 2889 on the route designed in the greater area of Oberursel, Germany.

Parameter		TOYOTA Yaris 2889	Criteria
V*Apos_95% [W/kg]	Urban	12.235	<= 18.092
	Rural	14.816	<= 24.559
	Motorway	16.804	<= 27.373
RPA [m/s²]	Urban	0.220	>= 0.133
	Rural	0.091	>= 0.056
	Motorway	0.079	>= 0.025

Table 13: Average driving dynamics of the RDE trip with the TOYOTA Yaris 9745 on the route designed in the greater area of Oberursel, Germany.

Parameter		TOYOTA Yaris 9745	Criteria
V*Apos_95% [W/kg]	Urban	12.809	<= 18.266
	Rural	15.379	<= 24.513
	Motorway	14.241	<= 27.481
RPA [m/s²]	Urban	0.199	>= 0.130
	Rural	0.102	>= 0.057
	Motorway	0.078	>= 0.025

4.3.2 RDE Final Emission Results

The aggregated emissions of the three TOYOTA Corolla are presented in Tables 14 to 16, the aggregated emissions of the three TOYOTA Yaris are presented in Tables 17 to 19. The CO, NO_x and PN emissions presented are the final emissions calculated following the RDE regulation. The urban/total CO_2 emissions presented are calculated by simply dividing the urban/total emitted CO2 mass by the urban/total trip distance travelled, respectively.

Table 14: Final emission results of the TOYOTA Corolla 6521.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	175.047	107.469	-
CO2	[g/km]	179.293	155.068	-
NOx	[mg/km]	18.026	7.255	126.000*
NO	[mg/km]	18.062	7.381	-
NO2	[mg/km]	0.341	0.145	-
PN	[#/km]	5.32E+10	3.13E+10	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 15: Final emission results of the TOYOTA Corolla 1501.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	169.676	119.936	-
CO2	[g/km]	172.617	146.576	-
NOx	[mg/km]	21.138	10.052	126.000*
NO	[mg/km]	21.418	10.573	-
NO2	[mg/km]	0.378	0.153	-
PN	[#/km]	6.75E+10	3.95E+10	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 16: Final emission results of the TOYOTA Corolla 7243.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	116.033	105.484	-
CO2	[g/km]	159.114	150.247	-
NOx	[mg/km]	19.345	8.564	126.000*
NO	[mg/km]	19.427	9.038	-
NO2	[mg/km]	0.484	0.203	-
PN	[#/km]	5.83E+10	3.64E+10	9.00 E+11*

*The NOx NTE is the NOx limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 17: Final emission results of the TOYOTA Yaris 2856.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	195.602	160.392	-
CO2	[g/km]	152.017	132.860	-
NOx	[mg/km]	5.826	2.795	126.000*
NO	[mg/km]	5.791	2.844	-
NO2	[mg/km]	0.222	0.096	-
PN	[#/km]	2.82E+11	1.37E+11	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 18: Final emission results of the TOYOTA Yaris 2889.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	177.740	254.643	-
CO2	[g/km]	154.197	130.175	-
NOx	[mg/km]	10.927	7.182	126.000*
NO	[mg/km]	10.911	7.100	-
NO2	[mg/km]	0.396	0.264	-
PN	[#/km]	4.16E+11	1.73E+11	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.

Table 19: Final emission results of the TOYOTA Yaris 9745.

		Urban	Total	NTE (Urban / Total)
CO	[mg/km]	195.877	255.984	-
CO2	[g/km]	151.280	132.850	-
NOx	[mg/km]	6.427	4.147	126.000*
NO	[mg/km]	6.408	4.012	-
NO2	[mg/km]	0.267	0.256	-
PN	[#/km]	3.25E+11	1.41E+11	9.00 E+11*

*The NOx NTE is the NOx Euro 6 limit of 60mg/km with the conformity factor of 2.1 and the PN NTE is the PN Euro 6 limit of 6.00E+11 multiplied with the conformity factor of 1.5.