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OPENBARE
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[G2] Annual ISC Report – 2024 (2023 ISC testing program)

Legislation

Regulation (EU) N°	:	715/2007
Amending Regulation (EU) N°	:	2018/1832, Annex II

References

Report number	:	ISC-MOW-2024
Number of pages	:	54
Number of annexes	:	1
Update	:	00

Manufacturer's information

Make of vehicle(s)	:	TOYOTA, LEXUS
Commercial name(s)	:	Toyota Yaris, Toyota RAV4, Lexus ES300h
Vehicle Type(s)	:	XPA1F(EU,M), XA5(EU,M), XZ1L(EU,M)
Category/Categories	:	M1
Name of the manufacturer	:	TOYOTA MOTOR EUROPE NV/SA
Address of the manufacturer	:	AVENUE DU BOURGET 60, BOURGETLAAN 60, 1140 BRUSSEL, BELGIUM

Inspection information

Location	:	HORIBA MIRA Ltd. Watling St, Nuneaton CV10 0TU, United Kingdom
Date of test	:	19/02/2024 – 05/04/2024
Inspector	:	Jorik De Bruycker

Conclusion

Representative samples for above mentioned types were inspected in accordance with the above mentioned legislation, and found to **comply / ~~not to comply~~** with the applicable requirements.

Name	:	Jorik De Bruycker
Position	:	Inspector
Signature	:	

Date	:	11/04/2024

Also attending tests

		Name Surname	*Function*
For the manufacturer	:	-	-
For CHTS (inspector)	:	Kamiel Kennes	Senior Homologation Inspector
For Mira (project engineer)	:	Daniel Newson	Project Engineer

Test equipment used

Lab appraisal reference	:	GB24020002 (IDIADA UK)
Name and address of the laboratory	:	HORIBA MIRA Ltd Watling Street, Nuneaton, Warwickshire CV10 0TU
Contact	:	+44 24 7635 5000
PEMS Equipment description	:	HORIBA OBS-ONE GS02 PEMS
Manufacturer	:	HORIBA
Type	:	GS02
Equipment owner	:	HORIBA MIRA Ltd.
Unique reference	:	PEMS : 4S84F7R3 & 2KJ0X326 PN analyzers : RP0HG2MN & U2VM8FNS
Calibration / Verification certificate	:	All equipment calibration documents and verification certificates have been collected and verified by CHTS, and are available upon request.

Table of Contents

A. Quick overview and main conclusions

For this report, we chose to adhere to the Euro 6d standard, regulation (EU) 2018/1832, as mentioned on the COC's of all tested vehicles. This decision will be re-evaluated for our 2025 ISC program after further investigations and consultations with stakeholders.

Conducting ISC tests presents significant challenges, including administrative hurdles and difficulties in acquiring appropriate vehicles for testing. The difficulty in assembling a suitable fleet for ISC testing prompted us to acquire vehicles through both purchasing and renting. Moreover, the task of compiling a comprehensive list of vehicles registered in Europe eligible for ISC testing and the general reluctance of vehicle owners to participate poses significant obstacles. Addressing these issues calls for legal frameworks to simplify data gathering and enforce compliance, enhancing the effectiveness of ISC testing while promoting regulatory conformity and environmental preservation.

In our 2023 ISC testing program (Annual report 2024), we tested six (6) vehicles, all of which complied with the emission limits outlined in Annex I to Regulation (EC) No 715/2007, showcasing compliance to environmental regulations and commitment to high standards of emission control.

This report is issued after the deadline of 31 March as some of the ISC investigations were still open by this date, in accordance with point 8. of annex II of the regulation. More information is available in section "F. Lessons Learned."

B. ISC activities performed by the manufacturer in the previous year:

See annex 1 for overview of tests and statistical procedure.

(1) Information gathering by manufacturer

Not applicable - Responsibility for manufacturer.

(2) ISC testing

Not applicable - Responsibility for manufacturer.

C. ISC activities performed by accredited laboratories or technical services in the previous year:

See annex 1 for overview of tests and statistical procedure.

(3) Information gathering and risk assessment

Not applicable - Responsibility for accredited laboratories or technical services.

(4) ISC testing

Not applicable - Responsibility for accredited laboratories or technical services.

D. ISC activities performed by the granting type approval authority in the previous year:

(5) Information gathering and risk assessment

The frequency of ISC testing performed by MOW (GTAA) is based on a risk assessment methodology consistent with the international standard ISO 31000:2018 (Risk Management - Principles and guidelines).

The following documents and information were gathered for the selection of the ISC families for ISC testing:

- Emission-related warranty claims, and any emission-related warranty repair works performed or recorded during servicing.
- Other ISC testing information, provided by TS, EC, or other 3rd party.
- Information on emissions obtained from a remote sensing program and PEMS testing.
- Previous ISC testing results by the GTAA.
- Gathering information from the e6 emission type approvals.
- Collecting relevant data from the manufacturer:
  - Sales numbers
  - PEMS test families (= ISC families)
  - Engine type
  - ISC test results
  - COP test results

(6) ISC testing

Selection of ISC families and test vehicles

Based on the gathered information and risk assessment mentioned above, the following ISC families have been selected for testing:

- 6-JT1-31 (Engine code: A25AFXS)
- 6-JT1-48 (Engine code: M15AFKS)

For each of these families, 3 vehicles have been selected in accordance with 5.10.1.

All vehicles have been checked to comply with the items listed in Appendix 1 to annex II of the regulation. They are Union-registered and driven for at least 90 % within the Union. Each comes with a maintenance record showing proper servicing with original parts for emissions components. No aerodynamic modifications or evidence of operating after fault codes without proper repair is present. All vehicles are fuelled with Directive 98/70/EC compliant fuel, and none have active recalls or field fixes performed.

ISC Family	:	**6-JT1-31**	**6-JT1-48**
Test vehicle	:	**ES 6408**	**YARIS 0138**
Make	:	LEXUS	TOYOTA
Type	:	XZ1L(EU,A25AFXSb)	XPA1F(EU,M15AFKSa)
VIN	:	??????????????6408	??????????????0138
Build date	:	02/12/2022	21/04/2021
Emission type approval	:	e6*715/2007*2018/1832AP*0344*04	e6*715/2007*2018/1832AP*0391*01
WVTA	:	e6*2007/46*0250*06	e6*2007/46*0437*00
Test vehicle	:	**RAV4 4720**	**YARIS 6906**
Make	:	TOYOTA	TOYOTA
Type	:	XA5(EU,A25AFXSd)	XPA1F(EU,M15AFKSa)
VIN	:	??????????????4720	??????????????6906
Build date	:	09/04/2022	18/11/2020
Emission type approval	:	e6*715/2007*2018/1832AP*0376*02	e6*715/2007*2018/1832AP*0391*01
WVTA	:	e6*2007/46*0289*05	e6*2007/46*0437*00
Test vehicle	:	**RAV4 6622**	**YARIS 7699**
Make	:	TOYOTA	TOYOTA
Type	:	XA5(EU,A25AFXSc)	XPA1F(EU,M15AFKSa)
VIN	:	??????????????6622	??????????????7699
Build date	:	02/12/2019	30/11/2020
Emission type approval	:	e6*715/2007*2018/1832AM*0239*01	e6*715/2007*2018/1832AP*0391*01
WVTA	:	e6*2007/46*0289*02	e6*2007/46*0437*00

Testing plan

The testing plan for the six (6) vehicles selected for testing encompasses both type 1 and type 1a (RDE) tests. All tests are conducted by HORIBA MIRA, under supervision of CHTS.

The ISC Type 1 tests have been performed in accordance with Annex XXI of the regulation.
The ISC Type 1a (RDE) tests have been performed in accordance with Annex IIIA of the regulation.

HORIBA MIRA (accredited according to EN ISO/IEC 17025:2017, see UKAS accreditation certificate 1105 and its scope 1105) is a world-class vehicle engineering service provider, collaborating with CHTS to deliver this In-Service Conformity (ISC) engine emissions test programme in compliance with the relevant requirements of the regulation (EU)2017/1151 as amended by (EU)2018/1832.

CHTS, the technical service, is a type-approval partner to OEMs for motor vehicles and their trailers, systems, components, and separate technical units intended for such vehicles, accredited according to EN ISO/IEC 17020:2012. See BELAC accreditation certificate 667-INSP.

In accordance with 5.6 of annex II of the regulation, specific attention has been given to the type 1a test to ensure a wide range of test conditions.

The following variance was introduced exclusively for the type 1a test:

- All vehicles underwent Hot and Cold tests.
- All vehicles have been tested on different days, under influence of different weather conditions.
- A distinct test route was selected for each vehicle within a single ISC family.
- Different test masses were applied to each vehicle within a single ISC family, in order to create the following categories:
  - Low: Payload limited to mass of test equipment, driver, and passenger (if applicable).
  - Mid: Payload added to a value that falls within a range defined by a low and high category. (Low +30 kg or High -30kg, depending on the vehicle body type)
  - High: Payload added up to the RDE limit value, in accordance with 5.1.2. of annex IIIA of the regulation.

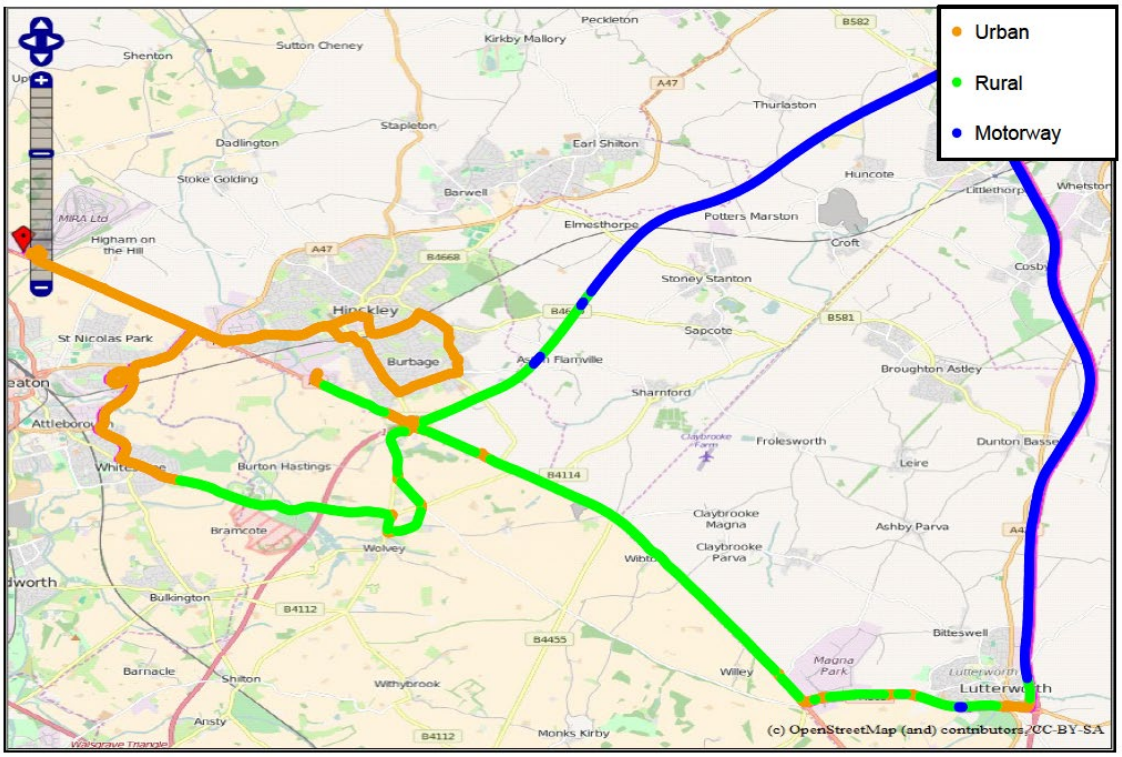
ISC Family	Test vehicle	VIN	Limit RDE ISC (kg)[1]	Actual test mass RDE (kg)	RDE route
6-JT1-31	RAV4 4720[3]	??????????????4720	2063	2029 - 2063[3]	1-2[3]
6-JT1-31	RAV4 6622	??????????????6622	1977	1931 - 1936[2]	2
6-JT1-31	ES 6408	??????????????6408	2022	2019	3
6-JT1-48	YARIS 7699	??????????????7699	1417	1265-1271[2]	1
6-JT1-48	YARIS 0138	??????????????0138	1417	1414	2
6-JT1-48	YARIS 6906	??????????????6906	1406	1308	3

[1] Artificial payload up to 90% of the sum of the 'mass of the passengers' and the 'pay- mass' defined in points 19 and 21 of Article 2 of Commission Regulation (EU) No 1230/2012.

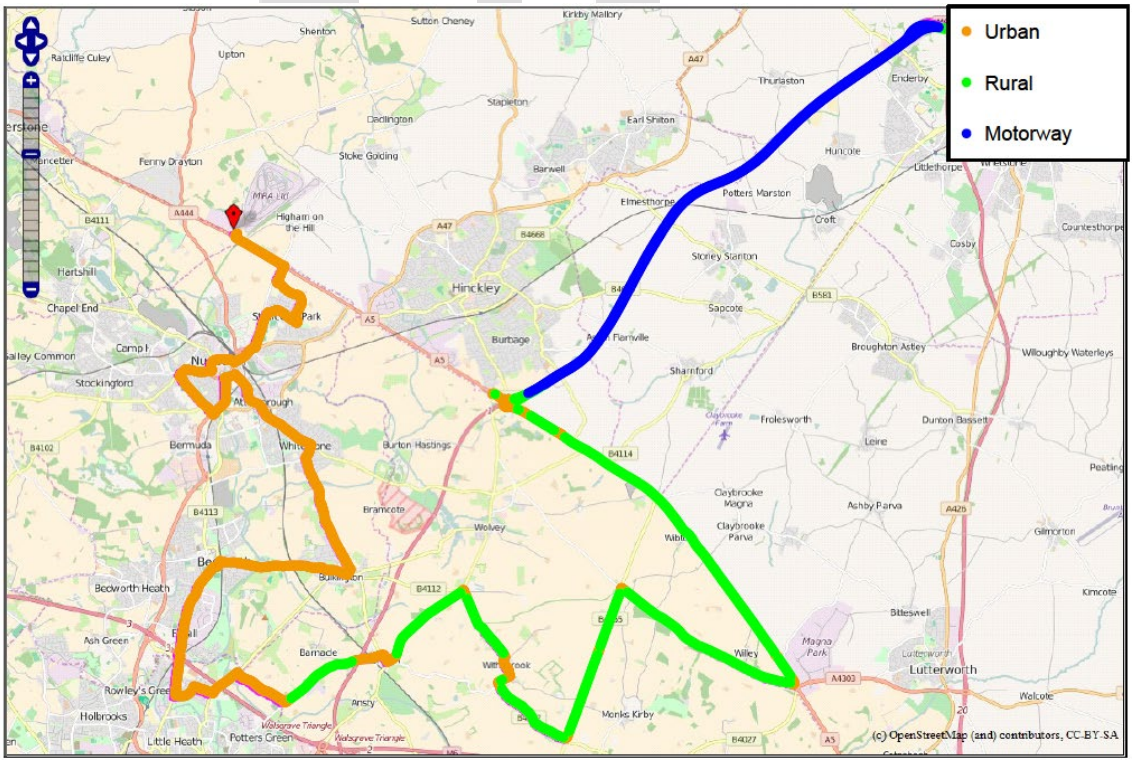
[2] Variance between hot and cold test.

[3] Test plan adjusted for Cold type 1a test,
see F. Lessons Learned: RDE Moving Average Window Challenges and Adjustments for the Toyota RAV4.

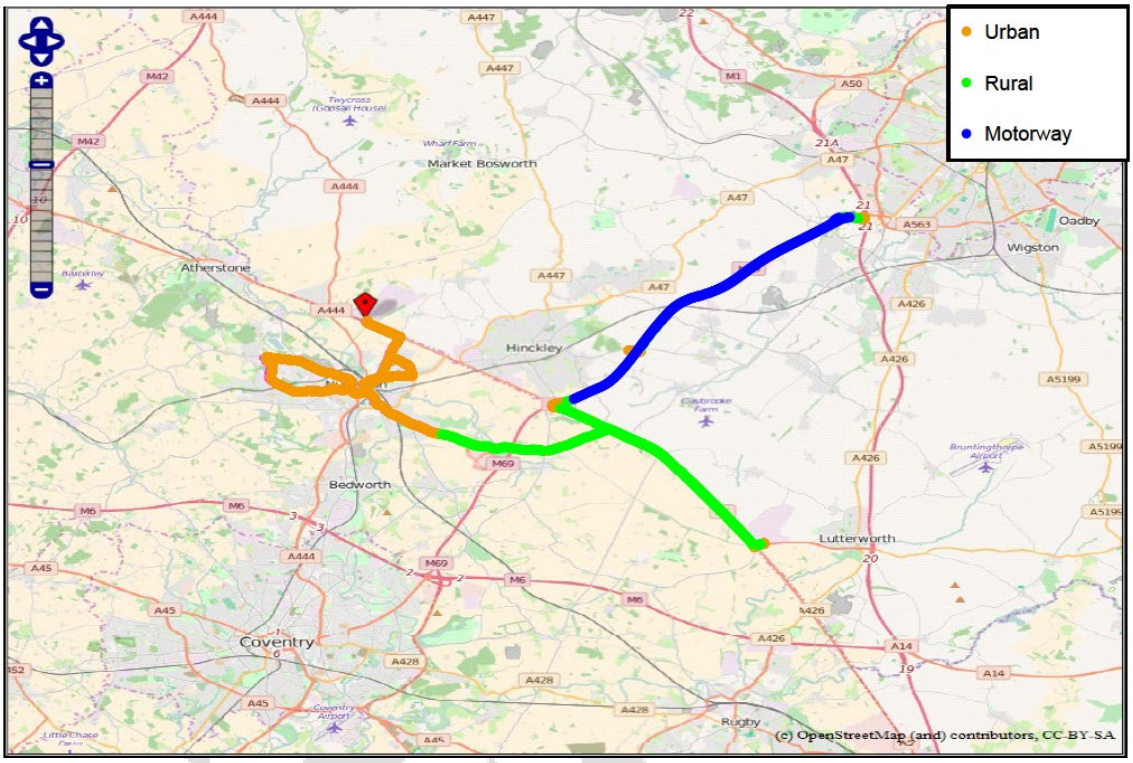
Route 1



Route 2



Route 3


Urban
Rural
Motorway
Market Bosworth
Atherstone
Hinckley
Bedworth
Coventry
Lutterworth
Oadby
Wigston
Rugby
(c) OpenStreetMap (and) contributors, CC-BY-SA

Final results of tests

6-JT1-31 RAV4 4720

Type 1

Test information

Date :	29/03/2024	**Preconditioning Cycle :**	WLTP
Start Time :	09:53:47	**Soak In :**	28/03/2024 @ 09:30
End Time :	11:08:36	**Soak Out :**	29/03/2024 @ 09:45
Test Cycle :	WLTC Class3b	**Odometer :** (km)	30204
Regulation :	Euro 6d	**Oil Temp :** (°C)	23.1
MIRA Engineer :	Daniel Newson	**Coolant Temp :** (°C)	23.0

Vehicle Details

Manufacturer :	Toyota	**VIN :**	??????????????4720
Model :	Rav4	**Engine Capacity :** (cc)	2487
Front Tyre Size :	225/60R18	**Transmission :**	CVT
Rear Tyre Size :	225/60R18	**Front Pressure :** (bar)	2.3
		Rear Pressure : (bar)	2.3

Test conditions

	Maximum	Minimum
Barometer : (kPA)	97.40	97.35
Cell Temperature: (°C)	23.60	22.10
Relative Humidity : (%)	41.30	38.30
Absolute Humidity : (g/kg)	7.33	7.00

Vehicle Road Load Model

	Inertia(kg)	**F0**(N)	**F1**(N/(km/h))	**F2**(N/(km/h)²)
Target :	1897.35	134.5	0.317	0.04028
Dyno :	1871.18	77.9	-0.943	0.04733

Fuel Info

Fuel Type : Gasoline E10
Batch Number : 58720
Density : 0.7440 (kg/l)
HC Ratio : 1.9170
OC Ratio : 0.0311
C.W.F. : 83.1700 (%mass)
N.H.V. : 41.6200 (MJ/kg)

Final test results

	CO_2 (g/km)	CO (mg/km)	THC (mg/km)	NOx (mg/km)	HC +NOx (mg/km)	CH_4 (mg/km)	PM (mg/km)	NMHC (mg/km)	NMHC +NOx (mg/km)	PN (#/km)	Fuel Cons. (l/100km)	Distance (km)
Sample 1	93.4	579.5	84.0	8.3	92.3	11.1	-	73.3	81.6	5.73E+10	4.21	3.097
Sample 2	125.1	57.6	4.5	1.3	5.8	2.3	-	2.3	3.6	4.53E+10	5.53	4.748
Sample 3	92.9	26.4	1.7	0.0	1.7	1.1	-	0.6	0.7	2.59E+10	4.14	7.152
Sample 4	117.0	62.6	3.0	0.3	3.3	1.4	-	1.6	1.9	3.48E+10	5.17	8.248
Total	**108**	**119.3**	**13.7**	**1.5**	**15.2**	**2.8**	**0.06**	**11.0**	**12.5**	**3.72E+10**	**4.8**	**23.244**
Limit[1]	-	1000	100	60	-	-	4.5	68	-	6.00E+11	-	-
% Limit	-	11.93%	13.70%	2.47%	-	-	1.44%	16.19%	-	6.20%	-	-
COC	131	190.7	12.1	1.7	-	-	0.11	9.8	-	4.10E+10	5.8	-
% COC	83%	63%	113%	87%	-	-	59%	112%	-	91%	83%	-
Status	-	Pass	Pass	Pass	-	-	Pass	Pass	-	Pass	-	-

[1] *The emission limit set out in Annex I of Regulation (EC) No 715/2007.*

PEMS Validation

	CO_2 (g/km)	CO (mg/km)	NOx (mg/km)	PN (#/km)	Distance[2] (km)
Absolute Difference	8.81	-32.60	-0.28	-8.12E+08	-604.45
Absolute Limit (±)[3]	10	150	10	1E11	250.00
Status	**Pass**	**Pass**	**Pass**	**Pass**	**Fail**
Relative Difference (%)	8.08	-27.10	-16.96	-2.16	-
Relative Limit (±%)[3]	10	15	15	50	-
Status	**Pass**	**Fail**	**Fail**	**Pass**	-
Overall	**Pass**	**Pass**	**Pass**	**Pass**	**N.A.**

[2] *Only applicable if vehicle speed is determined by the ECU;*
to meet the permissible tolerance it is permitted to adjust the ECU vehicle speed measurements based on the outcome of the validation test.

[3] *Limit in accordance with Table 1, appendix 3 to Annex IIIA. " (…) of the laboratory reference, whichever is larger"*

Type 1a (RDE)- Hot Test

Test Date : 03/04/2024
Test Start : 13:11:55
Test End : 15:37:12
Comment : Hot Test

Vehicle Name : RAV4 4720
Vehicle Category : M1
Vehicle Class : NOVC-HEV
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	136.5	Moderate
Min. Temp.	°C	12.3	Moderate
Max. Temp.	°C	14.9	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	267.2 ppm	4382.7 ppm	0.0 %
CO_2	Pass	Pass	133597.1 ppm	151423.1 ppm	0.0 %
NOx	Pass	Pass	12.6 ppm	119.8 ppm	0.0 %
NO	---	---	13.2 ppm	123.7 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	58:32	19:04	14:51
Distance	km	29.3	23.9	26.2
Dist. Share	%	36.9	30.1	33.0
Ave. Speed	km/h	30.0	75.1	105.9

Total Duration	min:s	92:27

Stop

	Unit	Value
First Idling Duration	s	1
Longest Stop Duration	s	98
Total Stop Duration	s	524
Stop Ratio in Urban	%	14.9

Motorway

	Unit	Value
Maximum Speed	km/h	116.0
Duration (> 100 km/h)	min:s	13:05
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	28.0
Altitude Diff. (GPS - MAP)	m	-0.3
CPE Gain (Total Trip)	m/100km	439.0
CPE Gain (Urban)	m/100km	474.0

Hot Start

	Unit	Value
Coolant Temp. at Start Point	°C	81.0
Oil Temp. at Start Point	°C	72.0

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1207	431	396
v*apos_[95]	m2/s3	11.973	15.740	17.270
RPA	m/s2	0.219	0.134	0.143

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	96.1	100.0	71.4

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	17.832	43.055	-	-	---	---
CO_2	g/km	119.693	120.118	-	-	---	---
NO	mg/km	1.813	1.506	-	-	---	---
NO2	mg/km	0.134	0.073	-	-	---	---
NOx	mg/km	1.806	1.430	2%	1.43	85.80	60.0
PN	#/km	9.94E10	8.89E10	15%	1.50	9.00E11	6.00E11

* Final Conformity Factor

Type 1a (RDE) - Cold test [3]

Test Date :	05/04/2024	**Vehicle Name :**	RAV4 4720
Test Start :	11:18:11	**Vehicle Category :**	M1
Test End :	13:56:18	**Vehicle Class :**	NOVC-HEV
Comment :	Cold test Sport mode[3]	**Fuel Type :**	Gasoline

[3] Test plan adjusted, see F. Lessons Learned : RDE Moving Average Window Challenges and Adjustments for the Toyota RAV4.

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	145.2	Moderate
Min. Temp.	°C	16.7	Moderate
Max. Temp.	°C	21.8	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	585.2 ppm	4831.3 ppm	0.0 %
CO_2	Pass	Pass	136472.5 ppm	153880.5 ppm	0.0 %
NOx	Pass	Pass	21.1 ppm	86.6 ppm	0.0 %
NO	---	---	21.5 ppm	89.6 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	70:28	22:14	16:09
Distance	km	34.6	27.0	28.6
Dist. Share	%	38.4	30.0	31.7
Ave. Speed	km/h	29.5	72.9	106.2

Total Duration	min:s	108:51

Stop

	Unit	Value
First Idling Duration	s	2
Longest Stop Duration	s	98
Total Stop Duration	s	611
Stop Ratio in Urban	%	14.5

Motorway

	Unit	Value
Maximum Speed	km/h	115.3
Duration (> 100 km/h)	min:s	14:58
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	29.2
Altitude Diff. (GPS - MAP)	m	3.8
CPE Gain (Total Trip)	m/100km	414.5
CPE Gain (Urban)	m/100km	421.9

Cold Start

	Unit	Value
Total Stop Duration	s	29
Average Speed	km/h	31.5
Maximum Speed	km/h	57.4

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1729	543	476
v*apos_[95]	m2/s3	11.646	15.477	17.439
RPA	m/s2	0.264	0.159	0.165

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	96.4	50.5

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	65.211	39.214	-	-	---	---
CO_2	g/km	128.953	122.990	-	-	---	---
NO	mg/km	1.627	2.395	-	-	---	---
NO2	mg/km	0.167	0.112	-	-	---	---
NOx	mg/km	1.679	2.385	4%	1.43	85.80	60.0
PN	#/km	6.43E10	5.89E10	10%	1.50	9.00E11	6.00E11

* Final Conformity Factor

6-JT1-31 RAV4 6622

Type 1

Test information

Date :	14/03/2024	**Preconditioning Cycle :**	WLTP
Start Time :	08:37:13	**Soak In :**	13/03/2024 @ 10:35
End Time :	09:33:27	**Soak Out :**	14/03/2024 @ 08:25
Test Cycle :	WLTC Class3b	**Odometer :** (km)	53652
Regulation :	Euro 6d	**Oil Temp :** (°C)	23.4
MIRA Engineer :	Daniel Newson	**Coolant Temp :** (°C)	23.9

Vehicle Details

Manufacturer :	Toyota	**VIN :**	??????????????6622
Model :	RAV4	**Engine Capacity :** (cc)	2487
Front Tyre Size :	225/60R18	**Transmission :**	CVT
Rear Tyre Size :	225/60R18	**Front Pressure :** (bar)	2.3
		Rear Pressure : (bar)	2.3

Test conditions

	Maximum	Minimum
Barometer : (kPA)	99.53	99.46
Cell Temperature: (°C)	23.80	22.30
Relative Humidity : (%)	41.00	36.50
Absolute Humidity : (g/kg)	7.20	6.40

Vehicle Road Load Model

	Inertia(kg)	**F0**(N)	**F1**(N/(km/h))	**F2**(N/(km/h)²)
Target :	1834.7	118.5	1.052	0.03548
Dyno :	1809.35	53.6	-0.024	0.04112

Fuel Info

Fuel Type : Gasoline E10
Batch Number : 58720
Density : 0.7440 (kg/l)
HC Ratio : 1.9170
OC Ratio : 0.0311
C.W.F. : 83.1700 (%mass)
N.H.V. : 41.6200 (MJ/kg)

Final test results

	CO_2 (g/km)	CO (mg/km)	THC (mg/km)	NOx (mg/km)	HC +NOx (mg/km)	CH_4 (mg/km)	PM (mg/km)	NMHC (mg/km)	NMHC +NOx (mg/km)	PN (#/km)	Fuel Cons. (l/100km)	Distance (km)
Sample 1	137.1	432.2	65.1	3.9	69.1	8.7	-	56.7	60.6	1.47E+11	6.11	3.079
Sample 2	116.5	29.1	1.6	0.7	2.3	0.6	-	1.0	1.7	2.73E+10	5.16	4.725
Sample 3	99.0	14.3	1.1	0.6	1.7	0.5	-	0.6	1.2	1.87E+10	4.38	7.136
Sample 4	135.1	59.4	1.5	0.6	2.1	0.6	-	0.8	1.4	3.40E+10	5.98	8.229
Total	**120**	**88.9**	**9.8**	**1.1**	**10.9**	**1.7**	**0.13**	**8.2**	**9.3**	**4.29E+10**	**5.3**	**23.170**
Limit[1]	-	1000	100	60	-	-	4.5	68	-	6.00E+11	-	-
% Limit	-	9%	10%	2%	-	-	3%	12%	-	7%	-	-
COC	129	175.1	17.2	3.0	-	-	0.13	14.3	-	0.72E+11	5.7	-
% COC	93%	51%	57%	36%	-	-	100%	58%	-	60%	94%	-
Status	-	Pass	Pass	Pass	-	-	Pass	Pass	-	Pass	-	-

[1] The emission limit set out in Annex I of Regulation (EC) No 715/2007.

PEMS Validation

	CO_2 (g/km)	CO (mg/km)	NOx (mg/km)	PN (#/km)	Distance[2] (km)
Absolute Difference	9.68	-34.69	-0.76	-3.89E+09	-695.20
Absolute Limit (±)[3]	10	150	10	1E11	250.00
Status	**Pass**	**Pass**	**Pass**	**Pass**	**Fail**
Relative Difference (%)	7.98	-38.85	-63.12	-8.98	-
Relative Limit (±%)[3]	10	15	15	50	-
Status	**Pass**	**Fail**	**Fail**	**Pass**	-
Overall	**Pass**	**Pass**	**Pass**	**Pass**	**N.A.**

[2] Only applicable if vehicle speed is determined by the ECU;
to meet the permissible tolerance it is permitted to adjust the ECU vehicle speed measurements based on the outcome of the validation test.

[3] Limit in accordance with Table 1, appendix 3 to Annex IIIA. " (…) of the laboratory reference, whichever is larger"

Type 1a (RDE)- Hot Test

Test Date : 14/03/2024
Test Start : 11:37:50
Test End : 14:25:01
Comment : Hot Test

Vehicle Name : RAV4 6622
Vehicle Category : M1
Vehicle Class : NOVC-HEV
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	146.2	Moderate
Min. Temp.	°C	13.6	Moderate
Max. Temp.	°C	19.0	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	150.6 ppm	1665.8 ppm	0.0 %
CO_2	Pass	Pass	133215.1 ppm	152111.1 ppm	0.0 %
NOx	Pass	Pass	11.1 ppm	1082.7 ppm	0.0 %
NO	---	---	10.5 ppm	1149.6 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.1
GPS Invalid Longest Time	s	17
GPS Invalid Total Time	s	24

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	70:52	21:25	15:29
Distance	km	34.6	25.9	29.1
Dist. Share	%	38.6	28.9	32.5
Ave. Speed	km/h	29.3	72.7	112.8

Total Duration	min:s	107:46

Stop

	Unit	Value
First Idling Duration	s	0
Longest Stop Duration	s	122
Total Stop Duration	s	637
Stop Ratio in Urban	%	15.0

Motorway

	Unit	Value
Maximum Speed	km/h	125.0
Duration (> 100 km/h)	min:s	14:46
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	23.4
Altitude Diff. (GPS - MAP)	m	7.3
CPE Gain (Total Trip)	m/100km	426.3
CPE Gain (Urban)	m/100km	465.5

Hot Start

	Unit	Value
Coolant Temp. at Start Point	°C	85.0
Oil Temp. at Start Point	°C	---

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1474	422	264
v*apos_[95]	m2/s3	13.059	18.162	19.907
RPA	m/s2	0.231	0.107	0.075

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	91.1

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	4.223	21.934	-	-	---	---
CO_2	g/km	114.766	122.482	-	-	---	---
NO	mg/km	5.297	2.545	-	-	---	---
NO2	mg/km	0.499	0.389	-	-	---	---
NOx	mg/km	5.470	2.725	5%	1.43	85.80	60.0
PN	#/km	4.12E10	4.42E10	7%	1.50	9.00E11	6.00E11

* Final Conformity Factor

Type 1a (RDE) - Cold test

Test Date :	15/03/2024	**Vehicle Name :**	RAV4 6622
Test Start :	08:54:50	**Vehicle Category :**	M1
Test End :	11:42:19	**Vehicle Class :**	NOVC-HEV
Comment :	Cold test	**Fuel Type :**	Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	145.8	Moderate
Min. Temp.	°C	12.7	Moderate
Max. Temp.	°C	19.3	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	320.9 ppm	5925.5 ppm	0.0 %
CO_2	Pass	Pass	136400.2 ppm	154179.7 ppm	0.0 %
NOx	Pass	Pass	10.8 ppm	213.1 ppm	0.0 %
NO	---	---	10.7 ppm	219.9 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	75:33	22:24	15:38
Distance	km	33.8	27.4	29.1
Dist. Share	%	37.4	30.3	32.3
Ave. Speed	km/h	26.8	73.3	111.8

Total Duration	min:s	113:35

Stop

	Unit	Value
First Idling Duration	s	0
Longest Stop Duration	s	115
Total Stop Duration	s	711
Stop Ratio in Urban	%	15.7

Motorway

	Unit	Value
Maximum Speed	km/h	121.3
Duration (> 100 km/h)	min:s	15:11
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	26.3
Altitude Diff. (GPS - MAP)	m	8.1
CPE Gain (Total Trip)	m/100km	440.9
CPE Gain (Urban)	m/100km	463.6

Cold Start

	Unit	Value
Total Stop Duration	s	32
Average Speed	km/h	31.2
Maximum Speed	km/h	54.2

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1583	371	283
v*apos_[95]	m2/s3	13.160	17.907	19.137
RPA	m/s2	0.242	0.089	0.073

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	87.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	43.580	32.599	-	-	---	---
CO_2	g/km	134.044	128.524	-	-	---	---
NO	mg/km	3.084	1.506	-	-	---	---
NO2	mg/km	0.312	0.250	-	-	---	---
NOx	mg/km	3.184	1.558	3%	1.43	85.80	60.0
PN	#/km	6.16E10	5.01E10	8%	1.50	9.00E11	6.00E11

* Final Conformity Factor

6-JT1-31 ES 6408

Type 1

Test information

Date :	29/02/2024	**Preconditioning Cycle :**	WLTP
Start Time :	14:54:06	**Soak In :**	28/02/2024 @ 13:45
End Time :	15:48:27	**Soak Out :**	29/02/2024 @ 14:00
Test Cycle :	WLTC Class3b	**Odometer :** (km)	15097
Regulation :	Euro 6d	**Oil Temp :** (°C)	22.3
MIRA Engineer :	Daniel Newson	**Coolant Temp :** (°C)	22.4

Vehicle Details

Manufacturer :	Lexus	**VIN :**	??????????????6408
Model :	ES300H	**Engine Capacity :** (cc)	2487
Front Tyre Size :	235/45R18	**Transmission :**	Automatic
Rear Tyre Size :	235/45R18	**Front Pressure :** (bar)	2.4
		Rear Pressure : (bar)	2.4

Test conditions

	Maximum	Minimum
Barometer : (kPA)	99.21	99.13
Cell Temperature: (°C)	23.70	22.20
Relative Humidity : (%)	41.20	38.00
Absolute Humidity : (g/kg)	7.27	6.83

Vehicle Road Load Model

	Inertia(kg)	**F0**(N)	**F1**(N/(km/h))	**F2**(N/(km/h)²)
Target :	1894.4	170.1	0.017	0.03423
Dyno :	1867.7	72.8	-0.974	0.03965

Fuel Info

Fuel Type : Gasoline E10
Batch Number : 58720
Density : 0.7440 (kg/l)
HC Ratio : 1.9170
OC Ratio : 0.0311
C.W.F. : 83.1700 (%mass)
N.H.V. : 41.6200 (MJ/kg)

Final test results

	CO_2 (g/km)	CO (mg/km)	THC (mg/km)	NOx (mg/km)	HC +NOx (mg/km)	CH_4 (mg/km)	PM (mg/km)	NMHC (mg/km)	NMHC +NOx (mg/km)	PN (#/km)	Fuel Cons. (l/100km)	Distance (km)
Sample 1	146.8	498.4	64.8	5.1	69.9	9.5	-	55.6	60.7	5.76E+10	6.32	3.107
Sample 2	118.8	32.5	1.5	0.7	2.2	1.3	-	0.2	0.9	3.28E+10	5.08	4.764
Sample 3	92.4	20.3	0.6	0.2	0.7	0.6	-	0.0	0.1	1.70E+10	3.95	7.174
Sample 4	125.9	64.1	0.6	0.4	1.0	0.7	-	0.0	0.3	1.80E+10	5.39	8.254
Total	**117**	**102.1**	**9.3**	**1.0**	**10.4**	**2.0**	**0.08**	**7.4**	**8.4**	**2.60E+10**	**5.2**	**23.299**
Limit[1]	-	1000	100	60	-	-	4.5	68	-	6.00E+11	-	-
% Limit	-	10%	9%	2%	-	-	2%	11%	-	4%	-	-
COC	120	176.6	14.2	1.9	-	-	0.13	11.3	-	0.68E+11	5.3	-
% COC	97%	58%	66%	53%	-	-	63%	66%	-	38%	98%	-
Status	-	Pass	Pass	Pass	-	-	Pass	Pass	-	Pass	-	-

[1] *The emission limit set out in Annex I of Regulation (EC) No 715/2007.*

PEMS Validation

	CO_2 (g/km)	CO (mg/km)	NOx (mg/km)	PN (#/km)	Distance[2] (km)
Absolute Difference	9.67	-9.98	-0.55	-3.07E+09	-389.07
Absolute Limit (±)[3]	10	150	10	1E11	250.00
Status	**Pass**	**Pass**	**Pass**	**Pass**	**Fail**
Relative Difference (%)	8.01	-9.25	-43.77	-10.07	-
Relative Limit (±%)[3]	10	15	15	50	-
Status	**Pass**	**Pass**	**Fail**	**Pass**	-
Overall	**Pass**	**Pass**	**Pass**	**Pass**	**N.A.**

[2] *Only applicable if vehicle speed is determined by the ECU;*
to meet the permissible tolerance it is permitted to adjust the ECU vehicle speed measurements based on the outcome of the validation test.

[3] *Limit in accordance with Table 1, appendix 3 to Annex IIIA. " (…) of the laboratory reference, whichever is larger"*

Type 1a (RDE)- Hot Test

Test Date : 04/03/2024
Test Start : 09:37:42
Test End : 12:18:24
Comment : Hot test

Vehicle Name : ES 6408
Vehicle Category : M1
Vehicle Class : NOVC-HEV
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	143.4	Moderate
Min. Temp.	°C	9.5	Moderate
Max. Temp.	°C	16.2	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	308.4 ppm	3164.9 ppm	0.0 %
CO_2	Pass	Pass	131293.8 ppm	150084.2 ppm	0.0 %
NOx	Pass	Pass	23.8 ppm	122.4 ppm	0.0 %
NO	---	---	24.7 ppm	129.9 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	57:29	20:44	13:06
Distance	km	28.5	26.0	23.1
Dist. Share	%	36.7	33.5	29.8
Ave. Speed	km/h	29.7	75.1	105.9

Total Duration	min:s	91:19

Stop

	Unit	Value
First Idling Duration	s	0
Longest Stop Duration	s	139
Total Stop Duration	s	444
Stop Ratio in Urban	%	12.9

Motorway

	Unit	Value
Maximum Speed	km/h	116.8
Duration (> 100 km/h)	min:s	11:26
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	16.2
Altitude Diff. (GPS - MAP)	m	1.7
CPE Gain (Total Trip)	m/100km	521.2
CPE Gain (Urban)	m/100km	556.5

Hot Start

	Unit	Value
Coolant Temp. at Start Point	°C	89.0
Oil Temp. at Start Point	°C	77.0

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1274	433	296
v*apos_[95]	m2/s3	13.128	17.177	18.111
RPA	m/s2	0.239	0.125	0.115

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	91.3	100.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	36.850	45.893	-	-	---	---
CO_2	g/km	133.591	129.334	-	-	---	---
NO	mg/km	4.629	2.169	-	-	---	---
NO2	mg/km	0.198	0.256	-	-	---	---
NOx	mg/km	4.484	2.109	4%	1.43	85.80	60.0
PN	#/km	3.58E10	5.30E10	9%	1.50	9.00E11	6.00E11

* Final Conformity Factor

Type 1a (RDE) - Cold test

Test Date :	05/03/2024	**Vehicle Name :**	ES 6408
Test Start :	08:59:43	**Vehicle Category :**	M1
Test End :	11:28:41	**Vehicle Class :**	NOVC-HEV
Comment :	Cold test	**Fuel Type :**	Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	143.9	Moderate
Min. Temp.	°C	8.5	Moderate
Max. Temp.	°C	16.4	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	583.4 ppm	8818.8 ppm	0.0 %
CO_2	Pass	Pass	137198.1 ppm	155129.8 ppm	0.0 %
NOx	Pass	Pass	23.9 ppm	590.8 ppm	0.0 %
NO	---	---	24.2 ppm	628.3 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	62:40	18:56	12:45
Distance	km	31.9	23.2	23.0
Dist. Share	%	40.8	29.7	29.5
Ave. Speed	km/h	30.5	73.4	108.4

Total Duration	min:s	94:21

Stop

	Unit	Value
First Idling Duration	s	0
Longest Stop Duration	s	87
Total Stop Duration	s	445
Stop Ratio in Urban	%	11.8

Motorway

	Unit	Value
Maximum Speed	km/h	117.8
Duration (> 100 km/h)	min:s	11:50
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	16.6
Altitude Diff. (GPS - MAP)	m	2.8
CPE Gain (Total Trip)	m/100km	506.8
CPE Gain (Urban)	m/100km	534.5

Cold Start

	Unit	Value
Total Stop Duration	s	11
Average Speed	km/h	33.9
Maximum Speed	km/h	52.1

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1380	400	319
v*apos_[95]	m2/s3	12.826	17.290	18.472
RPA	m/s2	0.229	0.127	0.120

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	99.4	100.0	100.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	70.174	50.513	-	-	---	---
CO_2	g/km	139.411	132.455	-	-	---	---
NO	mg/km	4.906	2.823	-	-	---	---
NO2	mg/km	0.130	0.182	-	-	---	---
NOx	mg/km	4.663	2.711	5%	1.43	85.80	60.0
PN	#/km	4.60E10	5.15E10	9%	1.50	9.00E11	6.00E11

* Final Conformity Factor

6-JT1-48 YARIS 7699

Type 1

Test information

Date :	20/03/2024	**Preconditioning Cycle :**	WLTP
Start Time :	08:27:22	**Soak In :**	19/03/2024 @ 09:50
End Time :	09:25:07	**Soak Out :**	20/03/2024 @ 08:00
Test Cycle :	WLTC Class3b	**Odometer :** (km)	35974
Regulation :	Euro 6d	**Oil Temp :** (°C)	24.1
MIRA Engineer :	Daniel Newson	**Coolant Temp :** (°C)	23.9

Vehicle Details

Manufacturer :	Toyota	**VIN :**	????????????7699
Model :	Yaris	**Engine Capacity :** (cc)	1490
Front Tyre Size :	185/65R15	**Transmission :**	Manual
Rear Tyre Size :	185/65R15	**Front Pressure :** (bar)	2.3
		Rear Pressure : (bar)	2.2

Test conditions

	Maximum	Minimum
Barometer : (kPA)	100.73	100.66
Cell Temperature: (°C)	23.80	22.20
Relative Humidity : (%)	41.20	36.20
Absolute Humidity : (g/kg)	7.05	6.29

Vehicle Road Load Model

	Inertia(kg)	**F0**(N)	**F1**(N/(km/h))	**F2**(N/(km/h)²)
Target :	1248.2	62.5	0.966	0.02595
Dyno :	1231.1	26.7	0.403	0.02723

Fuel Info

Fuel Type : Gasoline E10
Batch Number : 58720
Density : 0.7440 (kg/l)
HC Ratio : 1.9170
OC Ratio : 0.0311
C.W.F. : 83.1700 (%mass)
N.H.V. : 41.6200 (MJ/kg)

Final test results

	CO_2 (g/km)	CO (mg/km)	THC (mg/km)	NOx (mg/km)	HC +NOx (mg/km)	CH_4 (mg/km)	PM (mg/km)	NMHC (mg/km)	NMHC +NOx (mg/km)	PN (#/km)	Fuel Cons. (l/100km)	Distance (km)
Sample 1	169.5	527.1	41.7	26.2	67.9	6.6	-	35.3	61.5	1.98E+11	7.54	3.099
Sample 2	119.2	10.6	2.4	4.8	7.2	2.4	-	0.1	4.9	1.33E+11	5.28	4.762
Sample 3	103.1	45.1	3.3	3.1	6.4	2.8	-	0.6	3.7	3.93E+10	4.57	7.165
Sample 4	120.3	126.6	10.9	10.0	20.9	4.4	-	6.6	16.6	6.13E+10	5.33	8.251
Total	**121**	**131.1**	**10.9**	**8.9**	**19.9**	**3.8**	**0.19**	**7.3**	**16.2**	**8.75E+10**	**5.4**	**23.277**
Limit[1]	-	1000	100	60	-	-	4.5	68	-	6.00E+11	-	-
% Limit	-	13%	11%	15%	-	-	4%	11%	-	15%	-	-
COC	118	120.8	10.7	8.9	-	-	0.52	8.9	-	8.80E+10	5.0	118
% COC	103%	109%	102%	100%	-	-	37%	82%	-	99%	108%	103%
Status	-	Pass	Pass	Pass	-	-	Pass	Pass	-	Pass	-	-

[1] *The emission limit set out in Annex I of Regulation (EC) No 715/2007.*

PEMS Validation

	CO_2 (g/km)	CO (mg/km)	NOx (mg/km)	PN (#/km)	Distance[2] (km)
Absolute Difference	5.07	-26.24	-0.90	1.19E+09	-199.47
Absolute Limit (±)[3]	10	150	10	1E11	250.00
Status	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**
Relative Difference (%)	4.12	-19.93	-8.87	1.35	-
Relative Limit (±%)[3]	10	15	15	50	-
Status	**Pass**	**Fail**	**Pass**	**Pass**	-
Overall	**Pass**	**Pass**	**Pass**	**Pass**	**N.A.**

[2] *Only applicable if vehicle speed is determined by the ECU;*
to meet the permissible tolerance it is permitted to adjust the ECU vehicle speed measurements based on the outcome of the validation test.

[3] *Limit in accordance with Table 1, appendix 3 to Annex IIIA. " (…) of the laboratory reference, whichever is larger"*

Type 1a (RDE)- Hot Test

Test Date : 21/03/2024
Test Start : 13:54:44
Test End : 16:36:30
Comment : Hot test

Vehicle Name : Toyota Yaris
Vehicle Category : M1
Vehicle Class : ICE
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	141.8	Moderate
Min. Temp.	°C	13.3	Moderate
Max. Temp.	°C	17.3	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	357.6 ppm	1902.8 ppm	0.0 %
CO_2	Pass	Pass	132844.4 ppm	157989.4 ppm	0.0 %
NOx	Pass	Pass	25.5 ppm	339.5 ppm	0.0 %
NO	---	---	25.7 ppm	357.3 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	67:11	20:04	11:38
Distance	km	28.9	25.6	20.5
Dist. Share	%	38.5	34.2	27.3
Ave. Speed	km/h	25.8	76.6	105.7

Total Duration	min:s	98:53

Stop

	Unit	Value
First Idling Duration	s	4
Longest Stop Duration	s	108
Total Stop Duration	s	687
Stop Ratio in Urban	%	17.0

Motorway

	Unit	Value
Maximum Speed	km/h	118.1
Duration (> 100 km/h)	min:s	8:22
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	16.3
Altitude Diff. (GPS - MAP)	m	4.7
CPE Gain (Total Trip)	m/100km	433.5
CPE Gain (Urban)	m/100km	402.8

Hot Start

	Unit	Value
Coolant Temp. at Start Point	°C	74.0
Oil Temp. at Start Point	°C	---

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1329	430	203
v*apos_[95]	m2/s3	11.456	14.932	14.238
RPA	m/s2	0.195	0.109	0.061

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	93.1	100.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	6.610	38.225	-	-	---	---
CO_2	g/km	144.045	124.106	-	-	---	---
NO	mg/km	5.092	5.322	-	-	---	---
NO2	mg/km	0.282	0.209	-	-	---	---
NOx	mg/km	5.288	5.389	9%	1.43	85.80	60.0
PN	#/km	4.44E10	4.23E10	7%	1.50	9.00E11	6.00E11

* Final Conformity Factor

Type 1a (RDE) - Cold test

Test Date : 22/03/2024
Test Start : 09:02:10
Test End : 11:23:29
Comment : Cold test

Vehicle Name : Toyota Yaris
Vehicle Category : M1
Vehicle Class : ICE
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	131.8	Moderate
Min. Temp.	°C	10.5	Moderate
Max. Temp.	°C	14.0	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	581.1 ppm	23710.7 ppm	0.0 %
CO_2	Pass	Pass	135427.1 ppm	152885.6 ppm	0.0 %
NOx	Pass	Pass	36.8 ppm	751.8 ppm	0.0 %
NO	---	---	37.1 ppm	776.4 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	58:21	19:54	14:22
Distance	km	29.8	25.6	26.4
Dist. Share	%	36.4	31.3	32.3
Ave. Speed	km/h	30.6	77.3	110.3

Total Duration	min:s	92:37

Stop

	Unit	Value
First Idling Duration	s	4
Longest Stop Duration	s	96
Total Stop Duration	s	543
Stop Ratio in Urban	%	15.5

Motorway

	Unit	Value
Maximum Speed	km/h	120.1
Duration (> 100 km/h)	min:s	13:23
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	2.7
Altitude Diff. (GPS - MAP)	m	4.5
CPE Gain (Total Trip)	m/100km	425.4
CPE Gain (Urban)	m/100km	427.4

Cold Start

	Unit	Value
Total Stop Duration	s	5
Average Speed	km/h	33.6
Maximum Speed	km/h	54.6

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1175	413	217
v*apos_[95]	m2/s3	11.748	14.961	16.094
RPA	m/s2	0.188	0.097	0.061

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	100.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	80.135	68.331	-	-	---	---
CO_2	g/km	138.206	123.965	-	-	---	---
NO	mg/km	6.760	5.910	-	-	---	---
NO2	mg/km	0.225	0.186	-	-	---	---
NOx	mg/km	6.839	5.884	10%	1.43	85.80	60.0
PN	#/km	5.07E10	4.47E10	7%	1.50	9.00E11	6.00E11

* Final Conformity Factor

6-JT1-48 YARIS 0138

Type 1

Test information

Date :	22/02/2024	**Preconditioning Cycle :**	WLTP
Start Time :	11:04:42	**Soak In :**	21/02/2024 @ 15:20
End Time :	11:59:00	**Soak Out :**	22/02/2024 @ 10:40
Test Cycle :	WLTC Class3b	**Odometer :** (km)	51975
Regulation :	Euro 6d	**Oil Temp :** (°C)	24.0
MIRA Engineer :	Daniel Newson	**Coolant Temp :** (°C)	24.1

Vehicle Details

Manufacturer :	Toyota	**VIN :**	??????????????0138
Model :	Yaris	**Engine Capacity :** (cc)	1490
Front Tyre Size :	185/65R15	**Transmission :**	Manual
Rear Tyre Size :	185/65R15	**Front Pressure :** (bar)	2.3
		Rear Pressure : (bar)	2.2

Test conditions

	Maximum	Minimum
Barometer : (kPA)	96.95	96.91
Cell Temperature: (°C)	23.80	22.30
Relative Humidity : (%)	41.00	35.80
Absolute Humidity : (g/kg)	7.31	6.43

Vehicle Road Load Model

	Inertia (kg)	**F0** (N)	**F1** (N/(km/h))	**F2** (N/(km/h)²)
Target :	1248.2	62.5	0.966	0.02595
Dyno :	1231.1	23.2	0.422	0.02715

Fuel Info

Fuel Type : Gasoline E10 (reference fuel)
Batch Number : 58720
Density : 0.7440 (kg/l)
HC Ratio : 1.9170
OC Ratio : 0.0311
C.W.F. : 83.1700 (%mass)
N.H.V. : 41.6200 (MJ/kg)

Final test results

	CO_2 (g/km)	CO (mg/km)	THC (mg/km)	NOx (mg/km)	HC +NOx (mg/km)	CH_4 (mg/km)	PM (mg/km)	NMHC (mg/km)	NMHC +NOx (mg/km)	PN (#/km)	Fuel Cons. (l/100km)	Distance (km)
Sample 1	154.1	450.6	36.3	15.4	51.7	5.7	-	30.7	46.1	1.59E+10	6.86	3.092
Sample 2	109.7	20.1	1.1	2.8	4	1.1	-	0.1	2.9	8.18E+09	4.90	4.741
Sample 3	97.3	36.8	0.9	2.1	2.9	0.9	-	0	2.1	1.83E+09	4.35	7.172
Sample 4	115.5	93.5	5.5	4.9	10.4	2.4	-	3.2	8.1	5.46E+09	5.15	8.262
Total	**114**	**108.5**	**7.3**	**5.0**	**12.3**	**2.1**	**0.54**	**5.2**	**10.2**	**6.29E+09**	**5.1**	**23.267**
Limit[1]	-	1000	100	60	-	-	4.5	68	-	6.00E+11	-	-
% Limit	-	11%	7%	8%	-	-	12%	8%	-	1%	-	-
COC	118	120.8	10.7	8.9	-	-	0.52	8.9	-	0.88E+11	5.0	-
% COC	96%	90%	68%	56%	-	-	104%	59%	-	7%	102%	-
Status	-	Pass	Pass	Pass	-	-	Pass	Pass	-	Pass	-	-

[1] The emission limit set out in Annex I of Regulation (EC) No 715/2007.

PEMS Validation

	CO_2 (g/km)	CO (mg/km)	NOx (mg/km)	PN (#/km)	Distance[2] (km)
Absolute Difference	9.61	-33.22	0.11	3.28E+08	-453.14
Absolute Limit (±)[3]	10	150	10	1E11	250.00
Status	**Pass**	**Pass**	**Pass**	**Pass**	**Fail**
Relative Difference (%)	8.30	-27.26	1.54	4.16	-
Relative Limit (±%)[3]	10	15	15	50	-
Status	**Pass**	**Fail**	**Pass**	**Pass**	-
Overall	**Pass**	**Pass**	**Pass**	**Pass**	**N.A.**

[2] Only applicable if vehicle speed is determined by the ECU;
to meet the permissible tolerance it is permitted to adjust the ECU vehicle speed measurements based on the outcome of the validation test.

[3] Limit in accordance with Table 1, appendix 3 to Annex IIIA. " (…) of the laboratory reference, whichever is larger"

Type 1a (RDE)- Hot Test

Test Date : 26/02/2024
Test Start : 09:17:28
Test End : 11:57:25
Comment : Hot test

Vehicle Name : YARIS 0138
Vehicle Category : M1
Vehicle Class: ICE
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	140.2	Moderate
Min. Temp.	°C	7.1	Moderate
Max. Temp.	°C	11.4	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	251.2 ppm	1044.3 ppm	0.0 %
CO_2	Pass	Pass	129102.5 ppm	145522.3 ppm	0.0 %
NOx	Pass	Pass	54.4 ppm	275.9 ppm	0.0 %
NO	---	---	52.5 ppm	271.8 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	66:39	22:04	15:31
Distance	km	34.3	27.2	28.2
Dist. Share	%	38.2	30.3	31.5
Ave. Speed	km/h	30.9	73.9	109.1

Total Duration	min:s	104:14

Stop

	Unit	Value
First Idling Duration	s	3
Longest Stop Duration	s	88
Total Stop Duration	s	525
Stop Ratio in Urban	%	13.1

Motorway

	Unit	Value
Maximum Speed	km/h	118.7
Duration (> 100 km/h)	min:s	14:50
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	23.0
Altitude Diff. (GPS - MAP)	m	2.6
CPE Gain (Total Trip)	m/100km	408.3
CPE Gain (Urban)	m/100km	404.5

Hot Start

	Unit	Value
Coolant Temp. at Start Point	°C	83.0
Oil Temp. at Start Point	°C	---

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1444	458	314
v*apos_[95]	m2/s3	12.146	15.631	17.267
RPA	m/s2	0.218	0.125	0.104

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	97.8	100.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	1.096	21.445	-	-	---	---
CO_2	g/km	150.639	140.703	-	-	---	---
NO	mg/km	8.201	6.924	-	-	---	---
NO2	mg/km	0.288	0.138	-	-	---	---
NOx	mg/km	8.325	6.806	11%	1.43	85.80	60.0
PN	#/km	8.43E9	1.01E10	2%	1.50	9.00E11	6.00E11

* Final Conformity Factor

Type 1a (RDE) - Cold test

Test Date : 28/02/2024
Test Start : 13:03:36
Test End : 15:57:39
Comment : Cold test

Vehicle Name : YARIS 0138
Vehicle Category : M1
Vehicle Class : ICE
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	141.2	Moderate
Min. Temp.	°C	8.1	Moderate
Max. Temp.	°C	17.1	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	443.6 ppm	26497.3 ppm	0.0 %
CO_2	Pass	Pass	136830.8 ppm	154637.2 ppm	0.0 %
NOx	Pass	Pass	36.7 ppm	1142.9 ppm	0.0 %
NO	---	---	38.3 ppm	1178.8 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	80:50	22:40	13:31
Distance	km	34.9	28.6	25.5
Dist. Share	%	39.2	32.1	28.7
Ave. Speed	km/h	25.9	75.6	113.3

Total Duration	min:s	117:01

Stop

	Unit	Value
First Idling Duration	s	4
Longest Stop Duration	s	131
Total Stop Duration	s	917
Stop Ratio in Urban	%	18.9

Motorway

	Unit	Value
Maximum Speed	km/h	124.5
Duration (> 100 km/h)	min:s	13:05
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	23.0
Altitude Diff. (GPS - MAP)	m	4.5
CPE Gain (Total Trip)	m/100km	414.4
CPE Gain (Urban)	m/100km	389.3

Cold Start

	Unit	Value
Total Stop Duration	s	22
Average Speed	km/h	30.8
Maximum Speed	km/h	50.4

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1590	369	214
v*apos_[95]	m2/s3	12.490	16.164	18.429
RPA	m/s2	0.204	0.089	0.073

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	94.9	87.0	88.7

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	50.220	70.094	-	-	---	---
CO_2	g/km	153.227	148.291	-	-	---	---
NO	mg/km	6.359	6.566	-	-	---	---
NO2	mg/km	0.055	0.029	-	-	---	---
NOx	mg/km	6.010	6.068	10%	1.43	85.80	60.0
PN	#/km	6.21E9	5.90E9	1%	1.50	9.00E11	6.00E11

* Final Conformity Factor

6-JT1-48 YARIS 6906

Type 1

Test information

Date :	06/03/2024	**Preconditioning Cycle :**	WLTP
Start Time :	08:19:50	**Soak In :**	05/03/2024 @ 13:20
End Time :	09:15:22	**Soak Out :**	06/03/2024 @ 08:08
Test Cycle :	WLTC Class3b	**Odometer :** (km)	19012
Regulation :	Euro 6d	**Oil Temp :** (°C)	24.3
MIRA Engineer :	Daniel Newson	**Coolant Temp :** (°C)	21.2

Vehicle Details

Manufacturer :	Toyota	**VIN :**	??????????????6906
Model :	Yaris	**Engine Capacity :** (cc)	1490
Front Tyre Size :	195/55R16	**Transmission :**	Manual
Rear Tyre Size :	195/55R16	**Front Pressure :** (bar)	2.2
		Rear Pressure : (bar)	2.0

Test conditions

	Maximum	Minimum
Barometer : (kPA)	101.03	100.99
Cell Temperature: (°C)	23.70	22.10
Relative Humidity : (%)	41.00	37.70
Absolute Humidity : (g/kg)	7.01	6.60

Vehicle Road Load Model

	Inertia(kg)	**F0**(N)	**F1**(N/(km/h))	**F2**(N/(km/h)²)
Target :	1260.2	75.9	0.966	0.02657
Dyno :	1243.1	25.9	0.497	0.02762

Fuel Info

Fuel Type : Gasoline E10
Batch Number : 58720
Density : 0.7440 (kg/l)
HC Ratio : 1.9170
OC Ratio : 0.0311
C.W.F. : 83.1700 (%mass)
N.H.V. : 41.6200 (MJ/kg)

Final test results

	CO_2 (g/km)	CO (mg/km)	THC (mg/km)	NOx (mg/km)	HC +NOx (mg/km)	CH_4 (mg/km)	PM (mg/km)	NMHC (mg/km)	NMHC +NOx (mg/km)	PN (#/km)	Fuel Cons. (l/100km)	Distance (km)
Sample 1	162.8	1102.7	66.6	16.7	83.3	8.4	-	58.5	75.2	9.08E+10	7.29	3.091
Sample 2	115.3	4.6	0.7	3.8	4.5	0.6	-	0.1	4.0	2.16E+10	5.10	4.751
Sample 3	101.6	49.3	1.2	3.1	4.2	1.0	-	0.1	3.2	2.36E+10	4.50	7.163
Sample 4	118.9	126.5	8.0	5.9	13.9	2.3	-	5.8	11.7	5.22E+10	5.27	8.257
Total	**119**	**207.5**	**12.2**	**6.0**	**18.2**	**2.4**	**0.00**	**9.9**	**16.0**	**4.23E+10**	**5.3**	**23.263**
Limit[1]	-	1000	100	60	-	-	4.5	68	-	6.00E+11	-	-
% Limit	-	21%	12%	10%	-	-	0.00%	15%	-	7%	-	-
COC	121	120.8	10.7	8.9	-	-	0.52	8.9	-	8.80E+10	5.2	-
% COC	98%	172%	114%	68%	-	-	0%	111%	-	48%	102%	-
Status	-	Pass	Pass	Pass	-	-	Pass	Pass	-	Pass	-	-

[1] *The emission limit set out in Annex I of Regulation (EC) No 715/2007.*

PEMS Validation

	CO_2 (g/km)	CO (mg/km)	NOx (mg/km)	PN (#/km)	Distance[2] (km)
Absolute Difference	4.31	-43.61	-0.68	-4.23E+08	-271.71
Absolute Limit (±)[3]	10	150	10	1E11	250.00
Status	**Pass**	**Pass**	**Pass**	**Pass**	**Fail**
Relative Difference (%)	3.61	-20.93	-9.93	-0.99	-
Relative Limit (±%)[3]	10	15	15	50	-
Status	**Pass**	**Fail**	**Pass**	**Pass**	-
Overall	**Pass**	**Pass**	**Pass**	**Pass**	**N.A.**

[2] *Only applicable if vehicle speed is determined by the ECU;*
to meet the permissible tolerance it is permitted to adjust the ECU vehicle speed measurements based on the outcome of the validation test.

[3] *Limit in accordance with Table 1, appendix 3 to Annex IIIA. " (…) of the laboratory reference, whichever is larger"*

Type 1a (RDE)- Hot Test

Test Date : 06/03/2024
Test Start : 12:24:11
Test End : 14:51:51
Comment : Hot test

Vehicle Name : YARIS 6906
Vehicle Category : M1
Vehicle Class : ICE
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	143.8	Moderate
Min. Temp.	°C	9.1	Moderate
Max. Temp.	°C	13.1	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	224.0 ppm	1103.1 ppm	0.0 %
CO_2	Pass	Pass	125568.7 ppm	144542.7 ppm	0.0 %
NOx	Pass	Pass	40.0 ppm	1220.3 ppm	0.0 %
NO	---	---	39.3 ppm	1164.6 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	57:12	20:40	13:36
Distance	km	28.7	25.4	23.4
Dist. Share	%	37.0	32.8	30.2
Ave. Speed	km/h	30.1	73.8	103.4

Total Duration	min:s	91:28

Stop

	Unit	Value
First Idling Duration	s	3
Longest Stop Duration	s	93
Total Stop Duration	s	519
Stop Ratio in Urban	%	15.1

Motorway

	Unit	Value
Maximum Speed	km/h	114.5
Duration (> 100 km/h)	min:s	10:32
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	16.3
Altitude Diff. (GPS - MAP)	m	0.7
CPE Gain (Total Trip)	m/100km	507.9
CPE Gain (Urban)	m/100km	540.3

Hot Start

	Unit	Value
Coolant Temp. at Start Point	°C	80.0
Oil Temp. at Start Point	°C	77.0

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1268	436	319
v*apos_[95]	m2/s3	12.121	15.710	16.477
RPA	m/s2	0.215	0.111	0.102

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	100.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	1.971	13.333	-	-	---	---
CO_2	g/km	158.455	131.278	-	-	---	---
NO	mg/km	8.583	5.537	-	-	---	---
NO2	mg/km	0.439	0.190	-	-	---	---
NOx	mg/km	8.914	5.581	9%	1.43	85.80	60.0
PN	#/km	5.27E10	6.53E10	11%	1.50	9.00E11	6.00E11

* Final Conformity Factor

Type 1a (RDE) - Cold test

Test Date : 07/03/2024
Test Start : 08:58:32
Test End : 11:24:23
Comment : Cold test

Vehicle Name : YARIS 6906
Vehicle Category : M1
Vehicle Class : ICE
Fuel Type : Gasoline

Pass :	Green
Fail :	Red

Ambient Conditions

	Unit	Value	Condition
Max. Altitude	m	144.2	Moderate
Min. Temp.	°C	5.3	Moderate
Max. Temp.	°C	16.2	

Analyzer Check

	Drift Check		Span Check		
	Zero	**Span**	**99th x0.9**	**Max. Meas.**	**> Span**
CO	Pass	Pass	593.4 ppm	36660.8 ppm	0.0 %
CO_2	Pass	Pass	135431.6 ppm	153005.3 ppm	0.0 %
NOx	Pass	Pass	51.9 ppm	370.4 ppm	0.0 %
NO	---	---	51.1 ppm	393.4 ppm	0.0 %
THC	---	---	---	---	---
CH_4	---	---	---	---	---

GPS

	Unit	Value
Total Trip Dist. Deviation	%	0.0
GPS Invalid Longest Time	s	0
GPS Invalid Total Time	s	0

Trip Composition

	Unit	Urban	Rural	Motorway
Duration	min:s	60:39	19:54	13:32
Distance	km	29.0	24.5	24.5
Dist. Share	%	37.2	31.4	31.4
Ave. Speed	km/h	28.7	74.0	108.7

Total Duration	min:s	94:05

Stop

	Unit	Value
First Idling Duration	s	2
Longest Stop Duration	s	96
Total Stop Duration	s	560
Stop Ratio in Urban	%	15.4

Motorway

	Unit	Value
Maximum Speed	km/h	117.7
Duration (> 100 km/h)	min:s	12:38
Duration Share (> 145 km/h)	%	0.0

Cumulative Positive Elevation Gain (CPE Gain)

	Unit	Value
Altitude Diff. (End - Start)	m	11.2
Altitude Diff. (GPS - MAP)	m	11.7
CPE Gain (Total Trip)	m/100km	499.8
CPE Gain (Urban)	m/100km	500.2

Cold Start

	Unit	Value
Total Stop Duration	s	2
Average Speed	km/h	35.1
Maximum Speed	km/h	53.5

Dynamics

	Unit	Urban	Rural	Motorway
Positive Count	#	1404	508	294
v*apos_[95]	m2/s3	11.605	15.214	17.209
RPA	m/s2	0.232	0.143	0.109

MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	100.0

Final Emission

	Unit	Urban	Total Trip	% COC	CF*	NTE Pollutant	Value COC
CO	mg/km	87.558	48.852	-	-	---	---
CO_2	g/km	162.597	138.412	-	-	---	---
NO	mg/km	5.631	6.089	-	-	---	---
NO2	mg/km	0.165	0.107	-	-	---	---
NOx	mg/km	5.674	5.994	10%	1.43	85.80	60.0
PN	#/km	7.24E10	6.90E10	12%	1.50	9.00E11	6.00E11

* Final Conformity Factor

(7) Detailed investigations

No detailed investigations were conducted in the reporting period,
as no statistical procedure was concluded as "failed".

(8) Remedial measures

No remedial measures were conducted in the reporting period,
as no statistical procedure was concluded as "failed".

E. Assessment of the yearly expected emissions decrease due to any ISC remedial measures

No assessment was performed due to the answers provided in paragraph 8 “Remedial measures”.

F. Lessons Learned

The 2024 ISC testing program has been an enlightening journey, yielding invaluable insights that will shape our approach to vehicle emissions testing and regulatory compliance in the years to come. Reflecting on the challenges and achievements of this year's program, we have identified several key lessons:

Adaptability to Evolving Standards:
The dynamic landscape of emissions regulations, highlighted by the adoption of the Worldwide harmonized Light vehicles Test Procedure (WLTP) and ISC standards, necessitates an adaptable approach. This year's decision to adhere to Certificate of Conformity (COC) standards, while ensuring compliance, has underscored the importance of flexibility in our testing protocols to accommodate future regulatory changes.

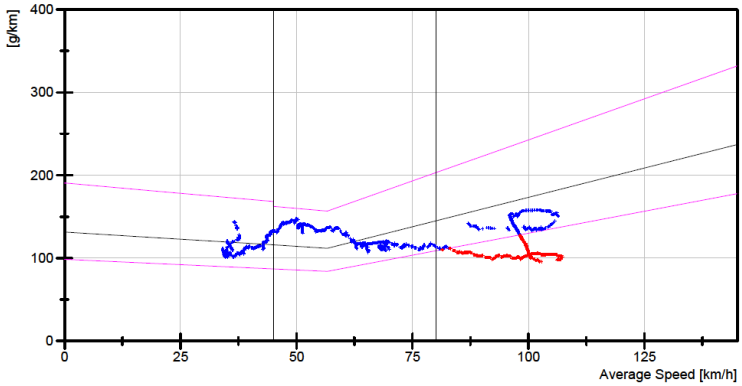
Addressing the Challenges of Vehicle Procurement:
One of the more significant hurdles this year was the procurement of suitable vehicles for testing. The combined strategy of purchasing and renting vehicles, although effective, highlighted the need for a more systematic approach to vehicle selection. This experience has catalysed the pursuit of legislative changes to simplify data collection and ensure a more robust framework for compliance enforcement.

Emphasis on Comprehensive Testing Conditions:
Introducing variances for type 1a tests, including hot and cold tests under varying conditions, has reaffirmed the importance of comprehensive testing. Ensuring a wide range of test conditions guarantees that our assessments accurately reflect real-world emissions, bolstering the credibility and reliability of our testing program. The variances introduced for this year's testing program will be re-evaluated for the 2025 ISC testing program, with options for testing in multiple seasonal weather conditions in mind.

PEMS test equipment accuracy:
The successful execution of the ISC testing program relied heavily on the utilization of state-of-the-art testing equipment. However, it was observed that achieving the desired accuracy, particularly in PEMS validation tests, posed significant challenges. In some instances, meeting the 10% absolute limit for CO_2 proved to be difficult. Notably, as Euro 6e mandates an even stricter accuracy threshold of 7.5%, it became evident that the current PEMS equipment might not suffice to meet this requirement. This experience underscores the imperative for continuous investment in technology upgrades to uphold elevated standards of accuracy and efficiency in emissions testing.

RDE Moving Average Window Challenges and Adjustments for the Toyota RAV4:
During our testing of the Toyota RAV4, particularly with the vehicle identified as RAV 4720, we encountered significant challenges in achieving the required valid window ratio of 50%. This was notably difficult due to the disparities between the interpolated CO_2 values, and those we measured during the Type 1 test.

For instance, the CO_2 emissions recorded at 108.1 g/km represented only 83% of the expected interpolated figure of 131 g/km, marking the lowest CO_2 correlation across all tested vehicles. The discrepancy widened during the Extra-High cycle emissions test, where the measured 117 g/km fell short of the interpolated 162 g/km, correlating to just 72%.



MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	100.0	45.6

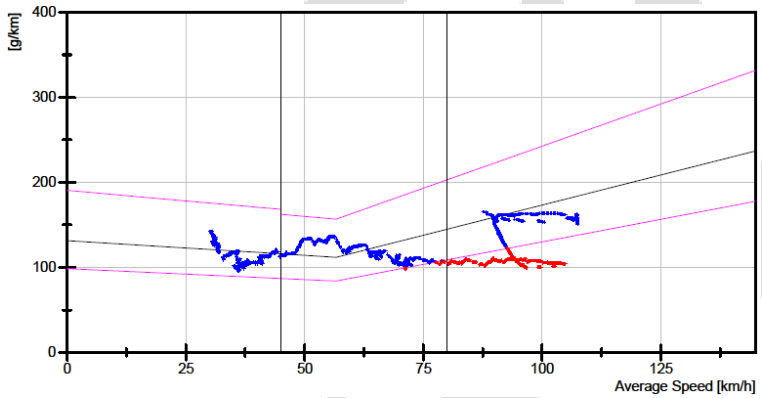
As illustrated above, this variance led to an inability to meet the 50% valid window ratio for the highway segment of the Type 1a test (RDE), necessitating adjustments to our testing approach. Our motivation for these adjustments was to reflect the dynamic range of real-world driving conditions more accurately, while meeting the minimum 50% valid moving average window requirement.

Artificial Payload Adjustment:
We increased the artificial payload up to the limit value to better simulate real-life scenarios where vehicles are often driven with varying loads, impacting their emissions profile significantly.

Test Route Modification:
We opted for a test route adjustment from route 1 to route 2, as it was observed that test vehicle RAV4 6622 did not have any issues driving route 2. By introducing the test route variation between hot and cold tests, a more comprehensive representation of real-world driving patterns is ensured, including different urban, rural, and highway segments. Therefore, capturing a wide range of driving conditions and vehicle performances.

Testing in "Sport Mode":
The decision to test the vehicle in "sport mode" was driven by the recognition that drivers may occasionally select this mode under normal conditions. This mode's inclusion is crucial for understanding its impact on emissions during real-world driving scenarios. Noting that a provision to test in any available mode exist only for OVC-HEV's in (EU) 2018/1832, this provision was adapted to include all vehicles under point 5.3.1 of (EU) 2023/443. Therefore, this adjustment to the vehicle mode was deemed acceptable under the circumstances.

These proactive adjustments ultimately enabled us to surpass the 50% valid window ratio threshold, while providing a more accurate reflection of the vehicle's performance under diverse driving conditions.



MAW

	Unit	Urban	Rural	Motorway
Valid Window	%	100.0	96.4	50.5

Data Transparency and Public Trust:
Finally, the publication of our annual report reinforces our commitment to transparency. Making our findings publicly available not only satisfies regulatory requirements but also builds trust with stakeholders and the public. Going forward, we will continue to prioritize open communication about our testing processes and outcomes.

As we look ahead to the 2025 ISC testing program, the lessons learned this year will guide our efforts to refine our testing protocols, strengthen collaborations, and enhance our overall approach to ensuring vehicle compliance with emission standards. Our commitment to environmental stewardship and public health remains steadfast, as we continue to navigate the complexities of vehicle emissions testing with diligence and integrity.

G. Report of other invalid or undecided tests

An ISC family was registered by a third party (Toyota RAV4). However, the associated check was carried out (13/11/2020) before the notification (16/11/2020). In accordance with Regulation (EU) 2017/1151, as amended ANNEX II Part B, point 5.10.1. the notification must be made prior the start of the test. Therefore, the test was deemed invalid. Even though the results of the tests are within the applicable limits.

Seven (7) other tests performed by accredited laboratories or technical services have been marked as “Undecided” due to the sample sizes not reaching the minimum of three (3) per ISC family. If only one vehicle was tested for a given In-Service Conformity (ISC) family, and considering the minimum sample size is three vehicles, the test cannot conclusively determine compliance for the entire ISC family based on the established criteria. Therefore, testing a single vehicle does not provide a sufficient basis for a definitive decision (pass or fail) according to the statistical method described for in-service conformity testing. As a result, with only one vehicle tested, it can be considered insufficient to make a conclusive decision, leading to an "undecided" until additional vehicles are tested to meet the minimum sample size requirement.

Annex 1: Overview of tests and statistical procedure

Pass:	Green
Invalid:	Orange
Undecided:	Yellow

								Statistical procedure result			
ISC-Family	**Make**	**Model**	**Emission type**	**VIN**	**Relevant party**	**Test location**	**Test date**	**Type 1**	**Type 4**	**Type 6**	**RDE**
6-JT1-22-0	Toyota	Corolla	ZE1HE (EU,8NRFTS)	xxxxxxxxxxxx 6521	GTAA	HORIBA Europe	Jan. - Mar. 2021	PASS	-	-	PASS
	Toyota	Corolla	ZE1HE (EU,8NRFTS)	xxxxxxxxxxxx 1501	GTAA	HORIBA Europe			-	-	
	Toyota	Corolla	ZE1HE (EU,8NRFTS)	xxxxxxxxxxxx 7243	GTAA	HORIBA Europe			-	-	
6-JT1-35-0	Toyota	Yaris	XP13 (EU,2NRFKE1)	xxxxxxxxxxxx 2856	GTAA	HORIBA Europe		PASS	-	-	PASS
	Toyota	Yaris	XP13 (EU,2NRFKE1)	xxxxxxxxxxxx 2889	GTAA	HORIBA Europe			-	-	
	Toyota	Yaris	XP13 (EU,2NRFKE1)	xxxxxxxxxxxx 9745	GTAA	HORIBA Europe			-	-	
6-JT1-38-0	LEXUS	NX300H	AZ1 (EU,2AR-FXEa)	xxxxxxxxxxxx 1881	GTAA	UTAC	Mar. - Apr. 2022	PASS	-	-	PASS
	LEXUS	NX300H	AZ1 (EU,2AR-FXEa)	xxxxxxxxxxxx 5420	GTAA	UTAC			-	-	
	LEXUS	NX300H	AZ1 (EU,2AR-FXEa)	xxxxxxxxxxxx 3636	GTAA	UTAC			-	-	
6-JT1-27-2	LEXUS	UX250H	ZA1 (EU,M20AFXSb)	xxxxxxxxxxxx 6533	GTAA	UTAC	Apr. 2022	PASS	-	-	PASS
	LEXUS	UX250H	ZA1 (EU,M20AFXSb)	xxxxxxxxxxxx 0606	GTAA	UTAC			-	-	
	LEXUS	UX250H	ZA1 (EU,M20AFXSb)	xxxxxxxxxxxx 5045	GTAA	UTAC			-	-	
6-JT1-31	Toyota	RAV4	XA5 (EU,A25AFXSd)	xxxxxxxxxxxx 4720	GTAA	CHTS - MIRA	Jan. - Mar. 2024	PASS	-	-	PASS
	Toyota	RAV4	XA5 (EU,A25AFXSc)	xxxxxxxxxxxx 6622	GTAA	CHTS - MIRA			-	-	
	LEXUS	ES300H	XZ1L (EU,A25AFXSb)	xxxxxxxxxxxx 6408	GTAA	CHTS - MIRA			-	-	
6-JT1-48-0	Toyota	Yaris	XPA1F (EU,M15AFKSa)	xxxxxxxxxxxx 7699	GTAA	CHTS - MIRA		PASS	-	-	PASS
	Toyota	Yaris	XPA1F (EU,M15AFKSa)	xxxxxxxxxxxx 0138	GTAA	CHTS - MIRA			-	-	
	Toyota	Yaris	XPA1F (EU,M15AFKSa)	xxxxxxxxxxxx 6906	GTAA	CHTS - MIRA			-	-	
6-JT1-31-1	Toyota	RAV4	XA5 (EU,A25AFXSc)	xxxxxxxxxxxx 7600	Technical service	Teknologisk Institut (TNO)	13/11/2020	-	-	-	INVAL
6-JT1-31-2	Toyota	Camry	XV7 (EU,A25AFXS1d)	xxxxxxxxxxxx 4542	Technical service	Teknologisk Institut (TNO)	14/03/2021	-	-	-	UND
6-JT1-34-0	Toyota	Yaris	ZE1HE (EU,8NRFTS)	xxxxxxxxxxxx 2780	Technical service	Emisia (TNO)	21/05/2021	-	-	-	UND
6-VF7-33-0	Peugeot	108G	JP (EU,1KR-FE1d)	xxxxxxxxxxxx 6146	Technical service	Emisia (TNO)	18/06/2021	-	-	-	UND
6-JT1-33-0	Toyota	Aygo	AB5 (EU,1KR-FE1d)	xxxxxxxxxxxx 0231	Technical service	Emisia (TNO)	24/06/2021	-	-	-	UND
6-JT1-48-1	Toyota	Yaris	XPA1F (EU,M15AFKSb)	xxxxxxxxxxxx 3350	Technical service	Emisia (TNO)	3/11/2021	-	-	-	UND
6-SMC-1-0	Suzuki	Across	XA5P(S) (EU,A25AFXSa)	xxxxxxxxxxxx 7085	Technical service	Teknologisk Institut (TNO)	16/02/2022	-	-	-	UND
6-VF7-33-0	Citroën	C1	JP (EU,1KR-FE1c)	xxxxxxxxxxxx 1619	Technical service	Emisia (TNO)	19/05/2022	-	-	-	UND

								Statistical procedure result			
ISC-Family	**Make**	**Model**	**Emission type**	**VIN**	**Relevant party**	**Test location**	**Test date**	**Type 1**	**Type 4**	**Type 6**	**RDE**
6-JT1-10-0	Toyota	C-HR HEV	AX1T (EU,2ZRFXEa)	xxxxxxxxxxxx 0673	OEM	TME	10/03/2021	PASS	-	-	-
	Toyota	C-HR HEV	AX1T (EU,2ZRFXEa)	xxxxxxxxxxxx 8098	OEM	TME	13/04/2021		-	-	-
	Toyota	C-HR HEV	AX1T (EU,2ZRFXEa)	xxxxxxxxxxxx 1269	OEM	TME	21/04/2021		-	-	-
6-JT1-20-0	Toyota	RA4 HEV	XA5 (EU,A25AFXSa)	xxxxxxxxxxxx 0861	OEM	TME	28/04/2021	PASS	-	-	-
	Toyota	RA4 HEV	XA5 (EU,A25AFXSa)	xxxxxxxxxxxx 9632	OEM	TME	21/10/2021		-	-	-
	Toyota	RA4 HEV	XA5 (EU,A25AFXSa)	xxxxxxxxxxxx 0089	OEM	TME	13/04/2022		-	-	-
6-JT1-21-0	Toyota	RAV4	XA5 (EU,M20AFKSb)	xxxxxxxxxxxx 0587	OEM	TME	6/07/2021	PASS	-	-	-
	Toyota	RAV4	XA5 (EU,M20AFKSb)	xxxxxxxxxxxx 9009	OEM	TME	16/11/2021		-	-	-
	Toyota	RAV4	XA5 (EU,M20AFKSb)	xxxxxxxxxxxx 0481	OEM	TME	25/01/2022		-	-	-
6-JT1-22-0	Toyota	Corolla	ZE1HE (EU,8NRFTSa)	xxxxxxxxxxxx 0415	OEM	TME	5/05/2021	PASS	-	-	-
	Toyota	Corolla	ZE1HE (EU,8NRFTSa)	xxxxxxxxxxxx 0219	OEM	TME	20/10/2021		-	-	-
	Toyota	Corolla	ZE1HE (EU,8NRFTSa)	xxxxxxxxxxxx 2142	OEM	TME	9/12/2021		-	-	-
6-JT1-23-0	Toyota	Corolla	ZE1EE (EU,1ZR-FAEa)	xxxxxxxxxxxx 2211	OEM	TME	14/10/2021	PASS	-	-	-
	Toyota	Corolla	ZE1EE (EU,1ZR-FAEa)	xxxxxxxxxxxx 7977	OEM	TME	18/02/2022		-	-	-
	Toyota	Corolla	ZE1EE (EU,1ZR-FAEa)	xxxxxxxxxxxx 3996	OEM	TME	4/03/2022		-	-	-
6-JT1-24-0	Toyota	Corolla HEV	ZE1EE (EU,2ZR-FXEa)	xxxxxxxxxxxx 7228	OEM	TME	12/08/2021	PASS	-	-	-
	Toyota	Corolla HEV	ZE1EE (EU,2ZR-FXEa)	xxxxxxxxxxxx 6035	OEM	TME	10/08/2021		-	-	-
	Toyota	Corolla HEV	ZE1EE (EU,2ZR-FXEa)	xxxxxxxxxxxx 5798	OEM	TME	6/10/2021		-	-	-
6-JT1-25-1	Toyota	C-HR HEV	AX1T (EU,2ZRFXEc)	xxxxxxxxxxxx 3368	OEM	TME	20/10/2021	PASS	-	-	-
	Toyota	C-HR HEV	AX1T (EU,2ZRFXEc)	xxxxxxxxxxxx 2487	OEM	TME	8/02/2022		-	-	-
	Toyota	C-HR HEV	AX1T (EU,2ZRFXEc)	xxxxxxxxxxxx 6985	OEM	TME	17/02/2022		-	-	-
6-JT1-26-0	Toyota	Corolla HEV	ZE1HE (EU,2ZRFXEa)	xxxxxxxxxxxx 3274	OEM	TME	2/03/2021	PASS	-	-	-
	Toyota	Corolla HEV	ZE1HE (EU,2ZRFXEa)	xxxxxxxxxxxx 4490	OEM	TME	10/03/2021		-	-	-
	Toyota	Corolla HEV	ZE1HE (EU,2ZRFXEa)	xxxxxxxxxxxx 6656	OEM	TME	15/04/2021		-	-	-
6-JT1-27-0	Toyota	Corolla HEV	ZE1HE (EU,M20AFXSa)	xxxxxxxxxxxx 3156	OEM	TME	11/05/2021	PASS	-	-	-
	Toyota	Corolla HEV	ZE1HE (EU,M20AFXSa)	xxxxxxxxxxxx 2821	OEM	TME	19/05/2021		-	-	-
	Toyota	Corolla HEV	ZE1HE (EU,M20AFXSa)	xxxxxxxxxxxx 0868	OEM	TME	1/03/2022		-	-	-
6-JT1-28-0	Toyota	Camry HEV	XV7 (EU,A25AFXS1c)	xxxxxxxxxxxx 4053	OEM	TME	2/06/2021	PASS	-	-	-
	Toyota	Camry HEV	XV7 (EU,A25AFXS1c)	xxxxxxxxxxxx 7583	OEM	TME	1/06/2021		-	-	-
	Toyota	Camry HEV	XV7 (EU,A25AFXS1c)	xxxxxxxxxxxx 7950	OEM	TME	6/07/2021		-	-	-
6-JT1-29-0	Lexus	UX250H	ZA1 (EU,M20AFXSb)	xxxxxxxxxxxx 0754	OEM	TME	17/11/2021	PASS	-	-	-
	Lexus	UX250H	ZA1 (EU,M20AFXSb)	xxxxxxxxxxxx 5045	OEM	TME	10/05/2022		-	-	-
	Lexus	UX250H	ZA1 (EU,M20AFXSb)	xxxxxxxxxxxx 8131	OEM	TME	8/06/2022		-	-	-
6-JT1-31-1	Toyota	RAV4 HEV	XA5 (EU,A25AFXSb)	xxxxxxxxxxxx 8599	OEM	TME	26/05/2021	PASS	-	-	-
	Toyota	RAV4 HEV	XA5 (EU,A25AFXSb)	xxxxxxxxxxxx 0513	OEM	TME	27/07/2021		-	-	-
	Toyota	RAV4 HEV	XA5* (EU,A25AFXSb)	xxxxxxxxxxxx 2113	OEM	TME	26/04/2022		-	-	-

								Statistical procedure result			
ISC-Family	**Make**	**Model**	**Emission type**	**VIN**	**Relevant party**	**Test location**	**Test date**	**Type 1**	**Type 4**	**Type 6**	**RDE**
6-JT1-32-0	Toyota	Prius Plus	XW4 (2ZRFXE1b)	xxxxxxxxxxxx 3059	OEM	TME	31/08/2021	PASS	-	-	-
	Toyota	Prius Plus	XW4 (2ZRFXE1b)	xxxxxxxxxxxx 2139	OEM	TME	28/09/2021		-	-	-
	Toyota	Prius Plus	XW4 (2ZRFXE1b)	xxxxxxxxxxxx 4954	OEM	TME	13/09/2022		-	-	-
6-JT1-33-0	Toyota	Aygo	AB5 (EU,1KR-FE1b)	xxxxxxxxxxxx 7166	OEM	TME	16/09/2021	PASS	-	-	-
	Toyota	Aygo	AB5 (EU,1KR-FE1b)	xxxxxxxxxxxx 3598	OEM	TME	30/03/2022		-	-	-
	Toyota	Aygo	AB5 (EU,1KR-FE1b)	xxxxxxxxxxxx 8119	OEM	TME	9/11/2022		-	-	-
6-JT1-34-0	Toyota	Yaris HEV	HXP13 (1NZ-FXE,E6)(a)	xxxxxxxxxxxx 6794	OEM	TME	2/03/2021	PASS	-	-	-
	Toyota	Yaris HEV	HXP13 (1NZ-FXE,E6)(a)	xxxxxxxxxxxx 2143	OEM	TME	17/03/2022		-	-	-
	Toyota	Yaris HEV	HXP13 (1NZ-FXE,E6)(a)	xxxxxxxxxxxx 1847	OEM	TME	7/07/2022		-	-	-
6-JT1-35-0	Toyota	Yaris	XP13 (EU,2NRFKE1d)	xxxxxxxxxxxx 2889	OEM	TME	1/09/2021	PASS	-	-	-
	Toyota	Yaris	XP13 (EU,2NRFKE1d)	xxxxxxxxxxxx 7342	OEM	TME	22/09/2021		-	-	-
	Toyota	Yaris	XP13 (EU,2NRFKE1d)	xxxxxxxxxxxx 8845	OEM	TME	9/12/2021		-	-	-
6-JT1-38-0	LEXUS	NX300H	AZ1 (EU,2AR-FXEb)	xxxxxxxxxxxx 5393	OEM	TME	18/02/2022	PASS	-	-	-
	LEXUS	NX300H	AZ1 (EU,2AR-FXEb)	xxxxxxxxxxxx 2484	OEM	TME	24/05/2022		-	-	-
	LEXUS	NX300H	AZ1 (EU,2AR-FXEb)	xxxxxxxxxxxx 7685	OEM	TME	16/11/2022		-	-	-