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Delegations will find attached document D045884/02 ANNEXES 1 to 2.

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ANNEXES 1 to 2

## ANNEXES

*to the*

### **Commission Regulation**

**supplementing Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, amending Directive 2007/46/EC of the European Parliament and of the Council, Commission Regulation (EC) No 692/2008 and Commission Regulation (EU) No 1230/2012 and repealing Regulation (EC) No 692/2008**

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## ANNEX I

### ADMINISTRATIVE PROVISIONS FOR EC TYPE-APPROVAL

#### 1. ADDITIONAL REQUIREMENTS FOR GRANTING OF EC TYPE-APPROVAL

##### 1.1. Additional requirements for mono fuel gas vehicles, and bi-fuel gas vehicles.

1.1.1. The additional requirements for granting of type-approval for mono fuel gas vehicles, and bi-fuel gas vehicles shall be those set out in sections 1, 2 and 3 and Appendices 1 and 2 to Annex 12 to UN/ECE Regulation No 83, with the exceptions set out below.

1.1.2. The reference in paragraphs 3.1.2. and 3.1.4. of Annex 12 to UN/ECE Regulation No 83 to reference fuels of Annex 10a shall be understood as being reference to the appropriate reference fuel specifications in Section A of Annex IX to this Regulation.

##### 1.2. Additional requirements for flex fuel vehicles

The additional requirements for granting of type-approval for flex fuel vehicles shall be those set out in paragraph 4.9. of UN/ECE Regulation No 83.

#### 2. ADDITIONAL TECHNICAL REQUIREMENTS AND TESTS

##### 2.1. Small volume manufacturers

2.1.1. List of legislative acts referred to in Article 3(3):

Legislative Act	Requirements
The California Code of Regulations, Title 13, Sections 1961(a) and 1961(b)(1)(C)(1) applicable to 2001 and later model year vehicles, 1968.1, 1968.2, 1968.5, 1976 and 1975, published by Barclay's Publishing	Type-approval must be granted under the California Code of Regulations applicable to the most recent model year of light-duty vehicle.

##### 2.2. Inlets to fuel tanks

2.2.1. The requirements for inlets to fuel tanks shall be those specified in paragraphs 5.4.1. and 5.4.2. of Annex XXI and point 2.2.2 below.

2.2.2. Provision shall be made to prevent excess evaporative emissions and fuel spillage caused by a missing fuel filler cap. This may be achieved by using one of the following:

- (a) an automatically opening and closing, non-removable fuel filler cap,
- (b) design features which avoid excess evaporative emissions in the case of a missing fuel filler cap,

(c) any other provision which has the same effect. Examples may include, but are not limited to, a tethered filler cap, a chained filler cap or one utilizing the same locking key for the filler cap as for the vehicle's ignition. In this case the key shall be removable from the filler cap only in the locked condition.

### **2.3. Provisions for electronic system security**

2.3.1. The provisions for electronic system security shall be those specified in paragraph 5.5 of Annex XXI and points 2.3.2 and 2.3.3 below.

2.3.2 In the case of mechanical fuel-injection pumps fitted to compression-ignition engines, manufacturers shall take adequate steps to protect the maximum fuel delivery setting from tampering while a vehicle is in service.

2.3.3. Manufacturers shall effectively deter reprogramming of the odometer readings, in the board network, in any powertrain controller as well as in the transmitting unit for remote data exchange if applicable. Manufacturers shall include systematic tamper-protection strategies and write-protect features to protect the integrity of the odometer reading. Methods giving an adequate level of tamper protection shall be approved by the approval authority.

### **2.4. Application of tests**

2.4.1. Figure I.2.4 illustrates the application of the tests for type-approval of a vehicle. The specific test procedures are described in Annexes II, 111A, IV, V, VI, VII, VIII, XI, XVI<sup>1</sup>, XX and XXI.

Figure I.2.4

Application of test requirements for type-approval and extensions												
Vehicle category	Vehicles with positive ignition engines including hybrids <sup>1</sup>								Vehicles with compression ignition engines including hybrids	Pure electric vehicles	Hydrogen fuel cell vehicles	
	Mono fuel				Bi-fuel <sup>3</sup>							Flex-fuel <sup>3</sup>
Reference fuel	Petrol (E10)	LPG	NG/Biomethane	Hydrogen (ICE)	Petrol (E10)	Petrol (E10)	NG/Biomethane	Hydrogen (ICE) <sup>4</sup>	Petrol (E10)	Diesel (B7) <sup>5</sup>	—	—
Gaseous pollutants (Type 1 test)	Yes	Yes	Yes	Yes <sup>4</sup>	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)		Yes	—
PM (Type 1 test)	Yes <sup>2</sup>	—	—	—	Yes <sup>2</sup> (petrol only)	Yes <sup>2</sup> (petrol only)	Yes <sup>2</sup> (petrol only)	Yes <sup>2</sup> (petrol only)	Yes <sup>2</sup> (both fuels)	Yes	—	—

PN	Yes <sup>2</sup>	—	—	—	Yes <sup>2</sup> (petrol only)	Yes <sup>2</sup> (petrol only)	Yes <sup>2</sup> (petrol only)	Yes <sup>2</sup> (both fuels)	Yes <sup>2</sup> (both fuels)	Yes	—	—
Gaseous pollutants, RDE (Type 1A test)	Yes	Yes	Yes	Yes <sup>(4)</sup>	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes	-	-
PN, RDE (Type 1A test)	Yes	-	-	-	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes	-	-
Idle emissions (Type 2 test)	Yes	Yes	Yes	—	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	—	—	—
Crankcase emissions (Type 3 test)	Yes	Yes	Yes	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	—	—	—
Evaporative emissions (Type 4 test)	Yes	—	—	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	—	—	—
Durability (Type 5 test)	Yes	Yes	Yes	Yes	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes	—	—



Low temperature emissions (Type 6 test)	Yes	—	—	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (both fuels)	—	—	—
In-service conformity	Yes	Yes	Yes	Yes	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	—	—	—
On-board diagnostics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—	—	—
CO <sub>2</sub> emissions, fuel consumption, electric energy consumption and electric range	Yes	Yes	Yes	Yes	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	—	Yes	Yes
Smoke opacity	—	—	—	—	—	—	—	—	—	—	—	—
Engine power	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—	Yes	Yes

### **3. EXTENSIONS TO TYPE-APPROVALS**

#### **3.1. Extensions for tailpipe emissions (type 1 and type 2 tests)**

3.1.1. The type-approval shall be extended to vehicles if they conform to the criteria of Article 2 (1).

3.1.2. Vehicles with periodically regenerating systems

For Ki tests undertaken under Appendix 1 to Sub-Annex VI to Annex XXI (WLTP), the type-approval shall be extended to vehicles if they conform to the criteria of paragraph 5.9. of Annex XXI.

For Ki tests undertaken under Annex 13 of UN/ECE Regulation No 83 (NEDC) the type-approval shall be extended to vehicles according to the requirements of Section 3.1.4. of Annex I to Regulation No 692/2008.

#### **3.2. Extensions for evaporative emissions (type 4 test)**

3.2.1. The type-approval shall be extended to vehicles equipped with a control system for evaporative emissions which meet the following conditions:

3.2.1.1. The basic principle of fuel/air metering (e.g. single point injection) is the same.

3.2.1.2. The shape of the fuel tank and the material of the fuel tank and liquid fuel hoses are identical.

3.2.1.3. The worst-case vehicle with regard to the cross-section and approximate hose length shall be tested. Whether non-identical vapour/liquid separators are acceptable is decided by the technical service responsible for the type-approval tests.

3.2.1.4. The fuel tank volume is within a range of  $\pm 10\%$ .

3.2.1.5. The setting of the fuel tank relief valve is identical.

3.2.1.6. The method of storage of the fuel vapour is identical, i.e. trap form and volume, storage medium, air cleaner (if used for evaporative emission control), etc.

3.2.1.7. The method of purging of the stored vapour is identical (e.g. air flow, start point or purge volume over the preconditioning cycle).

3.2.1.8. The method of sealing and venting of the fuel metering system is identical.

3.2.2. The type-approval shall be extended to vehicles with:

3.2.2.1. different engine sizes;

- 3.2.2.2. different engine powers;
- 3.2.2.3. automatic and manual gearboxes;
- 3.2.2.4. two and four wheel transmissions;
- 3.2.2.5. different body styles; and
- 3.2.2.6. different wheel and tyre sizes.

### **3.3. Extensions for durability of pollution control devices (type 5 test)**

3.3.1. The type-approval shall be extended to different vehicle types, provided that the vehicle, engine or pollution control system parameters specified below are identical or remain within the prescribed tolerances:

#### 3.3.1.1. Vehicle:

Inertia category: the two inertia categories immediately above and any inertia category below.

Total road load at 80 km/h: + 5 % above and any value below.

#### 3.3.1.2. Engine

- (a) engine cylinder capacity ( $\pm 15\%$ ),
- (b) number and control of valves,
- (c) fuel system,
- (d) type of cooling system,
- (e) combustion process.

#### 3.3.1.3. Pollution control system parameters:

##### (a) Catalytic converters and particulate filters:

number of catalytic converters, filters and elements,

size of catalytic converters and filters (volume of monolith  $\pm 10\%$ ),

type of catalytic activity (oxidizing, three-way, lean NO<sub>x</sub> trap, SCR, lean NO<sub>x</sub> catalyst or other),

precious metal load (identical or higher),

precious metal type and ratio ( $\pm 15\%$ ),

substrate (structure and material),

cell density,

temperature variation of no more than 50 K at the inlet of the catalytic converter or filter. This temperature variation shall be checked under stabilized conditions at a vehicle speed of 120 km/h and the load setting of the type 1 test.

(b) Air injection:

with or without

type (pulsair, air pumps, other(s))

(c) EGR:

with or without

type (cooled or non-cooled, active or passive control, high pressure or low pressure).

3.3.1.4. The durability test may be carried out using a vehicle, which has a different body style, gear box (automatic or manual) and size of the wheels or tyres, from those of the vehicle type for which the type-approval is sought.

### **3.4. Extensions for on-board diagnostics**

3.4.1. The type-approval shall be extended to different vehicles with identical engine and emission control systems as defined in Annex XI, Appendix 2. The type-approval shall be extended regardless of the following vehicle characteristics:

(a) engine accessories;

(b) tyres;

(c) equivalent inertia;

(d) cooling system;

(e) overall gear ratio;

(f) transmission type; and

(g) type of bodywork.

### **3.5 Extensions for low temperature test (type 6 test)**

3.5.1. Vehicles with different reference masses

3.5.1.1. The type-approval shall be extended only to vehicles with a reference mass requiring the use of the next two higher equivalent inertia or any lower equivalent inertia.

3.5.1.2. For category N vehicles, the approval shall be extended only to vehicles with a lower reference mass, if the emissions of the vehicle already approved are within the limits prescribed for the vehicle for which extension of the approval is requested.

3.5.2. Vehicles with different overall transmission ratios

3.5.2.1. The type-approval shall be extended to vehicles with different transmission ratios only under certain conditions.

3.5.2.2. To determine whether type-approval can be extended, for each of the transmission ratios used in the type 6 test, the proportion,

$$(E) = (V_2 - V_1) / V_1$$

shall be determined where, at an engine speed of  $1000 \text{ min}^{-1}$ ,  $V_1$  is the speed of the vehicle-type approved and  $V_2$  is the speed of the vehicle type for which extension of the approval is requested.

3.5.2.3. If, for each transmission ratio,  $E \leq 8 \%$ , the extension shall be granted without repeating the type 6 test.

3.5.2.4. If, for at least one transmission ratio,  $E > 8 \%$ , and if, for each gear ratio,  $E \leq 13 \%$ , the type 6 test shall be repeated. The tests may be performed in a laboratory chosen by the manufacturer subject to the approval of the technical service. The report of the tests shall be sent to the technical service responsible for the type-approval tests.

3.5.3. Vehicles with different reference masses and transmission ratios

The type-approval shall be extended to vehicles with different reference masses and transmission ratios, provided that all the conditions prescribed in paragraphs 3.5.1 and 3.5.2 are fulfilled.

## **4. CONFORMITY OF PRODUCTION**

### **4.1. Introduction**

4.1.1. Every vehicle produced under a Type Approval according to this Regulation shall be so manufactured as to conform to the type approval requirements of this Regulation. The Manufacturer shall implement adequate arrangements and documented control plans and carry-out at specified intervals as given in this regulation the necessary emission and OBD tests to verify continued conformity with the approved type. The approval authority shall verify and agree with these arrangements and control plans of the manufacturer and perform audits and conduct emission and OBD tests at specific intervals, as given in this regulation, at the premises of the manufacturer, including production and test facilities as part of the product conformity and continued verification arrangements as described in Annex X of Directive 2007/46/EC.

4.1.2. The manufacturer shall check the conformity of production by testing the emissions of pollutants (given in Table 2 of Annex I to Regulation (EC) No 715/2007), the emission of  $\text{CO}_2$  (along with the measurement of electric energy consumption, EC), the crankcase emissions, evaporative emissions and the OBD. The verification shall therefore include the tests of types 1, 3, 4 and the test for OBD, as described in section 2.4 of this Annex and the relevant annexes quoted therein. The specific procedures for conformity of production are set out in Sections 4.2 to 4.7 and Appendixes 1 and 2.

4.1.3 For the purposes of the manufactures conformity of production check, the family means the CO<sub>2</sub> interpolation family for tests of Type 1 and 3, includes for the Type 4 test the extensions described in paragraph 3.2 of this Annex and the OBD family with the extensions described in paragraph 3.3 of this Annex for the OBD tests.

4.1.4 The frequency for product verification performed by the manufacturer shall be based on a risk assessment methodology consistent with the international standard ISO 31000:2009 — Risk Management — Principles and guidelines and at least for Type 1 with a minimum frequency of one verification per 5,000 vehicles produced per family or once per year, whichever comes first.

4.1.5 The Approval Authority which has granted type-approval may at any time verify the conformity control methods applied in each production facility.

For the purpose of this regulation the Approval Authority shall perform audits for verifying the manufacturers arrangements and documented control plans at the premises of the manufacturer on a risk assessment methodology consistent with the international standard ISO 31000:2009 — Risk Management — Principles and guidelines and, in all cases, with a minimum frequency of one audit per year.

If the Approval Authority is not satisfied with the auditing procedure of the manufacturer, physical test shall directly be carried out on production vehicles as described in Sections 4.2 to 4.9.

4.1.6. The normal frequency of physical test verifications by the Approval Authority shall be based on the results of the auditing procedure of the manufacturer on a risk assessment methodology and in all cases with a minimum frequency of one verification test per three years. The Approval Authority shall conduct these physical emission tests and OBD tests on production vehicles as described in Sections 4.2 to 4.9.

In the case of the manufacturer running the physical tests, the Approval Authority shall witness the tests at the manufacturer's facility.

4.1.7 The Approval Authority shall report the results of all audit checks and physical tests performed on verifying conformity of the manufacturers and file it for a period of minimum 10 years. These reports should be available for other type approval authorities and the European Commission on request.

4.1.8 In case of non-conformity Article 30 of Directive 2007/46/EC shall apply.

## **4.2. Checking the conformity of the vehicle for a type 1 test**

4.2.1. The Type 1 test shall be carried out on production vehicles of a valid member of the CO<sub>2</sub> interpolation family as described in the TA certificate. The limit values against which to check conformity for pollutants are set out in Table 2 of Annex I to Regulation (EC) No 715/2007. As regards CO<sub>2</sub> emissions, the limit value shall be the value determined by the manufacturer for the selected vehicle in accordance with the interpolation methodology set out in Sub-Annex 7 of Annex XXI. The interpolation calculation shall be verified by the approval authority.

4.2.2. A sample of three vehicles shall be selected at random in the family. After selection by the approval authority, the manufacturer shall not undertake any adjustment to the vehicles selected.

4.2.2.1. The selection shall only include finalised production vehicles which have completed a maximum of 80 km and those vehicles will be referred to as zero km vehicles for the purposes of checking conformity against Type 1 test. The vehicle shall be tested on the appropriate WLTP cycle as described in Annex XXI to this Regulation notwithstanding the requirements for test repetitions, or km of vehicles. The test results shall be the values after all corrections according to this regulation are applied.

4.2.3. The statistical method for calculating the test criteria is described in Appendix 1.

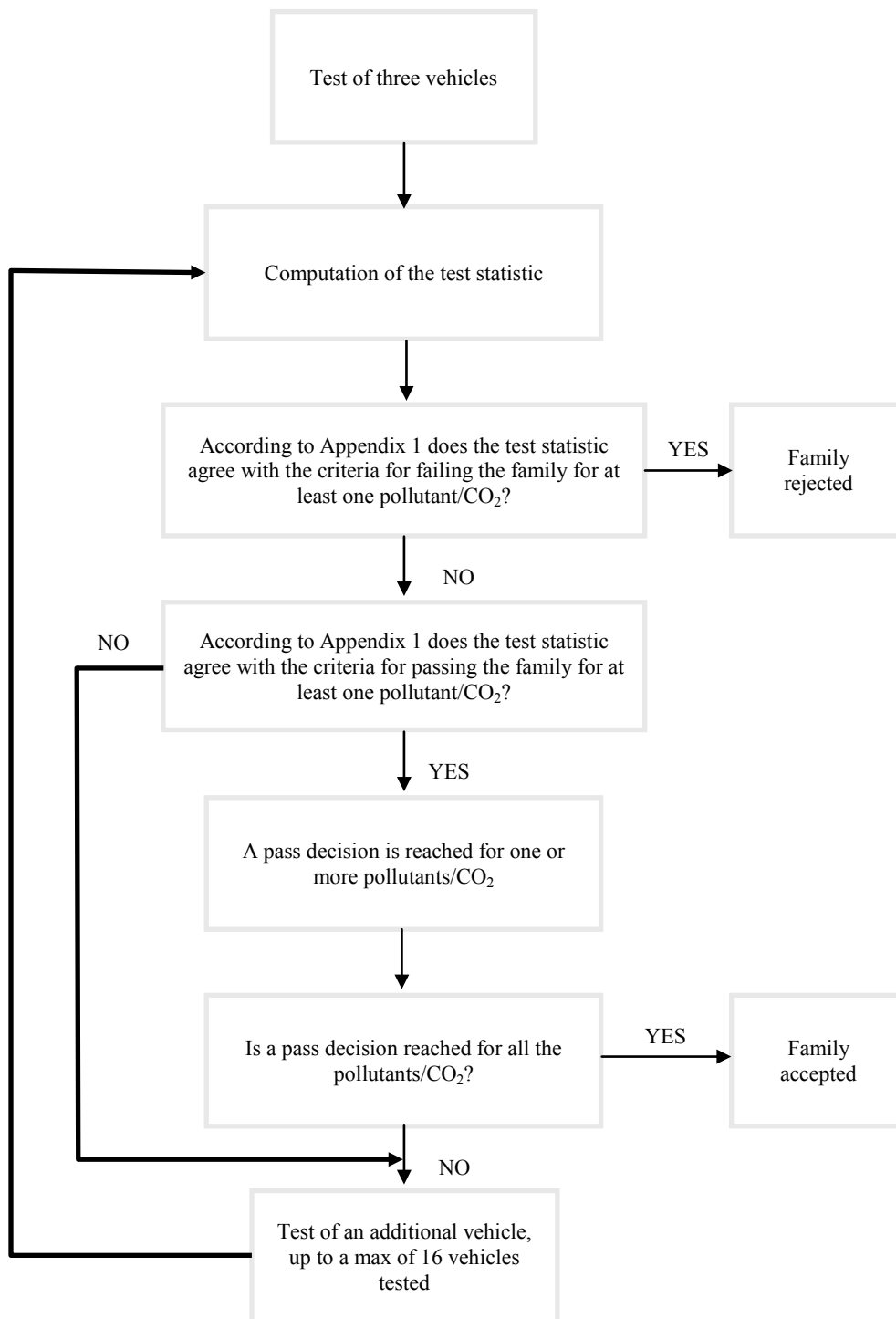
The production of a family shall be deemed to not conform when a fail decision is reached for one or more of the pollutants and CO<sub>2</sub> values, according to the test criteria in Appendix 1.

The production of a family shall be deemed to conform once a pass decision is reached for all the pollutants and CO<sub>2</sub> values according to the test criteria in Appendix 1.

When a pass decision has been reached for one pollutant, that decision shall not be changed by any additional tests carried out to reach a decision for the other pollutants and CO<sub>2</sub> values.

If a pass decision is not reached for all the pollutants and CO<sub>2</sub> values, a test shall be carried out on another vehicle, up to the maximum of 16 vehicles, and the procedure described in Appendix 1 for taking a pass or fail decision shall be repeated (see Figure I.4.2).

Figure I.4.2





4.2.4. At the request of the manufacturer and with the acceptance of the approval authority, tests may be carried out on a vehicle of the family with a maximum of 15,000 km in order to establish measured evolution coefficients EvC for pollutants/CO<sub>2</sub> for each family. The running-in procedure shall be conducted by the manufacturer, who shall not to make any adjustments to these vehicles.

4.2.4.1. In order to establish a measured evolution coefficient with a run-in vehicle the procedure shall be as follows:

(a) the pollutants/CO<sub>2</sub> shall be measured at a mileage of at most 80 km and at 'x' km of the first tested vehicle;

(b) the evolution coefficient (EvC) of the pollutants/CO<sub>2</sub> between 80 km and 'x' km shall be calculated as:

$EvC_{meas} = \text{values at 'x' km} / \text{values at 80 km}$

(c) the other vehicles in the interpolation family shall not be run in, but their zero km emissions/EC/CO<sub>2</sub> shall be multiplied by the evolution coefficient of the first run-in vehicle. In this case, the values to be taken for testing as in Appendix 1 shall be:

(i) the values at 'x' km for the first vehicle;

(ii) the values at zero km multiplied by the relevant evolution coefficient for the other vehicles.

4.2.4.2. All these tests shall be conducted with commercial fuel. However, at the manufacturer's request, the reference fuels described in Annex IX may be used.

4.2.4.3. When checking the conformity of production for CO<sub>2</sub>, as an alternative to the procedure mentioned in Section 4.2.4.1 the vehicle manufacturer may use a fixed evolution coefficient EvC of 0,98 and multiply all values of CO<sub>2</sub> measured at zero km by this factor.

4.2.5 Tests for conformity of production of vehicles fuelled by LPG or NG/biomethane may be performed with a commercial fuel of which the C3/C4 ratio lies between those of the reference fuels in the case of LPG, or of one of the high or low caloric fuels in the case of NG/biomethane. In all cases a fuel analysis shall be presented to the approval authority.

4.2.6. Vehicles fitted with eco-innovations

4.2.6.1. In the case of a vehicle type fitted with one or more eco-innovations, within the meaning of Article 12 of Regulation (EC) No 443/2009 for M<sub>1</sub> vehicles or Article 12 of Regulation (EU) No 510/2011 for N<sub>1</sub> vehicles, the conformity of production shall be demonstrated with respect to the eco-innovations, by checking the presence of the correct eco-innovation(s) in question.

### 4.3. PEVs

4.3.1 Measures to ensure the conformity of production with regard to electric energy consumption (EC) shall be checked on the basis of the type-approval certificate set out in Appendix 4 to this Annex.

#### 4.3.2. Electric energy consumption verification for conformity of production

4.3.2.1. During the conformity of production procedure, the break-off criterion for the Type 1 test procedure according to paragraph 3.4.4.1.3 of Sub-Annex 8 to Annex XXI of this Regulation (consecutive cycle procedure) and paragraph 3.4.4.2.3. of Sub-Annex 8 to Annex XXI of this Regulation (Shortened Test Procedure) shall be replaced with the following:

The break-off criterion for the conformity of production procedure shall be reached with having finished the first applicable WLTP test cycle.

4.3.2.2. During this first applicable WLTP test cycle, the DC energy from the REESS(s) shall be measured according to the method described in Appendix 3 of Sub-Annex 8 to Annex XXI of this Regulation and divided by the driven distance in this applicable WLTP test cycle.

4.3.2.3. The value determined according to paragraph 4.3.2.2 shall be compared to the value determined according to paragraph 1.2 of Appendix 2.

4.3.2.4. Conformity for EC shall be checked using the statistical procedures described in Section 4.2 and Appendix 1. For the purposes of this conformity check, the terms pollutants/CO<sub>2</sub> shall be replaced by EC.

#### **4.4. OVC-HEVS**

4.4.1. Measures to ensure the conformity of production with regard to CO<sub>2</sub> mass emission and electric energy consumption from OVC-HEV shall be checked on the basis of the description in the type-approval certificate set out in Appendix 4 to this Annex.

#### 4.4.2. CO<sub>2</sub> mass emission verification for conformity of production

4.4.2.1. The vehicle shall be tested according to the charge-sustaining Type 1 test as described in paragraph 3.2.5. of Sub-Annex 8 to Annex XXI of this Regulation.

4.4.2.2. During this test, the charge-sustaining CO<sub>2</sub> mass emission shall be determined according to Table A8/5 of Sub-Annex 8 to Annex XXI of this Regulation and compared to the charge-sustaining CO<sub>2</sub> mass emission according to paragraph 2.3 of Appendix 2.

4.4.2.3. Conformity for CO<sub>2</sub> emissions shall be checked using the statistical procedures described in Section 4.2 and Appendix 1.

#### 4.4.3. Electric energy consumption verification for conformity of production

4.4.3.1. During the conformity of production procedure, the end of the charge-depleting Type 1 test procedure according to paragraph 3.2.4.4. of Sub-Annex 8 to Annex XXI of this Regulation shall be replaced with the following:

The end of the charge-depleting Type 1 test procedure for the conformity of production procedure shall be reached with having finished the first applicable WLTP test cycle.

4.4.3.2. During this first applicable WLTP test cycle, the DC energy from the REESS(s) shall be measured according to the method described in Appendix 3 of Sub-Annex 8 to Annex XXI of this Regulation and divided by the driven distance in this applicable WLTP test cycle.

4.4.3.3. The value determined according to paragraph 4.5.3.2. of this Regulation shall be compared to the value determined according to paragraph 2.4. of Appendix 2.

4.4.1.4. Conformity for EC shall be checked using the statistical procedures described in Section 4.2 and Appendix 1. For the purposes of this conformity check, the terms pollutants/CO<sub>2</sub> shall be replaced by EC.

#### **4.5. Checking the conformity of the vehicle for a Type 3 test**

4.5.1. If a verification of the Type 3 test is to be carried out, it shall be conducted in accordance with the following requirements:

4.5.1.1. When the approval authority determines that the quality of production seems unsatisfactory, a vehicle shall be randomly taken from the family and subjected to the tests described in Annex V.

4.5.1.2. The production shall be deemed to conform if this vehicle meets the requirements of the tests described in Annex V.

4.5.1.3. If the vehicle tested does not satisfy the requirements of Section 4.5.1.1, a further random sample of four vehicles shall be taken from the same family and subjected to the tests described in Annex V. The tests may be carried out on vehicles which have completed a maximum of 15,000 km with no modifications.

4.5.1.4. The production shall be deemed to conform if at least three vehicles meet the requirements of the tests described in Annex V.

#### **4.6. Checking the conformity of the vehicle for a Type 4 test**

4.6.1. If a verification of the Type 4 test is to be carried out, it shall be conducted in accordance with the following requirements:

4.6.1.1. When the approval authority determines that the quality of production seems unsatisfactory, a vehicle shall be randomly taken from the family and subjected to the tests described in Annex VI, or at least as in paragraph 7 of Annex 7 of UN Regulation 83.

4.6.1.2. The production shall be deemed to conform if this vehicle meets the requirements of the tests described in Annex VI, or paragraph 7 of Annex 7 of UN Regulation 83 depending on the test performed.

4.6.1.3. If the vehicle tested does not satisfy the requirements of section 4.6.1.1, a further random sample of four vehicles shall be taken from the same family and subjected to the tests described in Annex VI, or at least as in paragraph 7 of Annex 7 of UN Regulation 83. The tests may be carried out on vehicles which have completed a maximum of 15000 km with no modifications.

4.6.1.4. The production shall be deemed to conform if at least three vehicles meet the requirements of the tests described in Annex VI, or paragraph 7 of Annex 7 of UN Regulation 83 depending on the test performed.

#### **4.7. Checking the conformity of the vehicle for On-board Diagnostics (OBD)**

4.7.1. If a verification of the performance of the OBD system is to be carried out, it shall be conducted in accordance with the following requirements:

4.7.1.1. When the approval authority determines that the quality of production seems unsatisfactory, a vehicle shall be randomly taken from the family and subjected to the tests described in Appendix 1 to Annex XI.

4.7.1.2. The production shall be deemed to conform if this vehicle meets the requirements of the tests described in Appendix 1 to Annex XI.

4.7.1.3. If the vehicle tested does not satisfy the requirements of section 4.7.1.1, a further random sample of four vehicles shall be taken from the same family and subjected to the tests described in Appendix 1 to Annex XI. The tests may be carried out on vehicles which have completed a maximum of 15,000 km with no modifications.

4.7.1.4. The production shall be deemed to conform if at least three vehicles meet the requirements of the tests described in Appendix 1 to Annex XI.

## Appendix 1

### **Verification of conformity of production for Type 1 test—statistical method**

1. This appendix describes the procedure to be used to verify the production conformity requirements for the Type 1 test for pollutants/CO<sub>2</sub>, including conformity requirements for PEVs and OVC-HEVs.

2. Measurements of the pollutants specified in Table 2 of Annex I to Regulation (EC) No 715/2007 and the emission of CO<sub>2</sub> shall be carried out on a minimum number of 3 vehicles, and consecutively increase until a pass or fail decision is reached.

From the number of  $N$  tests:  $x_1, x_2, \dots, x_N$ , the average  $X_{tests}$  and the variance  $VAR$  are to be determined from all  $N$  measurements:

$$X_{tests} = (x_1 + x_2 + x_3 + \dots + x_N)/N$$

and

$$VAR = ((x_1 - X_{tests})^2 + (x_2 - X_{tests})^2 + \dots + (x_N - X_{tests})^2)/(N-1)$$

3. For each number of tests, one of the three following decisions (see (i) to (iii) below) can be reached for pollutants based on the limit value  $L$  for each pollutant, the average of all  $N$  tests:  $X_{tests}$ , the variance of the test results  $VAR$  and the number of tests  $N$ :

(i) Pass the family if  $X_{tests} < A * L - VAR/L$

(ii) Fail the family if  $X_{tests} > A * L - ((N-3)/13) * VAR/L$

(iii) Take another measurement if:

$$A * L - VAR/L \leq X_{tests} < A * L - ((N-3)/13) * VAR/L$$

For the measurement of pollutants the factor  $A$  is set at 1.05 in order to take into account inaccuracies in the measurements.

4. For CO<sub>2</sub> and EC the normalised values for CO<sub>2</sub> and EC shall be used:

$$x_i = CO_{2test-i} / CO_{2declared}$$

$$x_i = EC_{test-i} / EC_{DC, COP}$$

In the case of CO<sub>2</sub> and EC the factor  $A$  is set at 1.01 and the value for  $L$  is set at 1. So in the case of CO<sub>2</sub> and EC the criteria are simplified to:

(i) Pass the family if  $X_{tests} < A - VAR$

(ii) Fail the family if  $X_{tests} > A - ((N-3)/13) * VAR$

(iii) Take another measurement if:

$$A - VAR \leq X_{tests} < A - ((N-3)/13) * VAR$$

The A values for pollutants, EC and CO<sub>2</sub> will be reviewed and may change according to the available evidence. For this reason the Type Approval Authorities will need to provide the Commission with all relevant data at least for the initial period of 5 years.

## Appendix 2

### **Calculations for Conformity of Production of EVs**

1. Calculations for conformity of production values for PEVs
- 1.1 Interpolating of individual electric energy consumption of PEVs

$$EC_{DC-ind,COP} = EC_{DC-L,COP} + K_{ind} \times (EC_{DC-H,COP} - EC_{DC-L,COP})$$

where:

- $EC_{DC-ind,COP}$  is the electric energy consumption of an individual vehicle for the conformity of production, Wh/km;
- $EC_{DC-L,COP}$  is the electric energy consumption of vehicle L for the conformity of production, Wh/km;
- $EC_{DC-H,COP}$  is the electric energy consumption of vehicle H for the conformity of production, Wh/km;
- $K_{ind}$  is the interpolation coefficient for the considered individual vehicle for the applicable WLTP test cycle.

- 1.2 Electric Consumption for PEVs

The following value shall be declared and used for verifying the conformity of production with respect to the electric consumption:

$$EC_{DC,COP} = EC_{DC,CD,first\ WLTC} \times AF_{EC}$$

where:

- $EC_{DC,COP}$  is the electric energy consumption based on the REESS depletion of the first applicable WLTC test cycle provided for the verification during the conformity of production test procedure;
- $EC_{DC,CD,first\ WLTC}$  is the electric energy consumption based on the REESS depletion of the first applicable WLTC test cycle according to paragraph 4.3. of Sub-Annex 8 to Annex XXI, in Wh/km;
- $AF_{EC}$  is the adjustment factor which compensates the difference between the charge-depleting electric energy consumption value declared after having performed the Type 1 test procedure during homologation and the measured test result determined during the conformity of production procedure

and

$$AF_{EC} = \frac{EC_{WLTC,declared}}{EC_{WLTC}}$$

where

- $EC_{WLTC,declared}$  is the declared electric energy consumption for PEVs according to paragraph 1.1.2.3. of Sub-Annex 6 of Annex XXI

$EC_{WLTC}$  is the measured electric energy consumption according to paragraph 4.3.4.2. of Sub-Annex 8 to Annex XXI.

## 2. Calculations for conformity of production values for OVC-HEVs

### 2.1 Individual charge-sustaining CO<sub>2</sub> mass emission of OVC-HEVs for conformity of production

$$M_{CO_2-ind,CS,COP} = M_{CO_2-L,CS,COP} + K_{ind} \times (M_{CO_2-H,CS,COP} - M_{CO_2-L,CS,COP})$$

where:

$M_{CO_2-ind,CS,COP}$  is the charge-sustaining CO<sub>2</sub> mass emission of an individual vehicle for the conformity of production, g/km;

$M_{CO_2-L,CS,COP}$  is the charge-sustaining CO<sub>2</sub> mass emission of vehicle L for the conformity of production, g/km;

$M_{CO_2-H,CS,COP}$  is the charge-sustaining CO<sub>2</sub> mass emission of vehicle H for the conformity of production, g/km;

$K_{ind}$  is the interpolation coefficient for the considered individual vehicle for the applicable WLTP test cycle.

### 2.2 Individual charge-depleting electric energy consumption of OVC-HEVs for conformity of production

$$EC_{DC-ind,CD,COP} = EC_{DC-L,CD,COP} + K_{ind} \times (EC_{DC-H,CD,COP} - EC_{DC-L,CD,COP})$$

where:

$EC_{DC-ind,CD,COP}$  is the charge-depleting electric energy consumption of an individual vehicle for the conformity of production, Wh/km;

$EC_{DC-L,CD,COP}$  is the charge-depleting electric energy consumption of vehicle L for the conformity of production, Wh/km;

$EC_{DC-H,CD,COP}$  is the charge-depleting electric energy consumption of vehicle H for the conformity of production, Wh/km;

$K_{ind}$  is the interpolation coefficient for the considered individual vehicle for the applicable WLTP test cycle.

### 2.3 Charge-sustaining CO<sub>2</sub> mass emission value for conformity of production

The following value shall be declared and used for the verification of the conformity of production with respect to the charge-sustaining CO<sub>2</sub> mass emission:

$$M_{CO_2,CS,COP} = M_{CO_2,CS} \times AF_{CO_2,CS}$$

where:

$M_{CO_2,CS,COP}$  is the charge-sustaining CO<sub>2</sub> mass emission value of the charge-sustaining Type 1 test provided for the verification during the conformity of production test procedure;

$M_{CO_2,CS}$  is the charge-sustaining CO<sub>2</sub> mass emission of the charge-sustaining Type 1 test according to paragraph 4.1.1. of Annex XXI, g/km;



$AF_{CO_2,CS}$  is the adjustment factor which compensates the difference between the value declared after having performed the Type 1 test procedure during homologation and the measured test result determined during the conformity of production procedure

And

$$AF_{CO_2,CS} = \frac{M_{CO_2,CS,c,declared}}{M_{CO_2,CS,c,6}}$$

where

$M_{CO_2,CS,c,declared}$  is the declared charge-sustaining CO<sub>2</sub> mass emission of the charge-sustaining Type 1 test according to step 7 of Table A8/5 of Sub-Annex 8 to Annex XXI.

$M_{CO_2,CS,c,6}$  is the measured charge-sustaining CO<sub>2</sub> mass emission of the charge-sustaining Type 1 test according to step 6 of Table A8/5 of Sub-Annex 8 to Annex XXI.

#### 2.4 Charge-depleting electric energy consumption for conformity of production

The following value shall be declared and used for verifying the conformity of production with respect to the charge-depleting electric energy consumption

$$EC_{DC,CD,COP} = EC_{DC,CD,first\ WLTC} \times AF_{EC,AC,CD}$$

where:

$EC_{DC,CD,COP}$  is the charge-depleting electric energy consumption based on the REESS depletion of the first applicable WLTC test cycle of the charge-depleting Type 1 test provided for the verification during the conformity of production test procedure;

$EC_{DC,CD,first\ WLTC}$  is the charge-depleting electric energy consumption based on the REESS depletion of the first applicable WLTC test cycle of the charge-depleting Type 1 test according to paragraph 4.3. of Sub-Annex 8 to Annex XXI, Wh/km;

$AF_{EC,AC,CD}$  is the adjustment factor for the charge-depleting electric energy consumption which compensates the difference between the value declared after having performed the Type 1 test procedure during homologation and the measured test result determined during the conformity of production procedure

and

$$AF_{EC,AC,CD} = \frac{EC_{AC,CD,declared}}{EC_{AC,CD}}$$

where

$EC_{AC,CD,declared}$  is the declared charge-depleting electric energy consumption of the charge-depleting Type 1 test according to paragraph 1.1.2.3. of Sub-Annex 6 to Annex XXI.

$EC_{AC,CD}$  is the measured charge-depleting electric energy consumption of the charge-depleting Type 1 test according to paragraph 4.3.1. of Sub-Annex 8 to Annex XXI.

### **Appendix 3**

#### **MODEL**

#### **INFORMATION DOCUMENT No ...**

#### **RELATING TO EC TYPE-APPROVAL OF A VEHICLE WITH REGARD TO EMISSIONS AND ACCESS TO VEHICLE REPAIR AND MAINTENANCE INFORMATION**

The following information, if applicable, must be supplied in triplicate and include a list of contents. Any drawings must be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, must show sufficient detail.

If the systems, components or separate technical units have electronic controls, information concerning their performance must be supplied.

0. GENERAL	
0.1.	Make (trade name of manufacturer): .....
0.2.	Type: .....
0.2.1.	Commercial name(s) (if available): .....
0.4.	Category of vehicle ( <sup>c</sup> ): .....
0.8.	Name(s) and address(es) of assembly plant(s): .....
0.9.	Name and address of the manufacturer's representative (if any): .....
1. GENERAL CONSTRUCTION CHARACTERISTICS	
1.1.	Photographs and/or drawings of a representative vehicle/component/separate technical unit ( <sup>1</sup> ):
1.3.3.	Powered axles (number, position, interconnection): .....
2. MASSES AND DIMENSIONS ( <sup>f</sup> ) ( <sup>g</sup> ) ( <sup>7</sup> ) (in kg and mm) (Refer to drawing where applicable)	
2.6.	Mass in running order ( <sup>h</sup> ) (a) maximum and minimum for each variant: . . . (b) mass of each version (a matrix must be provided): .....
2.8.	Technically permissible maximum laden mass stated by the manufacturer ( <sup>i</sup> ) ( <sup>3</sup> ): .....
3. PROPULSION ENERGY CONVERTER ( <sup>k</sup> )	
3.1.	Manufacturer of the propulsion energy converter(s): .....
3.1.1.	Manufacturer's code (as marked on the propulsion energy converter or other means of identification): . . .
3.2.	Internal combustion engine
3.2.1.1.	Working principle: positive ignition/compression ignition/dual fuel ( <sup>1</sup> ) Cycle: four stroke/two stroke/rotary ( <sup>1</sup> )
3.2.1.2.	Number and arrangement of cylinders: .....
3.2.1.2.1.	Bore ( <sup>l</sup> ): ..... mm
3.2.1.2.2.	Stroke ( <sup>l</sup> ): ..... mm
3.2.1.2.3.	Firing order: .....
3.2.1.3.	Engine capacity ( <sup>m</sup> ): ..... cm <sup>3</sup>
3.2.1.4.	Volumetric compression ratio ( <sup>2</sup> ): .....
3.2.1.5.	Drawings of combustion chamber, piston crown and, in the case of positive ignition engines, piston rings: .....
3.2.1.6.	Normal engine idling speed ( <sup>2</sup> ): ..... min <sup>-1</sup>
3.2.1.6.1.	High engine idling speed ( <sup>2</sup> ): ..... min <sup>-1</sup>
3.2.1.8.	Rated engine power ( <sup>n</sup> ): ..... kW at ..... min <sup>-1</sup> (manufacturer's declared value)
3.2.1.9.	Maximum permitted engine speed as prescribed by the manufacturer: ..... min <sup>-1</sup>
3.2.1.10.	Maximum net torque ( <sup>n</sup> ): ..... Nm at ..... min <sup>-1</sup> (manufacturer's declared value)
3.2.2.	Fuel
3.2.2.1.	Light-duty vehicles: Diesel/Petrol/LPG/NG or Biomethane/Ethanol (E85)/Biodiesel/Hydrogen/H2NG ( <sup>1</sup> ) ( <sup>6</sup> )
3.2.2.1.1.	RON, unleaded: .....
3.2.2.4.	Vehicle fuel type: Mono fuel, Bi fuel, Flex fuel ( <sup>1</sup> )
3.2.2.5.	Maximum amount of biofuel acceptable in fuel (manufacturer's declared value): ..... % by volume
3.2.4.	Fuel feed

3.2.4.1.	By carburettor(s): yes/no <sup>(1)</sup>
3.2.4.2.	By fuel injection (compression ignition or dual fuel only): yes/no <sup>(1)</sup>
3.2.4.2.1.	System description (common rail/unit injectors/distribution pump etc.): . . . . .
3.2.4.2.2.	Working principle: direct injection/pre-chamber/swirl chamber <sup>(1)</sup>
3.2.4.2.3.	Injection/Delivery pump
3.2.4.2.3.1.	Make(s): . . . . .
3.2.4.2.3.2.	Type(s): . . . . .
3.2.4.2.3.3.	Maximum fuel delivery <sup>(1)</sup> <sup>(2)</sup> : . . . . . mm <sup>3</sup> /stroke or cycle at an engine speed of: . . . . . . min <sup>-1</sup> or, alternatively, a characteristic diagram: . . . . . (When boost control is supplied, state the characteristic fuel delivery and boost pressure versus engine speed)
3.2.4.2.4.	Engine speed limitation control
3.2.4.2.4.2.1.	Speed at which cut-off starts under load: . . . . . min <sup>-1</sup>
3.2.4.2.4.2.2.	Maximum no-load speed: . . . . . min <sup>-1</sup>
3.2.4.2.6.	Injector(s)
3.2.4.2.6.1.	Make(s): . . . . .
3.2.4.2.6.2.	Type(s): . . . . .
3.2.4.2.8.	Auxiliary starting aid
3.2.4.2.8.1.	Make(s): . . . . .
3.2.4.2.8.2.	Type(s): . . . . .
3.2.4.2.8.3.	System description: . . . . .
3.2.4.2.9.	Electronic controlled injection: yes/no <sup>(1)</sup>
3.2.4.2.9.1.	Make(s): . . . . .
3.2.4.2.9.2.	Type(s):
3.2.4.2.9.3.	Description of the system: . . . . .
3.2.4.2.9.3.1.	Make and type of the control unit (ECU): . . . . .
3.2.4.2.9.3.1.1.	Software version of the ECU: . . . . .
3.2.4.2.9.3.2.	Make and type of the fuel regulator: . . . . .
3.2.4.2.9.3.3.	Make and type of the air-flow sensor: . . . . .
3.2.4.2.9.3.4.	Make and type of fuel distributor: . . . . .
3.2.4.2.9.3.5.	Make and type of the throttle housing: . . . . .
3.2.4.2.9.3.6.	Make and type or working principle of water temperature sensor: . . . . .
3.2.4.2.9.3.7.	Make and type or working principle of air temperature sensor: . . . . .
3.2.4.2.9.3.8.	Make and type or working principle of air pressure sensor: . . . . .
3.2.4.3.	By fuel injection (positive ignition only): yes/no <sup>(1)</sup>
3.2.4.3.1.	Working principle: intake manifold (single-/multi-point/direct injection <sup>(1)</sup> /other (specify): . .
3.2.4.3.2.	Make(s): . . . . .
3.2.4.3.3.	Type(s): . . . . .
3.2.4.3.4.	System description (In the case of systems other than continuous injection give equivalent details): . .
3.2.4.3.4.1.	Make and type of the control unit (ECU): . . . . .
3.2.4.3.4.1.1.	Software version of the ECU: . . . . .
3.2.4.3.4.3.	Make and type or working principle of air-flow sensor: . . . . .
3.2.4.3.4.8.	Make and type of throttle housing: . . . . .
3.2.4.3.4.9.	Make and type or working principle of water temperature sensor: . . . . .
3.2.4.3.4.10.	Make and type or working principle of air temperature sensor: . . . . .

3.2.4.3.4.11.	Make and type or working principle of air pressure sensor: .....
3.2.4.3.5.	Injectors
3.2.4.3.5.1.	Make: .....
3.2.4.3.5.2.	Type: .....
3.2.4.3.7.	Cold start system
3.2.4.3.7.1.	Operating principle(s): .....
3.2.4.3.7.2.	Operating limits/settings <sup>(1)</sup> <sup>(2)</sup> : .....
3.2.4.4.	Feed pump
3.2.4.4.1.	Pressure <sup>(2)</sup> : ..... kPa or characteristic diagram <sup>(2)</sup> : .....
3.2.4.4.2.	Make(s): .....
3.2.4.4.3.	Type(s): .....
3.2.5.	Electrical system
3.2.5.1.	Rated voltage: ..... V, positive/negative ground <sup>(1)</sup>
3.2.5.2.	Generator
3.2.5.2.1.	Type: .....
3.2.5.2.2.	Nominal output: ..... VA
3.2.6.	Ignition system (spark ignition engines only)
3.2.6.1.	Make(s): .....
3.2.6.2.	Type(s): .....
3.2.6.3.	Working principle: .....
3.2.6.6.	Spark plugs
3.2.6.6.1.	Make: .....
3.2.6.6.2.	Type: .....
3.2.6.6.3.	Gap setting: .....mm
3.2.6.7.	Ignition coil(s)
3.2.6.7.1.	Make: .....
3.2.6.7.2.	Type: .....
3.2.7.	Cooling system: liquid/air <sup>(1)</sup>
3.2.7.1.	Nominal setting of the engine temperature control mechanism: .....
3.2.7.2.	Liquid
3.2.7.2.1.	Nature of liquid: .....
3.2.7.2.2.	Circulating pump(s): yes/no <sup>(1)</sup>
3.2.7.2.3.	Characteristics: .....or
3.2.7.2.3.1.	Make(s): .....
3.2.7.2.3.2.	Type(s): .....
3.2.7.2.4.	Drive ratio(s): .....
3.2.7.2.5.	Description of the fan and its drive mechanism: .....
3.2.7.3.	Air
3.2.7.3.1.	Fan: yes/no <sup>(1)</sup>
3.2.7.3.2.	Characteristics: .....or
3.2.7.3.2.1.	Make(s): .....
3.2.7.3.2.2.	Type(s): .....
3.2.7.3.3.	Drive ratio(s): .....
3.2.8.	Intake system
3.2.8.1.	Pressure charger: yes/no <sup>(1)</sup>
3.2.8.1.1.	Make(s): .....

3.2.8.1.2.	Type(s): .....
3.2.8.1.3.	Description of the system (e.g. maximum charge pressure: ..... kPa; wastegate if applicable): . . .
3.2.8.2.	Intercooler: yes/no <sup>(1)</sup>
3.2.8.2.1.	Type: air-air/air-water <sup>(1)</sup>
3.2.8.3.	Intake depression at rated engine speed and at 100 % load (compression ignition engines only)
3.2.8.4.	Description and drawings of inlet pipes and their accessories (plenum chamber, heating device, additional air intakes, etc.): .....
3.2.8.4.1.	Intake manifold description (include drawings and/or photos): .....
3.2.8.4.2.	Air filter, drawings: ..... or
3.2.8.4.2.1.	Make(s): .....
3.2.8.4.2.2.	Type(s): .....
3.2.8.4.3.	Intake silencer, drawings: ..... or
3.2.8.4.3.1.	Make(s): .....
3.2.8.4.3.2.	Type(s): .....
3.2.9.	Exhaust system
3.2.9.1.	Description and/or drawing of the exhaust manifold: .....
3.2.9.2.	Description and/or drawing of the exhaust system: .....
3.2.9.3.	Maximum allowable exhaust back pressure at rated engine speed and at 100 % load (compression ignition engines only): ..... kPa
3.2.10.	Minimum cross-sectional areas of inlet and outlet ports: .....
3.2.11.	Valve timing or equivalent data
3.2.11.1.	Maximum lift of valves, angles of opening and closing, or timing details of alternative distribution systems, in relation to dead centres. For variable timing system, minimum and maximum timing: . . .
3.2.11.2.	Reference and/or setting ranges <sup>(1)</sup> : .....
3.2.12.	Measures taken against air pollution
3.2.12.1.	Device for recycling crankcase gases (description and drawings): .....
3.2.12.2.	Pollution control devices (if not covered by another heading)
3.2.12.2.1.	Catalytic converter
3.2.12.2.1.1.	Number of catalytic converters and elements (provide the information below for each separate unit): .....
3.2.12.2.1.2.	Dimensions, shape and volume of the catalytic converter(s): .....
3.2.12.2.1.3.	Type of catalytic action: .....
3.2.12.2.1.4.	Total charge of precious metals: .....
3.2.12.2.1.5.	Relative concentration: .....
3.2.12.2.1.6.	Substrate (structure and material): .....
3.2.12.2.1.7.	Cell density: .....
3.2.12.2.1.8.	Type of casing for the catalytic converter(s): .....
3.2.12.2.1.9.	Location of the catalytic converter(s) (place and reference distance in the exhaust line): . .
3.2.12.2.1.10.	Heat shield: yes/no <sup>(1)</sup>
3.2.12.2.1.11.	Normal operating temperature range: ..... °C
3.2.12.2.1.12.	Make of catalytic converter: .....
3.2.12.2.1.13.	Identifying part number: .....

3.2.12.2.2. Sensors	
3.2.12.2.2.1. Oxygen sensor: yes/no <sup>(1)</sup>	
3.2.12.2.2.1.1.	Make: .....
3.2.12.2.2.1.2.	Location: .....
3.2.12.2.2.1.3.	Control range: .....
3.2.12.2.2.1.4.	Type or working principle: .....
3.2.12.2.2.1.5.	Identifying part number: .....
3.2.12.2.2.2. NOx sensor: yes/no <sup>(1)</sup>	
3.2.12.2.2.2.1.	Make: ...
3.2.12.2.2.2.2.	Type: ...
3.2.12.2.2.2.3.	Location
3.2.12.2.2.3. Particulate sensor: yes/no <sup>(1)</sup>	
3.2.12.2.2.3.1.	Make: ...
3.2.12.2.2.3.2.	Type: ...
3.2.12.2.2.3.3.	Location: ...
3.2.12.2.3. Air injection: yes/no <sup>(1)</sup>	
3.2.12.2.3.1.	Type (pulse air, air pump, etc.): .....
3.2.12.2.4. Exhaust gas recirculation (EGR): yes/no <sup>(1)</sup>	
3.2.12.2.4.1.	Characteristics (make, type, flow, high pressure/low pressure/combined pressure, etc.): . .
3.2.12.2.4.2.	Water-cooled system (to be specified for each EGR system e.g. low pressure/high pressure/combined pressure: yes/no <sup>(1)</sup> )
3.2.12.2.5. Evaporative emissions control system (petrol and ethanol engines only): yes/no <sup>(1)</sup>	
3.2.12.2.5.1.	Detailed description of the devices: .....
3.2.12.2.5.2.	Drawing of the evaporative control system: .....
3.2.12.2.5.3.	Drawing of the carbon canister: .....
3.2.12.2.5.4.	Mass of dry charcoal: ..... g
3.2.12.2.5.5.	Schematic drawing of the fuel tank with indication of capacity and material (petrol and ethanol engines only): .....
3.2.12.2.5.6.	Description and schematic of the heat shield between tank and exhaust system: . .
3.2.12.2.6. Particulate trap (PT): yes/no <sup>(1)</sup>	
3.2.12.2.6.1.	Dimensions, shape and capacity of the particulate trap: .....
3.2.12.2.6.2.	Design of the particulate trap: .....
3.2.12.2.6.3.	Location (reference distance in the exhaust line): .....
3.2.12.2.6.4.	Make of particulate trap: .....
3.2.12.2.6.5.	Identifying part number: .....
3.2.12.2.7 On-board-diagnostic (OBD) system: yes/no <sup>(1)</sup>	
3.2.12.2.7.1.	Written description and/or drawing of the MI: .....
3.2.12.2.7.2.	List and purpose of all components monitored by the OBD system: .....
3.2.12.2.7.3. Written description (general working principles) for	
3.2.12.2.7.3.1 Positive-ignition engines	
3.2.12.2.7.3.1.1.	Catalyst monitoring: .....
3.2.12.2.7.3.1.2.	Misfire detection: .....
3.2.12.2.7.3.1.3.	Oxygen sensor monitoring: .....
3.2.12.2.7.3.1.4.	Other components monitored by the OBD system: .....
3.2.12.2.7.3.2. Compression-ignition engines: .....	



3.2.12.2.7.3.2.1.	Catalyst monitoring: . . . . .							
3.2.12.2.7.3.2.2.	Particulate trap monitoring: . . . . .							
3.2.12.2.7.3.2.3.	Electronic fuelling system monitoring: . . . . .							
3.2.12.2.7.3.2.5.	Other components monitored by the OBD system: . . . . .							
3.2.12.2.7.4.	Criteria for MI activation (fixed number of driving cycles or statistical method):. . . . .							
3.2.12.2.7.5.	List of all OBD output codes and formats used (with explanation of each): . . . . .							
3.2.12.2.7.6.	The following additional information shall be provided by the vehicle manufacturer for the purposes of enabling the manufacture of OBD-compatible replacement or service parts and diagnostic tools and test equipment.							
3.2.12.2.7.6.1.	A description of the type and number of the preconditioning cycles used for the original type approval of the vehicle.							
3.2.12.2.7.6.2.	A description of the type of the OBD demonstration cycle used for the original type-approval of the vehicle for the component monitored by the OBD system.							
3.2.12.2.7.6.3.	<p>A comprehensive document describing all sensed components with the strategy for fault detection and MI activation (fixed number of driving cycles or statistical method), including a list of relevant secondary sensed parameters for each component monitored by the OBD system. A list of all OBD output codes and format used (with an explanation of each) associated with individual emission related power-train components and individual non-emission related components, where monitoring of the component is used to determine MI activation, including in particular a comprehensive explanation for the data given in service \$05 Test ID \$21 to FF and the data given in service \$06.</p> <p>In the case of vehicle types that use a communication link in accordance with ISO 15765-4 "Road vehicles, diagnostics on controller area network (CAN) — Part 4: requirements for emissions-related systems", a comprehensive explanation for the data given in service \$06 Test ID \$00 to FF, for each OBD monitor ID supported, shall be provided.</p>							
3.2.12.2.7.6.4.	The information required above may be defined by completing a table as described below.							
3.2.12.2.7.6.4.1.	Light-duty vehicles							
	Component	Fault code	Monitoring strategy	Fault detection criteria	MI activation criteria	Secondary parameters	Preconditioning	Demonstration test
	Catalyst	P0420	Oxygen sensor 1 and sensor 2 signals	Difference between sensor 1 and sensor 2 signals-	3rd cycle	Engine speed load, A/F mode, catalyst temperature	Two type I cycles	Type I
3.2.12.2.8.	Other system: . . . . .							
3.2.12.2.8.2.	Driver inducement system							
3.2.12.2.8.2.3.	Type of inducement system: no engine restart after countdown/no start after refuelling/fuel-lockout/performance restriction							
3.2.12.2.8.2.4.	Description of the inducement system							
3.2.12.2.8.2.5.	Equivalent to the average driving range of the vehicle with a complete tank of fuel: . . . km							

3.2.12.2.10.	Periodically regenerating system: (provide the information below for each separate unit)
3.2.12.2.10.1.	Method or system of regeneration, description and/or drawing: . . . . .
3.2.12.2.10.2.	The number of Type 1 operating cycles, or equivalent engine test bench cycles, between two cycles where regenerative phases occur under the conditions equivalent to Type 1 test (Distance 'D' in Figure A6.App1/1 in Appendix 1 to Sub-Annex 6 of Annex XXI to Regulation (EU) No xxx/2016 or figure A13/1 in Annex 13 to UN/ECE Regulation 83 (as applicable)): . .
3.2.12.2.10.2.1.	Applicable Type 1 cycle (indicate the applicable procedure: Annex XXI, Sub-Annex 4 or UN/ECE Regulation 83): ...
3.2.12.2.10.3.	Description of method employed to determine the number of cycles between two cycles where regenerative phases occur: . . . . .
3.2.12.2.10.4.	Parameters to determine the level of loading required before regeneration occurs (i.e. temperature, pressure etc.): . . . . .
3.2.12.2.10.5.	Description of method used to load system in the test procedure described in paragraph 3.1., Annex 13 to UN/ECE Regulation 83: . . . . .
3.2.12.2.11.	Catalytic converter systems using consumable reagents (provide the information below for each separate unit) yes/no <sup>(1)</sup>
3.2.12.2.11.1.	Type and concentration of reagent needed: ...
3.2.12.2.11.2.	Normal operational temperature range of reagent: ...
3.2.12.2.11.3.	International standard: ...
3.2.12.2.11.4.	Frequency of reagent refill: continuous/maintenance (where appropriate):
3.2.12.2.11.5.	Reagent indicator: (description and location)
3.2.12.2.11.6.	Reagent tank
3.2.12.2.11.6.1.	Capacity: ...
3.2.12.2.11.6.2.	Heating system: yes/no
3.2.12.2.11.6.2.1.	Description or drawing
3.2.12.2.11.7.	Reagent control unit: yes/no <sup>(1)</sup>
3.2.12.2.11.7.1.	Make: ...
3.2.12.2.11.7.2.	Type: ...
3.2.12.2.11.8.	Reagent injector (make type and location): ...
3.2.13.	Smoke opacity
3.2.13.1.	Location of the absorption coefficient symbol (compression ignition engines only): . . . .
3.2.14.	Details of any devices designed to influence fuel economy (if not covered by other items): .
3.2.15.	LPG fuelling system: yes/no <sup>(1)</sup>
3.2.15.1.	Type-approval number according to Regulation (EC) No 661/2009 (OJ L 200, 31.7.2009, p1): . . . . .
3.2.15.2.	Electronic engine management control unit for LPG fuelling
3.2.15.2.1.	Make(s): . . . . .
3.2.15.2.2.	Type(s): . . . . .
3.2.15.2.3.	Emission-related adjustment possibilities: . . . . .
3.2.15.3.	Further documentation
3.2.15.3.1.	Description of the safeguarding of the catalyst at switch-over from petrol to LPG or back: . .
3.2.15.3.2.	System lay-out (electrical connections, vacuum connections compensation hoses, etc.): . .
3.2.15.3.3.	Drawing of the symbol: . . . . .
3.2.16.	NG fuelling system: yes/no <sup>(1)</sup>
3.2.16.1.	Type-approval number according to Regulation (EC) No 661/2009 (OJ L 200, 31.7.2009, p1): . . . . .

3.2.16.2.	Electronic engine management control unit for NG fuelling
3.2.16.2.1.	Make(s): .....
3.2.16.2.2.	Type(s): .....
3.2.16.2.3.	Emission-related adjustment possibilities: .....
3.2.16.3.	Further documentation
3.2.16.3.1.	Description of the safeguarding of the catalyst at switch-over from petrol to NG or back: . .
3.2.16.3.2.	System lay-out (electrical connections, vacuum connections compensation hoses, etc.): . .
3.2.16.3.3.	Drawing of the symbol: .....
3.2.18.	Hydrogen fuelling system: yes/no <sup>(1)</sup>
3.2.18.1.	EC type-approval number in accordance with Regulation (EC) No 79/2009: . . . . .
3.2.18.2.	Electronic engine management control unit for hydrogen fuelling
3.2.18.2.1.	Make(s): .....
3.2.18.2.2.	Type(s): .....
3.2.18.2.3.	Emission-related adjustment possibilities: .....
3.2.18.3.	Further documentation
3.2.18.3.1.	Description of the safeguarding of the catalyst at switch-over from petrol to hydrogen or back: .....
3.2.18.3.2.	System lay-out (electrical connections, vacuum connections compensation hoses, etc.): ...
3.2.18.3.3.	Drawing of the symbol: .....
3.2.19.4.	Further documentation
3.2.19.4.1.	Description of the safeguarding of the catalyst at switch-over from petrol to H2NG or back: ...
3.2.19.4.2.	System lay-out (electrical connections, vacuum connections compensation hoses, etc.): ....
3.2.19.4.3.	Drawing of the symbol: .....
3.2.20.	Heat storage information
3.2.20.1.	Active heat storage device: yes/no <sup>(1)</sup>
3.2.20.1.1.	Enthalpy: ... (J)
3.2.20.2.	Insulation materials
3.2.20.2.1.	Insulation material: ...
3.2.20.2.2.	Insulation volume: ...
3.2.20.2.3.	Insulation weight: ...
3.2.20.2.4.	Insulation location: ...
3.3.	Electric machine
3.3.1.	Type (winding, excitation): .....
3.3.1.2.	Operating voltage: ..... V
3.4.	Combinations of propulsion energy converters
3.4.1.	Hybrid electric vehicle: yes/no <sup>(1)</sup>
3.4.2.	Category of hybrid electric vehicle: off-vehicle charging/not off-vehicle charging: <sup>(1)</sup>
3.4.3.	Operating mode switch: with/without <sup>(1)</sup>
3.4.3.1.	Selectable modes
3.4.3.1.1.	Pure electric: yes/no <sup>(1)</sup>
3.4.3.1.2.	Pure fuel consuming: yes/no <sup>(1)</sup>
3.4.3.1.3.	Hybrid modes: yes/no <sup>(1)</sup> (if yes, short description): .....
3.4.4.	Description of the energy storage device: (REESS, capacitor, flywheel/generator)
3.4.4.1.	Make(s): .....
3.4.4.2.	Type(s): .....

3.4.4.3.	Identification number: .....
3.4.4.4.	Kind of electrochemical couple: .....
3.4.4.5.	Energy: ..... (for REESS: voltage and capacity Ah in 2 h, for capacitor: J, .....)
3.4.4.6.	Charger: on board/external/without <sup>(1)</sup>
3.4.5.	Electric machine (describe each type of electric machine separately)
3.4.5.1.	Make: .....
3.4.5.2.	Type: .....
3.4.5.3.	Primary use: traction motor/generator <sup>(1)</sup>
3.4.5.3.1.	When used as traction motor: single-/multimotors (number) <sup>(1)</sup> : ... ..
3.4.5.4.	Maximum power: ..... kW
3.4.5.5.	Working principle
3.4.5.5.1	Direct current/alternating current/number of phases: .....
3.4.5.5.2.	Separate excitation/series/compound <sup>(1)</sup>
3.4.5.5.3.	Synchronous/asynchronous <sup>(1)</sup>
3.4.6.	Control unit
3.4.6.1.	Make(s): .....
3.4.6.2.	Type(s): .....
3.4.6.3.	Identification number: .....
3.4.7.	Power controller
3.4.7.1.	Make: .....
3.4.7.2.	Type: .....
3.4.7.3.	Identification number: .....
3.4.9.	Manufacturer's recommendation for preconditioning: .....
3.5.	Manufacturer's declared values for determination of CO <sub>2</sub> emissions/fuel consumption/electric consumption/electric range and details of eco-innovations (where applicable) <sup>(6)</sup>
3.5.7.	Manufacturer's declared values
3.5.7.1.	Test vehicle parameters
3.5.7.1.1	Vehicle high
3.5.7.1.1.1.	Cycle Energy Demand (J): ...
3.5.7.1.1.2.	Road load coefficients
3.5.7.1.1.2.1.	$f_0$ , N: ...
3.5.7.1.1.2.2.	$f_1$ , N/(km/h): ...
3.5.7.1.1.2.3.	$f_2$ , N/(km/h) <sup>2</sup> : ...
3.5.7.1.2.	Vehicle Low (if applicable)
3.5.7.1.2.1.	Cycle Energy Demand (J)
3.5.7.1.2.2.	Road load coefficients
3.5.7.1.2.2.1.	$f_0$ , N: ...
3.5.7.1.2.2.2.	$f_1$ , N/(km/h): ...
3.5.7.1.2.2.3.	$f_2$ , N/(km/h) <sup>2</sup> : ...
3.5.7.1.3.	Vehicle M (if applicable)
3.5.7.1.3.1.	Cycle Energy Demand (J)
3.5.7.1.3.2.	Road load coefficients
3.5.7.1.3.2.1.	$f_0$ , N: ...
3.5.7.1.3.2.2.	$f_1$ , N/(km/h): ...
3.5.7.1.3.2.3.	$f_2$ , N/(km/h) <sup>2</sup> : ...
3.5.7.2.	Combined CO <sub>2</sub> mass emissions

3.5.7.2.1.	CO <sub>2</sub> mass emission for ICE
3.5.7.2.1.1.	Vehicle High: ..... g/km
3.5.7.2.1.2.	Vehicle low (if applicable): ..... g/km
3.5.7.2.2.	Charge Sustaining CO <sub>2</sub> mass emission for OVC-HEVs and NOVC-HEVs
3.5.7.2.2.1.	Vehicle high: ..... g/km
3.5.7.2.2.2.	Vehicle low (if applicable): ..... g/km
3.5.7.2.2.3.	Vehicle M (if applicable): ..... g/km
3.5.7.2.3.	Charge Depleting CO <sub>2</sub> mass emission for OVC-HEVs
3.5.7.2.3.1.	Vehicle high: ..... g/km
3.5.7.2.3.2.	Vehicle low (if applicable): ..... g/km
3.5.7.2.3.3.	Vehicle M (if applicable): ..... g/km
3.5.7.3.	Electric range for electrified vehicles
3.5.7.3.1.	Pure Electric Range (PER) for PEVs
3.5.7.3.1.1.	Vehicle high: ..... km
3.5.7.3.1.2.	Vehicle low (if applicable): ..... km
3.5.7.3.2.	All Electric Range AER for OVC-HEVs
3.5.7.3.2.1.	Vehicle high: ..... km
3.5.7.3.2.2.	Vehicle low (if applicable): ..... km
3.5.7.3.2.3.	Vehicle M (if applicable): ..... km
3.5.7.4.	Charge Sustaining fuel consumption (FC <sub>CS</sub> ) for FCHVs
3.5.7.4.1.	Vehicle high: ..... kg/100 km
3.5.7.4.2.	Vehicle low (if applicable): ..... kg/100 km
3.5.7.4.3.	Vehicle M (if applicable): ..... kg/100 km
3.5.7.5.	Electric energy consumption for electrified vehicles
3.5.7.5.1.	Combined electric energy consumption (EC <sub>WLTC</sub> ) for Pure electric vehicles
3.5.7.5.1.1.	Vehicle high: ..... Wh/km
3.5.7.5.1.2.	Vehicle low (if applicable): ..... Wh/km
3.5.7.5.2.	UF-weighted charge-depleting electric consumption EC <sub>AC,CD</sub> (combined)
3.5.7.5.2.1.	Vehicle high: ..... Wh/km
3.5.7.5.2.2.	Vehicle low (if applicable): ..... Wh/km
3.5.7.5.2.3.	Vehicle M (if applicable): ..... Wh/km
3.5.8.	Vehicle fitted with an eco-innovation within the meaning of Article 12 of Regulation (EC) No 443/2009 for M1 vehicles or Article 12 of Regulation (EU) No 510/2011 for N1 vehicles: yes/no <sup>(1)</sup>
3.5.8.1.	Type/Variant/Version of the baseline vehicle as referred to in Article 5 of Regulation (EU) No 725/2011 for M1 vehicles or Article 5 of Regulation (EU) No 427/2014 for N1 vehicles (if applicable): .....
3.5.8.2.	Existence of interactions between different eco-innovations: yes/no <sup>(1)</sup>

3.5.8.3. Emissions data related to the use of eco-innovations (repeat the table for each reference fuel tested) <sup>(w1)</sup>

Decision approving the eco-innovation <sup>(w2)</sup>	Code of the eco-innovation <sup>(w3)</sup>	1. CO <sub>2</sub> emissions of the baseline vehicle (g/km)	2. CO <sub>2</sub> emissions of the eco-innovation vehicle (g/km)	3. CO <sub>2</sub> emissions of the baseline vehicle under type 1 test-cycle <sup>(w4)</sup>	4. CO <sub>2</sub> emissions of the eco-innovation vehicle under type 1 test-cycle	5. Usage factor (UF), i.e. temporal share of technology usage in normal operation conditions	CO <sub>2</sub> emissions saving $((1 - 2) - (3 - 4)) * 5$
xxxx/201x							
Total CO <sub>2</sub> emissions saving (g/km) <sup>(w5)</sup>							

(w) Eco-innovations.

(w1) Expand the table if necessary, using one extra row per eco-innovation.

(w2) Number of the Commission Decision approving the eco-innovation.

(w3) Assigned in the Commission Decision approving the eco-innovation.

(w4) Under agreement of the type-approval authority, if a modelling methodology is applied instead of the type 1 test cycle, this value shall be the one provided by the modelling methodology.

(w5) Sum of the CO<sub>2</sub> emissions savings of each individual eco-innovation.

3.6. Temperatures permitted by the manufacturer

3.6.1. Cooling system

3.6.1.1. Liquid cooling

Maximum temperature at outlet: ..... K

3.6.1.2. Air cooling

3.6.1.2.1. Reference point: .....

3.6.1.2.2. Maximum temperature at reference point: ..... K

3.6.2. Maximum outlet temperature of the inlet intercooler: ..... K

3.6.3. Maximum exhaust temperature at the point in the exhaust pipe(s) adjacent to the outer flange(s) of the exhaust manifold or turbocharger: ..... K

3.6.4. Fuel temperature

Minimum: ..... K — maximum: ..... K

For diesel engines at injection pump inlet, for gas fuelled engines at pressure regulator final stage

3.6.5. Lubricant temperature

Minimum: .... K — maximum: ..... K

3.8. Lubrication system

3.8.1. Description of the system

3.8.1.1. Position of lubricant reservoir: .....

3.8.1.2. Feed system (by pump/injection into intake/mixing with fuel, etc.) <sup>(1)</sup>

3.8.2. Lubricating pump

3.8.2.1. Make(s): .....

3.8.2.2. Type(s): .....

3.8.3. Mixture with fuel

3.8.3.1. Percentage: .....

3.8.4. Oil cooler: yes/no <sup>(1)</sup>

3.8.4.1.	Drawing(s): ..... or			
3.8.4.1.1.	Make(s): .....			
3.8.4.1.2.	Type(s): .....			
4.	TRANSMISSION <sup>(p)</sup>			
4.3.	Moment of inertia of engine flywheel: .....			
4.3.1.	Additional moment of inertia with no gear engaged: .....			
4.4.	Clutch(es)			
4.4.1.	Type: .....			
4.4.2.	Maximum torque conversion: .....			
4.5.	Gearbox			
4.5.1.	Type (manual/automatic/CVT (continuously variable transmission)) <sup>(1)</sup>			
4.5.1.1.	Predominant mode: yes/no <sup>(1)</sup>			
4.5.1.2.	Best mode (if no predominant mode): ...			
4.5.1.3.	Worst mode (if no predominant mode): ...			
4.5.1.4.	Torque rating: .....			
4.5.1.5.	Number of clutches: .....			
4.6.	Gear ratios			
	Gear	Internal gearbox ratios (ratios of engine to gearbox output shaft revolutions)	Final drive ratio(s) (ratio of gearbox output shaft to driven wheel revolutions)	Total gear ratios
	Maximum for CVT			
	1			
	2			
	3			
	...			
	Minimum for CVT			
	Reverse			
4.7.	Maximum vehicle design speed (in km/h) <sup>(9)</sup> : .....			
6.	SUSPENSION			
6.6.	Tyres and wheels			
6.6.1.	Tyre/wheel combination(s)			
6.6.1.1.	Axles			
6.6.1.1.1.	Axle 1: .....			
6.6.1.1.1.1.	Tyre size designation			
6.6.1.1.2.	Axle 2: .....			
6.6.1.1.2.1.	Tyre size designation			
	etc.			
6.6.2.	Upper and lower limits of rolling radii			
6.6.2.1.	Axle 1: .....			
6.6.2.2.	Axle 2: .....			

6.6.3.	Tyre pressure(s) as recommended by the vehicle manufacturer: ..... kPa
9.	BODYWORK
9.1.	Type of bodywork using the codes defined in Part C of Annex II of Directive 2007/46/EC: . . .
9.10.3.	Seats
9.10.3.1.	Number of seating positions (s): . . . . .
16.	ACCESS TO VEHICLE REPAIR AND MAINTENANCE INFORMATION
16.1.	Address of principal website for access to vehicle repair and maintenance information: . . .
16.1.1.	Date from which it is available (no later than 6 months from the date of type-approval): . . .
16.2.	Terms and conditions of access to website: . . . . .
16.3.	Format of the vehicle repair and maintenance information accessible through website: . . . .



**Appendix to information document**

**INFORMATION ON TEST CONDITIONS**

**1. Lubricants used**

1.1. Engine lubricant

1.1.1. Make: ...

1.1.2. Type: ...

1.2. Gearbox lubricant

1.2.1. Make: ...

1.2.2. Type: ...

(state percentage of oil in mixture if lubricant and fuel mixed)

**2. Road load information**

2.1. Gearbox type (manual/automatic/CVT)

VL (if existing)	VH
2.2. Vehicle bodywork type (variant/version)	2.2. Vehicle bodywork type (variant/version)
2.3. Road load method used (measurement or calculation by road load family)	2.3. Road load method used (measurement or calculation by road load family)
2.4. Road load information from the test	2.4. Road load information from the test
2.4.1. Tyres make and type:	2.4.1. Tyres make and type:
2.4.2. Tyre dimensions (front/rear):	2.4.2. Tyre dimensions (front/rear):
2.4.4. Tyre pressure (front/rear) (kPa):	2.4.4. Tyre pressure (front/rear) (kPa):
2.4.5. Tyre rolling resistance (front/rear) (kg/t):	2.4.5. Tyre rolling resistance (front/rear) (kg/t):
2.4.6. Vehicle test mass (kg):	2.4.6. Vehicle test mass (kg):
2.4.7. Delta Cd.A compared to VH (m <sup>2</sup> )	
2.4.8. Road load coefficient $f_0, f_1, f_2$	2.4.8. Road load coefficient $f_0, f_1, f_2$

## Appendix 4

### MODEL OF EC TYPE-APPROVAL CERTIFICATE

(Maximum format: A4 (210 × 297 mm))

### EC TYPE-APPROVAL CERTIFICATE

*Stamp of administration*

Communication concerning the:

- EC type-approval <sup>(1)</sup>,
- extension of EC type-approval <sup>(1)</sup>,
- refusal of EC type-approval <sup>(1)</sup>,
- withdrawal of EC type-approval <sup>(1)</sup>,
- of a type of system/type of a vehicle with regard to a system <sup>(1)</sup> with regard to Regulation (EC) No 715/2007 <sup>(2)</sup> and Regulation (EC) No xxx/2016 <sup>(3)</sup>

EC type-approval number: ...

Reason for extension: ...

#### SECTION I

0.1. Make (trade name of manufacturer): ...

0.2. Type: ...

0.2.1. Commercial name(s) (if available): ...

0.3. Means of identification of type if marked on the vehicle <sup>(4)</sup>

0.3.1. Location of that marking: ...

0.4. Category of vehicle <sup>(5)</sup>

0.5. Name and address of manufacturer: ...

0.8. Name(s) and address(es) of assembly plant(s): ...

0.9. Representative of the manufacturer: ....

**SECTION II** – to be repeated for each interpolation family, as defined in paragraph 5.6. of Annex XXI.

0. Interpolation family identifier as defined in paragraph 5.0 of Annex XXI

1. Additional information (where applicable): (see addendum)

2. Technical service responsible for carrying out the tests: ...

3. Date of type 1 test report: ...

4. Number of the type 1 test report: ...

5. Remarks (if any): (see addendum)

6. Place: ...

7. Date: ...

8. Signature: ...

<i>Attachments:</i>	Information package (6).
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## Addendum to EC type-approval certificate No ...

### **concerning the type-approval of a vehicle with regard to emissions and access to vehicle repair and maintenance information according to Regulation (EC) No 715/2007**

Cross references to information in Test Report or Information Document should be avoided when completing the TA certificate.

#### **0. Interpolation family identifier as defined in paragraph 5.0 of Annex XXI...**

##### **1. Additional information**

1.1. Mass of the vehicle in running order: ...

1.2. Maximum mass: ...

1.3. Reference mass: ...

1.4. Number of seats: ...

1.6. Type of bodywork:

1.6.1. for M<sub>1</sub>, M<sub>2</sub>: saloon, hatchback, station wagon, coupé, convertible, multipurpose vehicle<sup>(1)</sup>

1.6.2. for N<sub>1</sub>, N<sub>2</sub>: lorry, van<sup>(1)</sup>

1.7. Drive wheels: front, rear, 4 x 4<sup>(1)</sup>

1.8. Pure electric vehicle: yes/no<sup>(1)</sup>

1.9. Hybrid electric vehicle: yes/no<sup>(1)</sup>

1.9.1. Category of Hybrid Electric vehicle: Off Vehicle Charging/Not Off Vehicle charging / Fuel Cell<sup>(1)</sup>

1.9.2. Operating mode switch: with/without<sup>(1)</sup>

1.10. Engine identification:

1.10.1. Engine displacement:

1.10.2. Fuel supply system: direct injection/indirect injection<sup>(1)</sup>

1.10.3. Fuel recommended by the manufacturer:

1.10.4.1. Maximum power: kW at min<sup>-1</sup>

1.10.4.2. Maximum torque: Nm at min<sup>-1</sup>

1.10.5. Pressure charging device: yes/no<sup>(1)</sup>

1.10.6. Ignition system: compression ignition/positive ignition (<sup>1</sup>)

1.11. Power train (for pure electric vehicle or hybrid electric vehicle) (<sup>1</sup>)

1.11.1. Maximum net power: ... kW, at: ... to ... min<sup>-1</sup>

1.11.2. Maximum thirty minutes power: ... kW

1.11.3 Maximum net torque: ... Nm, at ... min<sup>-1</sup>

1.12. Traction battery (for pure electric vehicle or hybrid electric vehicle)

1.12.1. Nominal voltage: V

1.12.2. Capacity (2 h rate): Ah

1.13. Transmission: ..., ...

1.13.1. Type of gearbox: manual/automatic/variable transmission (<sup>1</sup>)

1.13.2. Number of gear ratios:

1.13.3. Total gear ratios (including the rolling circumferences of the tyres under load):  
(vehicle speed (km/h)) / (engine speed (1000 (min<sup>-1</sup>)))

First gear: ...	Sixth gear: ...
Second gear: ...	Seventh gear: ...
Third gear: ...	Eighth gear: ...
Fourth gear: ...	Overdrive: ...
Fifth gear: ...	

1.13.4. Final drive ratio:

1.14. Tyres: ..., ..., ...

Type: radial/bias/...(<sup>7</sup>)

Dimensions: ...

Rolling circumference under load:

Rolling circumference of tyres used for the Type 1 test

## 2. TEST RESULTS

### 2.1. Tailpipe emissions test results

Emissions classification: Euro 6

Type 1 test results, where applicable

Type approval number if not parent vehicle <sup>(1)</sup>: ...

#### Test 1

Type 1 Result	CO (mg/km)	THC (mg/km)	NMHC (mg/km)	NO <sub>x</sub> (mg/km)	THC + NO <sub>x</sub> (mg/km)	PM (mg/km)	PN (#.10 <sup>11</sup> /km)
Measured <sup>(8)</sup> <sup>(9)</sup>							
Ki * <sup>(8)</sup> <sup>(10)</sup>					<sup>(11)</sup>		
Ki + <sup>(8)</sup> <sup>(10)</sup>					<sup>(11)</sup>		
Mean value calculated with Ki (M.Ki or M+Ki) <sup>(9)</sup>					<sup>(12)</sup>		
DF (+) <sup>(8)</sup> <sup>(10)</sup>							
DF (*) <sup>(8)</sup> <sup>(10)</sup>							
Final mean value calculated with Ki and DF <sup>(13)</sup>							
Limit value							

Test 2 (if applicable)

Repeat Test 1 table with the second test results.

Test 3 (if applicable)

Repeat Test 1 table with the third test results.

Repeat Test 1, test 2 (if applicable) and test 3 (if applicable) for Vehicle Low (if applicable), and VM (if applicable)

Information about regeneration strategy

D — number of operating cycles between 2 cycles where regenerative phases occur: ...

d — number of operating cycles required for regeneration: ...

Applicable Type 1 cycle: (Annex XXI, Sub-Annex 4 or UN/ECE Regulation No 83) <sup>(14)</sup>: ...

ATCT test

CO <sub>2</sub> Emission (g/km)	Combined
ATCT (14°C) M <sub>CO2,Treg</sub>	
Type 1 (23°C) M <sub>CO2,23°</sub>	
Family correction factor (FCF)	

Difference between engine coolant end temperature and average soak area temperature of the last 3 hours  $\Delta T_{ATCT}$  (°C): ...

The minimum soaking time  $t_{soak\_ATCT}$  (s): ...

Location of temperature sensor: ...

Type 2: (including data required for roadworthiness testing):

Test	CO value (% vol)	Lambda <sup>7</sup>	Engine speed (min <sup>-1</sup> )	Engine oil temperature (°C)
Low idle test		N/A		
High idle test				

Type 3: ...

Type 4: ... g/test

Type 5: - Durability test: whole vehicle test/bench ageing test/none <sup>(1)</sup>

- Deterioration factor DF: calculated/assigned <sup>(1)</sup>

- Specify the values: ...

- Applicable Type 1 cycle (Annex XXI, Sub-Annex 4 or UN/ECE Regulation No 83) <sup>(14)</sup>: ...

Type 6	CO (g/km)	THC (g/km)
Measured value		

2.1.1. For bi fuel vehicles, the type 1 table shall be repeated for both fuels. For flex fuel vehicles, when the type 1 test is to be performed on both fuels according to Figure I.2.4 of Annex I, and for vehicles running on LPG or NG/Biomethane, either mono fuel or bi fuel, the table shall be repeated for the different reference gases used in the test, and an additional table shall display the worst results obtained. When applicable, in accordance with section 3.1.4 of Annex 12 to UN/ECE Regulation No 83, it shall be shown if the results are measured or calculated.

2.1.2. Written description and/or drawing of the MI: ...

2.1.3. List and function of all components monitored by the OBD system: ...

2.1.4. Written description (general working principles) for: ...

2.1.4.1. Misfire detection <sup>(15)</sup>: ...

2.1.4.2. Catalyst monitoring <sup>(15)</sup>: ...

2.1.4.3. Oxygen sensor monitoring <sup>(15)</sup>: ...

2.1.4.4. Other components monitored by the OBD system <sup>(15)</sup>: ...

2.1.4.5. Catalyst monitoring <sup>(16)</sup>: ...

2.1.4.6. Particulate trap monitoring <sup>(16)</sup>: ...

2.1.4.7. Electronic fuelling system actuator monitoring <sup>(16)</sup>: ...

2.1.4.8. Other components monitored by the OBD system: ...

2.1.5. Criteria for MI activation (fixed number of driving cycles or statistical method): ...

2.1.6. List of all OBD output codes and formats used (with explanation of each): ...

2.2. Reserved

2.3. Catalytic converters yes/no <sup>(1)</sup>

2.3.1. Original equipment catalytic converter tested to all relevant requirements of this Regulation yes/no <sup>(1)</sup>

2.4. Smoke opacity test results <sup>(1)</sup>



2.4.1. At steady engine speeds: See technical service test report number: ...

2.4.2. Free acceleration tests

2.4.2.1. Measured value of the absorption coefficient: ... m<sup>-1</sup>

2.4.2.2. Corrected value of the absorption coefficient: ... m<sup>-1</sup>

2.4.2.3. Location of the absorption coefficient symbol on the vehicle: ...

2.5. CO<sub>2</sub> emissions and fuel consumption test results

2.5.1. Internal combustion engine vehicle and Not Externally Chargeable (NOVC) Hybrid Electric Vehicle

2.5.1.1 Vehicle High

2.5.1.1.1. Cycle Energy Demand: ... J

2.5.1.1.2. Road load coefficients

2.5.1.1.2.1.  $f_0$ , N: ...

2.5.1.1.2.2.  $f_1$ , N/(km/h): ...

2.5.1.1.2.3.  $f_2$ , N/(km/h)<sup>2</sup>: ...

2.5.1.1.3. CO<sub>2</sub> mass emissions (provide values for each reference fuel tested, for the phases: the measured values, for the combined see paragraphs 1.1.2.3.8 and 1.1.2.3.9 of Sub-Annex 6 to Annex XXI)

CO <sub>2</sub> Emission (g/km)	Test	Low	Medium	High	Extra High	Combined
$M_{CO_2,p,5} / M_{CO_2,c,5}$	1					
	2					
	3					
$M_{CO_2,p,H} / M_{CO_2,c,H}$						

2.5.1.1.4. Fuel consumption (provide values for each reference fuel tested, for the phases: the measured values for the combined see paragraphs 1.1.2.3.8 and 1.1.2.3.9 of Sub-Annex 6 to Annex XXI)

Fuel consumption (l/100 km) or m <sup>3</sup> /100 km or kg/100 km ( <sup>1</sup> )	Low	Medium	High	Extra High	Combined
Final values $FC_{p,H} / FC_{c,H}$					

2.5.1.2 Vehicle Low (if applicable)

2.5.1.2.1. Cycle Energy Demand: ... J

2.5.1.2.2. Road load coefficients

2.5.1.2.2.1.  $f_0$ , N: ...

2.5.1.2.2.2.  $f_1$ , N/(km/h): ...

2.5.1.2.2.3.  $f_2$ , N/(km/h)<sup>2</sup>: ...

2.5.1.2.2 CO<sub>2</sub> mass emissions (provide values for each reference fuel tested, for the phases: the measured values for the combined see paragraphs 1.1.2.3.8 and 1.1.2.3.9 of Sub-Annex 6 to Annex XXI)

CO <sub>2</sub> Emission (g/km)	Test	Low	Medium	High	Extra High	Combined
$M_{CO_2,p,5} / M_{CO_2,c,5}$	1					
	2					
	3					
$M_{CO_2,p,L} / M_{CO_2,c,L}$						

2.5.1.2.3. Fuel consumption (provide values for each reference fuel tested, for the phases: the measured values for the combined see paragraphs 1.1.2.3.8 and 1.1.2.3.9 of Sub-Annex 6 to Annex XXI)

Fuel consumption (l/100 km) or m <sup>3</sup> /100 km or kg/100 km ( <sup>1</sup> )	Low	Medium	High	Extra High	Combined
Final values $FC_{p,H} / FC_{c,H}$					

2.5.1.3. For vehicles powered by an internal combustion engine only which are equipped with periodically regenerating systems as defined in paragraph 6 of Article 2 of this Regulation, the test results shall be adjusted by the  $K_i$  factor as specified in Appendix 1 to Sub-Annex 6 of Annex XXI.

2.5.1.3.1. Information about regeneration strategy for CO<sub>2</sub> emissions and fuel consumption

D — number of operating cycles between 2 cycles where regenerative phases occur: ...

d — number of operating cycles required for regeneration: ...

Applicable Type 1 cycle (Annex XXI, Sub-Annex 4 or UN/ECE Regulation 83) (<sup>14</sup>): ...

	Low	Mid	High	Extra High	Combined
Ki (additive / multiplicative) <sup>(1)</sup> Values for CO <sub>2</sub> and fuel consumption <sup>(10)</sup>					

## 2.5.2. Pure electric vehicles <sup>(1)</sup>

### 2.5.2.1. Electric energy consumption (declared value)

#### 2.5.2.1.1. Electric energy consumption:

EC (Wh/km)	Test	City	Combined
Calculated EC	1		
	2		
	3		
Declared value		-	

#### 2.5.2.1.2. Total time out of tolerance for the conduct of the cycle: ... sec

### 2.5.2.2. Pure Electric Range

PER (km)	Test	City	Combined
Measured Pure Electric Range	1		
	2		
	3		
Declared value		-	

## 2.5.3. Externally chargeable (OVC) Hybrid Electric Vehicle:

### 2.5.3.1. CO<sub>2</sub> mass emission Charge Sustaining

#### Vehicle High

CO <sub>2</sub> Emission (g/km)	Test	Low	Medium	High	Extra	Combined

					High	
$M_{CO_2,p,5} / M_{CO_2,c,5}$	1					
	2					
	3					
$M_{CO_2,p,H} / M_{CO_2,c,H}$						

#### Vehicle Low (if applicable)

CO <sub>2</sub> Emission (g/km)	Test	Low	Medium	High	Extra High	Combined
$M_{CO_2,p,5} / M_{CO_2,c,5}$	1					
	2					
	3					
$M_{CO_2,p,L} / M_{CO_2,c,L}$						

#### Vehicle M (if applicable)

CO <sub>2</sub> Emission (g/km)	Test	Low	Medium	High	Extra High	Combined
$M_{CO_2,p,5} / M_{CO_2,c,5}$	1					
	2					
	3					
$M_{CO_2,p,M} / M_{CO_2,c,M}$						

#### 2.5.3.2. CO<sub>2</sub> mass emission Charge Depleting

##### Vehicle High

CO <sub>2</sub> Emission (g/km)	Test	Combined
$M_{CO_2,CD}$	1	
	2	

	3	
$M_{CO_2,CD,H}$		

Vehicle Low (if applicable)

CO <sub>2</sub> Emission (g/km)	Test	Combined
$M_{CO_2,CD}$	1	
	2	
	3	
$M_{CO_2,CD,L}$		

Vehicle M (if applicable)

CO <sub>2</sub> Emission (g/km)	Test	Combined
$M_{CO_2,CD}$	1	
	2	
	3	
$M_{CO_2,CD,M}$		

2.5.3.3. CO<sub>2</sub> mass emission (weighted, combined) <sup>(17)</sup>:

Vehicle High:  $M_{CO_2,weighted} \dots$  g/km

Vehicle Low (if applicable):  $M_{CO_2,weighted} \dots$  g/km

Vehicle M (if applicable):  $M_{CO_2,weighted} \dots$  g/km

2.5.3.4. Fuel consumption Charge Sustaining

Vehicle High

Fuel Consumption (l/100 km)	Low	Medium	High	Extra High	Combined

Final values $FC_{p,H} / FC_{c,H}$					
------------------------------------	--	--	--	--	--

Vehicle Low (if applicable)

Fuel Consumption (l/100 km)	Low	Medium	High	Extra High	Combined
Final values $FC_{p,L} / FC_{c,L}$					

Vehicle M (if applicable)

Fuel Consumption (l/100 km)	Low	Medium	High	Extra High	Combined
Final values $FC_{p,M} / FC_{c,M}$	■	■	■	■	■

### 2.5.3.5. Fuel consumption Charge Depleting

Vehicle High

Fuel consumption (l/100km)	Test	Combined
$FC_{CD}$	1	
	2	
	3	
$FC_{CD,H}$		

Vehicle Low (if applicable)

Fuel consumption (l/100km)	Test	Combined
$FC_{CD}$	1	
	2	
	3	
$FC_{CD,L}$		

Vehicle M (if applicable)

Fuel consumption (l/100km)	Test	Combined
FC <sub>CD</sub>	1	
	2	
	3	
FC <sub>CD,M</sub>		

2.5.3.6. Fuel consumption (weighted, combined) (<sup>17</sup>):

Vehicle High: FC<sub>weighted</sub> ... l/100 km

Vehicle Low (if applicable): FC<sub>weighted</sub> ... l/100 km

Vehicle M (if applicable): FC<sub>weighted</sub> ... l/100 km

2.5.3.7. Ranges:

2.5.3.7.1. All Electric Range AER

AER (km)	Test	City	Combined
AER values	1		
	2		
	3		
Final values AER			

2.5.3.7.2. Equivalent All Electric Range EAER

EAER (km)	City	Combined
EAER values		

2.5.3.7.3. Actual Charge Depleting Range R<sub>CDA</sub>

R <sub>CDA</sub> (km)	Combined

$R_{CDA}$ values	
------------------	--

#### 2.5.3.7.4. Charge Depleting Cycle Range $R_{CDC}$

$R_{CDC}$ (km)	Test	Combined
$R_{CDC}$ values	1	
	2	
	3	
Final values $R_{CDC}$		

#### 2.5.3.8. Electric consumption

##### 2.5.3.8.1. Electric Consumption EC

EC (Wh/km)	Low	Medium	High	Extra High	City	Combined
Electric consumption values						

##### 2.5.3.8.2. UF-weighted charge-depleting electric consumption $EC_{AC,CD}$ (combined)

$EC_{AC,CD}$ (Wh/km)	Test	Combined
$EC_{AC,CD}$ values	1	
	2	
	3	
Final values $EC_{AC,CD}$		

##### 2.5.3.8.3. UF-weighted electric consumption $EC_{AC,weighted}$ (combined)

$EC_{AC,weighted}$ (Wh/km)	Test	Combined
$EC_{AC,weighted}$ values	1	
	2	



	3	
Final values $EC_{AC,weighted}$		

## 2.6. Test results of eco-innovations <sup>(18)</sup><sup>(19)</sup>

Decision approving the eco-innovation <sup>(20)</sup>	Code of the eco-innovation <sup>(21)</sup>	Type 1/I cycle <sup>(22)</sup>	1. CO <sub>2</sub> emissions of the baseline vehicle (g/km)	2. CO <sub>2</sub> emissions of the eco-innovation vehicle (g/km)	3. CO <sub>2</sub> emissions of the baseline vehicle under type 1 test-cycle <sup>(23)</sup>	4. CO <sub>2</sub> emissions of the eco-innovation vehicle under type 1 test-cycle	5. Usage factor (UF) i.e. temporal share of technology usage in normal operation conditions	CO <sub>2</sub> emissions savings  $\frac{((1 - 2) - (3 - 4)) * 5}{5}$
xxx/201x								
	Total CO <sub>2</sub> emissions saving on NEDC (g/km) <sup>(24)</sup>							
	Total CO <sub>2</sub> emissions saving on WLTP (g/km) <sup>(25)</sup>							

### 2.6.1. General code of the eco-innovation(s) <sup>(26)</sup>: ...

#### 3. Vehicle repair information

3.1. Address of website for access to vehicle repair and maintenance information: ...

3.1.1. Date from which it is available (up to 6 months from the date of type approval): ...

3.2. Terms and conditions of access (i.e. duration of access, price of access on an hourly, daily, monthly, annual and per-transaction basis) to websites referred to in point 3.1): ...

3.3. Format of vehicle repair and maintenance information accessible through website referred to in point 3.1): ...

3.4. Manufacturer's certificate on access to vehicle repair and maintenance information provided: ...

## **4. POWER MEASUREMENT**

Maximum engine net power of internal combustion engine, net power and maximum 30 minutes power of electric drive train

### **4.1. Internal combustion engine net power**

- 4.1.1. Engine speed ( $\text{min}^{-1}$ ) ...
- 4.1.2. Measured fuel flow (g/h) ...
- 4.1.3. Measured torque (Nm) ...
- 4.1.4. Measured power (kW) ...
- 4.1.5. Barometric pressure (kPa) ...
- 4.1.6. Water vapour pressure (kPa) ...
- 4.1.7. Intake air temperature (K) ...
- 4.1.8. Power correction factor when applied ...
- 4.1.9. Corrected power (kW) ...
- 4.1.10. Auxiliary power (kW) ...
- 4.1.11. Net power (kW) ...
- 4.1.12. Net torque (Nm) ...
- 4.1.13. Corrected specific fuel consumption (g/kWh) ...

### **4.2. Electric drive train(s):**

- 4.2.1. Declared figures
- 4.2.2. Maximum net power: ... kW, at ...  $\text{min}^{-1}$
- 4.2.3. Maximum net torque: ... Nm, at ...  $\text{min}^{-1}$
- 4.2.4. Maximum net torque at zero engine speed: ... Nm
- 4.2.5. Maximum 30 minutes power: ... kW
- 4.2.6. Essential characteristics of the electric drive train
- 4.2.7. Test DC voltage: ... V
- 4.2.8. Working principle: ...
- 4.2.9. Cooling system:

4.2.10. Motor: liquid/air <sup>(1)</sup>

4.2.11. Variator: liquid/air <sup>(1)</sup>

## 5. REMARKS: ...

### *Explanatory Notes*

<sup>(1)</sup> Delete where not applicable (there are cases where nothing needs to be deleted when more than one entry is applicable)

<sup>(2)</sup> OJ L 171, 29.6.2007, p. 1.

<sup>(3)</sup> OJ L xxx

<sup>(4)</sup> If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this information, such characters shall be represented in the documentation by the symbol “?” (e.g. ABC??123??)

<sup>(5)</sup> As defined in Annex II, Section A

<sup>(6)</sup> As defined in article 3, paragraph 39 of Directive 2007/46/EC

<sup>(7)</sup> Type of tyre according UN/ECE Regulation 117

<sup>(8)</sup> Where applicable.

<sup>(9)</sup> Round to 2 decimal places

<sup>(10)</sup> Round to 4 decimal places

<sup>(11)</sup> Not applicable

<sup>(12)</sup> Mean value calculated by adding mean values (M.Ki) calculated for THC and NOx.

<sup>(13)</sup> Round to 1 decimal place more than limit value.

<sup>(14)</sup> Indicate the applicable procedure.

<sup>(15)</sup> For vehicles equipped with positive-ignition engines.

<sup>(16)</sup> For compression-ignition engine vehicles

<sup>(17)</sup> Measured over the combined cycle

<sup>(18)</sup> Repeat the table for each reference fuel tested.

<sup>(19)</sup> Expand the table if necessary, using one extra row per eco-innovation.

<sup>(20)</sup> Number of the Commission Decision approving the eco-innovation.

<sup>(21)</sup> Assigned in the Commission Decision approving the eco-innovation.

<sup>(22)</sup> Applicable Type 1 cycle: Annex XXI, Sub-Annex 4 or UN/ECE Regulation 83

<sup>(23)</sup> If modelling is applied instead of the type 1 test-cycle, this value shall be the one provided by the modelling methodology.

<sup>(24)</sup> Sum of the emissions saving of each individual eco-innovation on Type I according to UN/ECE Regulation 83.

<sup>(25)</sup> Sum of the emissions saving of each individual eco-innovation on Type 1 according to Annex XXI, Sub-Annex 4 of this regulation

<sup>(26)</sup> The general code of the eco-innovation(s) shall consist of the following elements, each separated by a blank

space:

- Code of the type-approval authority as set out in Annex VII to Directive 2007/46/EC;
- Individual code of each eco-innovation fitted in the vehicle, indicated in chronological order of the Commission approval decisions.

(E.g. the general code of three eco-innovations approved chronologically as 10, 15 and 16 and fitted to a vehicle certified by the German type approval authority should be: 'e1 10 15 16')



## Appendix to the Addendum to the Type Approval Certificate

Transitional period (correlation output)

(Transitional provision):

### 1. CO<sub>2</sub> emissions results from Co2mpas

#### 1.1 Co2mpas version

#### 1.2. Vehicle High

##### 1.2.1. CO<sub>2</sub> mass emissions (for each reference fuel tested)

CO <sub>2</sub> Emission (g/km)	Urban	Extra Urban	Combined
M <sub>CO2,NEDC_H,co2mpas</sub>			

#### 1.3. Vehicle Low (if applicable)

##### 1.3.1. CO<sub>2</sub> mass emissions (for each reference fuel tested)

CO <sub>2</sub> Emission (g/km)	Urban	Extra Urban	Combined
M <sub>CO2,NEDC_L,co2mpas</sub>			

### 2. CO<sub>2</sub> emissions test results (if applicable)

#### 2.1. Vehicle High

##### 2.1.1. CO<sub>2</sub> mass emissions (for each reference fuel tested)

CO <sub>2</sub> Emission (g/km)	Urban	Extra Urban	Combined
M <sub>CO2,NEDC_H,test</sub>			

#### 2.2. Vehicle Low (if applicable)

##### 2.2.1. CO<sub>2</sub> mass emissions (for each reference fuel tested)

CO <sub>2</sub> Emission (g/km)	Urban	Extra Urban	Combined
M <sub>CO2,NEDC_L,test</sub>			

### 3. Deviation factors (determined in accordance with point 3.2.8 of Regulation xxx/20yy)

Deviation factors	Vehicle High	Vehicle Low (if applicable)
De		

## Appendix 5

### Vehicle OBD information

1. The information required in this Appendix shall be provided by the vehicle manufacturer for the purposes of enabling the manufacture of OBD-compatible replacement or service parts and diagnostic tools and test equipment.

2. Upon request, the following information shall be made available to any interested component, diagnostic tools or test equipment manufacturer, on a non-discriminatory basis:

2.1. A description of the type and number of the preconditioning cycles used for the original type-approval of the vehicle;

2.2. A description of the type of the OBD demonstration cycle used for the original type-approval of the vehicle for the component monitored by the OBD system;

2.3. A comprehensive document describing all sensed components with the strategy for fault detection and MI activation (fixed number of driving cycles or statistical method), including a list of relevant secondary sensed parameters for each component monitored by the OBD system and a list of all OBD output codes and format used (with an explanation of each) associated with individual emission-related power-train components and individual non-emission related components, where monitoring of the component is used to determine MI activation. In particular, a comprehensive explanation for the data given in service \$ 05 Test ID \$ 21 to FF and the data given in service \$ 06 shall be provided. In the case of vehicle types that use a communication link in accordance with ISO 15765-4 'Road vehicles — Diagnostics on Controller Area Network (CAN) — Part 4: Requirements for emissions-related systems', a comprehensive explanation for the data given in service \$ 06 Test ID \$ 00 to FF, for each OBD monitor ID supported, shall be provided.

This information may be provided in the form of a table, as follows:

Component	Fault code	Monitoring strategy	Fault detection criteria	MI activation criteria	Secondary parameters	Preconditioning	Demonstration test
Catalyst	P0420	Oxygen sensor 1 and 2 signals	Difference between sensor 1 and sensor 2 signals	3rd cycle	Engine speed, engine load, A/F mode, catalyst temperature	e.g. Two Type 1 cycles (as described in Annex III of EC No 692/2008 or in Annex XXI of EC No xxx/2016)	e.g. Type 1 test (as described in Annex III of EC No 692/2008 or in Annex XXI of EC No xxx/2016)



### **3. INFORMATION REQUIRED FOR THE MANUFACTURE OF DIAGNOSTIC TOOLS**

In order to facilitate the provision of generic diagnostic tools for multi-make repairers, vehicle manufacturers shall make available the information referred to in the points 3.1 to 3.3. through their repair information web-sites. This information shall include all diagnostic tool functions and all the links to repair information and troubleshooting instructions. The access to this information may be subject to the payment of a reasonable fee.

#### **3.1. Communication Protocol Information**

The following information shall be required indexed against vehicle make, model and variant, or other workable definition such as VIN or vehicle and systems identification:

- (a) Any additional protocol information system necessary to enable complete diagnostics in addition to the standards prescribed in Section 4 of Annex XI, including any additional hardware or software protocol information, parameter identification, transfer functions, 'keep alive' requirements, or error conditions;
- (b) Details of how to obtain and interpret all fault codes not in accordance with the standards prescribed in Section 4 of Annex XI:
- (c) A list of all available live data parameters including scaling and access information;
- (d) A list of all available functional tests including device activation or control and the means to implement them;
- (e) Details of how to obtain all component and status information, time stamps, pending DTC and freeze frames;
- (f) Resetting adaptive learning parameters, variant coding and replacement component setup, and customer preferences;
- (g) ECU identification and variant coding;
- (h) Details of how to reset service lights;
- (i) Location of diagnostic connector and connector details;
- (j) Engine code identification.

#### **3.2. Test and diagnosis of OBD monitored components**

The following information shall be required:

- (a) A description of tests to confirm its functionality, at the component or in the harness
- (b) Test procedure including test parameters and component information

- (c) Connection details including minimum and maximum input and output and driving and loading values
- (d) Values expected under certain driving conditions including idling
- (e) Electrical values for the component in its static and dynamic states
- (f) Failure mode values for each of the above scenarios
- (g) Failure mode diagnostic sequences including fault trees and guided diagnostics elimination.

### **3.3. Data required to perform the repair**

The following information shall be required:

- (a) ECU and component initialisation (in the event of replacements being fitted)
- (b) Initialisation of new or replacement ECUs where relevant using pass-through (re-) programming techniques.

## Appendix 6

### EC Type –Approval Certification Numbering System

1. Section 3 of the EC type-approval number issued according to Article 6(1) shall be composed by the number of the implementing regulatory act or the latest amending regulatory act applicable to the EC type-approval. This number shall be followed by one or more characters reflecting the different categories in accordance with Table 1.

Character	Emission standard	OBD standard	Vehicle category and class	Engine	Implementation date: new types	Implementation date: new vehicles	Last date of registration
AA	Euro 6c	Euro 6-1	M, N1 class I	PI, CI			31.8.2018
AB	Euro 6c	Euro 6-1	N1 class II	PI, CI			31.8.2019
AC	Euro 6c	Euro 6-1	N1 class III, N2	PI, CI			31.8.2019
AD	Euro 6c	Euro 6-2	M, N1 class I	PI, CI		1.9.2018	31.8.2019
AE	Euro 6c	Euro 6-2	N1 class II	PI, CI		1.9.2019	31.8.2020
AF	Euro 6c	Euro 6-2	N1 class III, N2	PI, CI		1.9.2019	31.8.2020
AG	Euro 6d-TEMP	Euro 6-2	M, N1 class I	PI, CI	1.9.2017	1.9.2019	31.12.2020
AH	Euro 6d-TEMP	Euro 6-2	N1 class II	PI, CI	1.9.2018	1.9.2020	31.12.2021
AI	Euro 6d-TEMP	Euro 6-2	N1 class III, N2	PI, CI	1.9.2018	1.9.2020	31.12.2021
AJ	Euro 6d	Euro 6-2	M, N1 class I	PI, CI	1.1.2020	1.1.2021	
AK	Euro 6d	Euro 6-2	N1 class II	PI, CI	1.1.2021	1.1.2022	

AL	Euro 6d	Euro 6-2	N1 class III, N2	PI, CI	1.1.2021	1.1.2022	
AX	n.a.	n.a.	All vehicles	Battery full electric	1.9.2009	1.1.2011	
AY	n.a.	n.a.	All vehicles	Battery full electric	1.9.2009	1.1.2011	
AZ	n.a.	n.a.	All vehicles using certificates according to point 2.1.1 of Annex I	PI, CI	1.9.2009	1.1.2011	

**Key:**

'Euro 6-1' OBD standard = Full Euro 6 OBD requirements but with preliminary OBD threshold limits as defined in point 2.3.4 of Annex XI and partially relaxed IUPR;

'Euro 6-2' OBD standard = Full Euro 6 OBD requirements but with final OBD threshold limits as defined in point 2.3.3 of Annex XI;

'Euro 6c' emissions standard = RDE testing for monitoring only (no NTE emission limits applied), otherwise full Euro 6 emission requirements;

'Euro 6d-TEMP' emissions standard = RDE testing against temporary conformity factors, otherwise full Euro 6 emission requirements;"

'Euro 6d' emissions standard = RDE testing against final conformity factors, otherwise full Euro 6 emission requirements;

**2. EXAMPLES OF TYPE-APPROVAL CERTIFICATION NUMBERS.**

2.1 An example is provided below of an approval of a Euro 6 light passenger car to the 'Euro 6d' emission standard and 'Euro 6-2' OBD standard, identified by the characters AJ according to table 1, issued by Luxembourg, identified by the code e13. The approval was granted for the base Regulation (EC) 715/2007 and its implementing Regulation (EC) xxx/2016 without any amendments. It is the 17<sup>th</sup> approval of this kind without any extension, so the fourth and fifth components of the certification number are 0017 and 00, respectively.

e13\*715/2007\*xxx/2016AJ\*0017\*00

- 2.2 This second example shows an approval of a Euro 6 N1 class II light commercial vehicle to the 'Euro 6d-TEMP' emission standard and 'Euro 6-2' OBD standard, identified by the characters AH according to table 1, issued by Romania, identified by the code e19. The approval was granted for the base Regulation (EC) 715/2007 and its implementing legislation as last amended by a Regulation xyz/2018. It is the 1<sup>st</sup> approval of this kind without extension, so the fourth and fifth components of the certification number are 0001 and 00, respectively.

e19\*715/2007\*xyz/2018AH\*0001\*00

**Appendix 7**

**Manufacturer's certificate of compliance with the OBD in-use performance requirements**

(Manufacturer): .....

(Address of the manufacturer): .....

Certifies that

- The vehicle types listed in attachment to this Certificate are in compliance with the provisions of section 3 of Appendix 1 to Annex XI of Regulation (EC) NO xxx/2016 relating to the in-use performance of the OBD system under all reasonably foreseeable driving conditions.
- The plan(s) describing the detailed technical criteria for incrementing the numerator and denominator of each monitor attached to this Certificate are correct and complete for all types of vehicles to which the Certificate applies.

Done at [ .....Place]

On [ .....Date]

.....  
[Signature of the Manufacturer's Representative]

Annexes:

- List of vehicle types to which this Certificate applies
- Plan(s) describing the detailed technical criteria for incrementing the numerator and denominator of each monitor, as well as plan(s) for disabling numerators, denominators and general denominator.

## Appendix 8a – Test Report

The Test Report is the report issued by the technical service responsible for conducting the tests according to this regulation.

A separate Test Report shall be prepared for each interpolation family, as defined in paragraph 5.6. of Annex XXI

The following information, if applicable, is the minimum data required for the Type 1 test and Ambient Temperature Correction Test (ATCT) test.

### REPORT number

<b>APPLICANT</b>	
<b>Manufacturer</b>	
<b>SUBJECT</b>	Determination of a vehicle road load
<b>Object submitted to tests</b>	
	Make :
	Type :
<b>CONCLUSION</b>	The object submitted to tests complies with the requirements mentioned in the subject.

PLACE, DD/MM/YYYY

Remarks:

- The references to the relevant sections of 692/2008 are highlighted in grey
- (ATCT) means only for Ambient Temperature Correction Test (ATCT) test report
- (not ATCT) means not relevant for ATCT test report
- No reference to ATCT means needed for both 'type 1' test report and ATCT test report

General notes:

(1)

If there are several options (references), the one tested should be described in the test report

If there are not, a single reference to the information document at the start of the test report may be sufficient.

Every Technical Service is free to include some additional information

(a) Specific to positive ignition engine

(b) Specific to compression ignition engine

## 1. DESCRIPTION OF TESTED VEHICLE(S): HIGH, LOW AND M (IF APPLICABLE)

### 1.1. GENERAL

Vehicle numbers	:	Prototype number and VIN
Category Annex I Appendix 3 & 4 §0.4	:	
Number of seats including the driver Annex I Appendix 3 §9.10.3 & Appendix 4 addendum §1.4	:	
Bodywork Annex I Appendix 3 §9.1 & Appendix 4 addendum §1.6	:	
Drive wheels Annex I Appendix 3 §1.3.3 & Appendix 4 addendum §1.7	:	

#### 1.1.1. Powertrain Architecture

Powertrain architecture	:	internal combustion, hybrid, electric or fuel cell
-------------------------	---	--

#### 1.1.2. INTERNAL COMBUSTION ENGINE (if applicable)

For more than one ICE, please repeat the paragraph

Make	:	
Type Annex I Appendix 3 §3.1.1 & Appendix 4 addendum §1.10	:	
Working principle Annex I Appendix 3 §3.2.1.1	:	two/four stroke
Cylinders number and arrangement Annex I Appendix 3 §3.2.1.2	:	
Engine capacity (cm <sup>3</sup> ) Annex I Appendix 3 §3.2.1.3 & Appendix 4 addendum §1.10.1	:	
Engine idling speed (min <sup>-1</sup> ) Annex I Appendix 3 §3.2.1.6	:	+ -
High engine idling speed (min <sup>-1</sup> ) (a) Annex I Appendix 3 §3.2.1.6.1	:	+ -
$n_{\min \text{ drive}}$ (rpm)	:	
Rated engine power Annex I Appendix 3 §3.2.1.8 & Appendix 4 addendum §1.10.4	:	kW      at      rpm
Maximum net torque Annex I Appendix 3 §3.2.1.10 & Appendix 4 addendum §1.11.3	:	Nm      at      rpm
Engine lubricant	:	Manufacturer specification (If there are several references in the information document)
Cooling system Annex I Appendix 3 §3.2.7	:	Type: air/water/oil
Insulation	:	material, amount, location, volume and weight



### 1.1.3. TEST FUEL for type 1 test (if applicable)

For more than one test fuel, please repeat the paragraph

Make	:	
Type Annex I Appendix 3 §3.2.2.1 & Appendix 4 addendum §1.10.3	:	petrol E10 - Diesel B7 – LPG – NG - ...
Density at 15°C Annex IX	:	
Sulphur content sub annex 3 of annex XXI Annex IX	:	Only for Diesel B7 and Petrol E10
Batch number	:	
Willans factors (for ICE) for CO <sub>2</sub> emission (gCO <sub>2</sub> /km)	:	

### 1.1.4. FUEL FEED SYSTEM (if applicable)

For more than one fuel feed system, please repeat the paragraph

Direct injection	:	yes/no or description
Vehicle fuel type Annex I Appendix 3 §3.2.2.4	:	Monofuel / bifuel / flex fuel
Control unit		
Part reference Annex I Appendix 3 § 3.2.4.2.9.3.1	:	same as information document
Software tested Annex I Appendix 3 § 3.2.4.2.9.3.1.1	:	read via scantool, for example
Air flowmeter Annex I Appendix 3 § 3.2.4.2.9.3.3	:	
Throttle body Annex I Appendix 3 § 3.2.4.2.9.3.5	:	
Pressure sensor Annex I Appendix 3 § 3.2.4.3.4.11	:	
Injection pump Annex I Appendix 3 § 3.2.4.2.3	:	
Injector(s) Annex I Appendix 3 § 3.2.4.2.6	:	

### 1.1.5. INTAKE SYSTEM (if applicable)

For more than one intake system, please repeat the paragraph

Pressure charger Annex I Appendix 3 § 3.2.8.1	:	Yes/no make & type (1)
Intercooler Annex I Appendix 3 § 3.2.8.2	:	yes/no type (air/air – air/water) (1)
Air filter (element) (1) Annex I Appendix 3 § 3.2.8.4.2	:	make & type
Intake silencer (1) Annex I Appendix 3 § 3.2.8.4.3	:	make & type

### 1.1.6. EXHAUST SYSTEM AND ANTI-EVAPORATIVE SYSTEM (if applicable)

For more than one, please repeat the paragraph

First catalytic converter Annex I Appendix 3 §3.2.12.2.1.12.& 3.2.12.2.1.13	:	make & reference (1) principle: three way / oxidising / NOx trap / Selective Catalyst Reduction
Second catalytic converter	:	make & reference (1) principle: three way / oxidising / NOx trap / Selective Catalyst Reduction
Particulate trap Annex I Appendix 3 §3.2.12.2.6	:	with/without/not applicable make & reference (1)
Reference and position of oxygen sensor(s) Annex I Appendix 3 §3.2.12.2.2	:	before catalyst / after catalyst

Air injection Annex I Appendix 3 §3.2.12.2.3	:	with/without/not applicable
EGR Annex I Appendix 3 §3.2.12.2.4	:	with/without/not applicable cooled/non-cooled
Evaporative emission control system Annex I Appendix 3 §3.2.12.2.5	:	with/without/not applicable
Reference and position of NOx sensor(s)	:	Before/ after
General description (1) Annex I Appendix 3 §3.2.9.2	:	

### 1.1.7. HEAT STORAGE DEVICE (if applicable)

For more than one Heat Storage System, please repeat the paragraph

Heat storage device	:	yes/no
Heat capacity (enthalpy stored J)	:	
Time for heat release (s)	:	

### 1.1.8. TRANSMISSION (if applicable)

For more than one Transmission, please repeat the paragraph

Gearbox Annex I Appendix 3 § 4.5.1 & Appendix 4 addendum §1.13.1	:	manual / automatic / continuous variation
Gear shifting procedure		
Predominant mode	:	yes/no normal / drive / eco/...
Best case mode for CO <sub>2</sub> emissions and fuel consumption (if applicable)	:	
Worst case mode for CO <sub>2</sub> emissions and fuel consumption (if applicable)	:	
Control unit	:	
Gearbox lubricant	:	Manufacturer's specification (If there are several references in the information document)
Tyres Annex I Appendix 3 §6.6 & Appendix 4 addendum §1.14		
Make	:	
Type	:	
Dimensions front/rear Annex I Appendix 3 §6.6.1	:	
Circumference (m)	:	
Tyre pressure (kPa) Annex I Appendix 3 §6.6.3	:	

Transmission ratios (R.T.), primary ratios (R.P.) and (vehicle speed (km/h)) / (engine speed (1000 min<sup>-1</sup>)) (V<sub>1000</sub>) for each of the gearbox ratios (R.B.).

Annex I Appendix 3 §4.6 & Appendix 4 addendum §1.13.3

R.B.	R.P.	R.T.	V <sub>1000</sub>
1 <sup>st</sup>	1/1		
2 <sup>nd</sup>	1/1		
3 <sup>rd</sup>	1/1		
4 <sup>th</sup>	1/1		
5 <sup>th</sup>	1/1		
...			

### 1.1.9. ELECTRIC MACHINE (if applicable)

For more than one Electric Machine, please repeat the paragraph

Make	:	
Type	:	
Peak Power	:	

### 1.1.10. TRACTION REESS (if applicable)

For more than one Traction REESS, please repeat the paragraph

Make	:	
Type	:	
Capacity	:	
Nominal Voltage	:	

### 1.1.12. FUEL CELL (if applicable)

For more than one Fuel Cell, please repeat the paragraph

Make	:	
Type	:	
Maximum Power	:	
Nominal Voltage	:	

### 1.1.13. POWER ELECTRONICS (if applicable)

Can be more than one PE (propulsion converter, low voltage system or charger)

Make	:	
Type	:	
Power	:	

## 1.2. VEHICLE HIGH DESCRIPTION (TYPE 1) OR VEHICLE DESCRIPTION (ATCT)

### 1.2.1. MASS

Test mass of VH (kg)	:	
----------------------	---	--

### 1.2.2. ROAD LOAD PARAMETERS

$f_0$ (N)	:	
$f_1$ (N/(km/h))	:	
$f_2$ (N/(km/h) <sup>2</sup> )	:	
$f_{2\_TReg}$ (N/(km/h) <sup>2</sup> )	:	(ATCT)
Cycle energy demand (Ws) Annex XXI §3.5.6	:	
Road load test report reference	:	

### 1.2.3. CYCLE SELECTION PARAMETERS

Cycle (without downscaling)	:	Class 1 / 2 / 3a / 3b
Ratio of rated power to mass in running order (PMR)(W/kg)	:	(if applicable)
Capped speed process used during measurement Annex XXI sub-annex 1 §9	:	yes/no
Maximum speed of the vehicle Annex I appendix 3 §4.7	:	
Downscaling (if applicable)	:	yes/no
Downscaling factor $f_{dsc}$	:	
Cycle distance (m)	:	
Constant speed (in the case of the shortened test procedure)	:	if applicable

### 1.2.4. GEAR SHIFT POINT (IF APPLICABLE)

Gear shifting	:	Average gear for $v \geq 1$ km/h, rounded to four places of decimal
---------------	---	---

## 1.3. VEHICLE LOW DESCRIPTION (IF APPLICABLE)

### 1.3.1. MASS

Test mass of VL(kg)	:	
---------------------	---	--

### 1.3.2. ROAD LOAD PARAMETERS

$f_0$ (N)	:	
$f_1$ (N/(km/h))	:	
$f_2$ (N/(km/h) <sup>2</sup> )	:	
Cycle energy demand (Ws)	:	
$\Delta(C_D \times A_f)_{LH}$	:	
Road load test report reference	:	

### 1.3.3. CYCLE SELECTION PARAMETERS

Cycle (without downscaling)	:	Class 1 / 2 / 3a / 3b
Ratio of rated power to mass in running order (PMR)(W/kg)	:	(if applicable)
Capped speed process used during measurement Annex XXI sub-annex 1 §9	:	yes/no
Maximum speed of the vehicle Annex I appendix 3 §4.7	:	
Downscaling (if applicable)	:	yes/no
Downscaling factor $f_{dsc}$	:	
Cycle distance (m)	:	
Constant speed (in the case of the shortened test procedure)	:	if applicable

### 1.3.4. GEAR SHIFT POINT (IF APPLICABLE)

Gear shifting	:	Average gear for $v \geq 1$ km/h, rounded to four places of decimal
---------------	---	---

## 1.4. VEHICLE M DESCRIPTION (IF APPLICABLE)

### 1.4.1. MASS

Test mass of VL(kg)	:	
---------------------	---	--

### 1.4.2. ROAD LOAD PARAMETERS

$f_0$ (N)	:	
$f_1$ (N/(km/h))	:	
$f_2$ (N/(km/h) <sup>2</sup> )	:	
Cycle energy demand (Ws)	:	
$\Delta(C_D \times A_f)_{LH}$	:	

### 1.4.3. CYCLE SELECTION PARAMETERS

Cycle (without downscaling)	:	Class 1 / 2 / 3a / 3b
Ratio of rated power to mass in running order (PMR)(W/kg)	:	(if applicable)
Capped speed process used during measurement Annex XXI sub-annex 1 §9	:	yes/no
Maximum speed of the vehicle Annex I appendix 3 §4.7	:	
Downscaling (if applicable)	:	yes/no
Downscaling factor $f_{dsc}$	:	
Cycle distance (m)	:	
Constant speed (in the case of the shortened test procedure)	:	if applicable

#### 1.4.4. GEAR SHIFT POINT (IF APPLICABLE)

Gear shifting	:	Average gear for $v \geq 1$ km/h, rounded to four places of decimal
---------------	---	---

## 2. TEST RESULTS

### 2.1. TYPE 1 TEST or ATCT TEST

Method of chassis dyno setting	:	Fixed run / iterative / alternative with its own warmup cycle
Dynamometer operation mode Ann XXI sub-ann6 §1.2.4.2.2.	:	yes/no
Coastdown mode Ann XXI sub-ann4 §4.2.1.8.5	:	yes/no
Additional preconditioning	:	yes/no description
Deterioration factors	:	assigned / tested

#### 2.1.1. Vehicle high (used for ATCT, also)

Date of tests	:	(day/month/year)
Place of the test	:	
Height of the lower edge above ground of cooling fan (cm)	:	
Lateral position of fan centre (if modified as request by the manufacturer)	:	in the vehicle centre-line/...
Distance from the front of the vehicle (cm)	:	

#### 2.1.1.1. Pollutant emissions (if applicable)

##### 2.1.1.1.1. Pollutant emissions of vehicles with at least one combustion engine, of NOVC-HEVs and of OVC-HEVs in case of a charge-sustaining Type 1 test

For each operating modes tested the paragraphs below has to be repeated (predominant mode or best case mode and worst case, mode if applicable)

#### Test 1

Pollutants	CO (mg/km)	THC (a) (mg/km)	NMHC (a) (mg/km)	NO <sub>x</sub> (mg/km)	THC+NO <sub>x</sub> (b) (mg/km)	Particulate Matter (mg/km)	Particle Number (#.10 <sup>11</sup> /k m)
Measured values							
Regeneration factors (Ki)(2) Additive							
Regeneration factors (Ki)(2) Multiplicative							
Deterioration factors (DF) additive							
Deterioration factors (DF) multiplicative							
Final values							
Limit values							

(2) See Ki family report(s)	:	
Type 1/I performed for Ki	:	Annex XXI, Sub-Annex 4 or UN/ECE Regulation No 83 <sup>2</sup>

<sup>2</sup> Indicate as applicable

determination

Test 2 if applicable: for CO<sub>2</sub> reason ( $d_{CO_2}^1$ ) / for pollutants reason (90% of the limits) / for both  
Same paragraph

Test 3 if applicable: for CO<sub>2</sub> reason ( $d_{CO_2}^2$ )  
Same paragraph

### 2.1.1.1.2. Pollutant emissions of OVC-HEVs in case of a charge-depleting Type 1 test

#### Test 1

Pollutant emission limits have to be fulfilled and the following paragraph has to be repeated for each driven test cycle.

Pollutants	CO (mg/km)	THC (a) (mg/km)	NMHC (a) (mg/km)	NO <sub>x</sub> (mg/km)	THC+NO <sub>x</sub> (b) (mg/km)	Particulate Matter (mg/km)	Particle Number (#.10 <sup>11</sup> /km)
Measured single cycle values							
Limit single cycle values							

Test 2 (if applicable): for CO<sub>2</sub> reason ( $d_{CO_2}^1$ ) / for pollutants reason (90% of the limits) / for both  
Same paragraph

Test 3 (if applicable): for CO<sub>2</sub> reason ( $d_{CO_2}^2$ )  
Same paragraph

### 2.1.1.1.3. UF-WEIGHTED POLLUTANT EMISSIONS OF OVC-HEVS

Pollutants	CO (mg/km)	THC (a) (mg/km)	NMHC (a) (mg/km)	NO <sub>x</sub> (mg/km)	THC+NO <sub>x</sub> (b) (mg/km)	Particulate Matter (mg/km)	Particle Number (#.10 <sup>11</sup> /km)
Calculated values							

### 2.1.1.2. CO<sub>2</sub> emission (if applicable)

#### 2.1.1.2.1. CO<sub>2</sub> Emission of vehicles with at least one combustion engine, of NOVC-HEV and of OVC-HEV in case of a charge-sustaining Type 1 test (not ATCT)

For each operating mode tested the paragraphs below have to be repeated (predominant mode or best case mode and worst case, mode if applicable)

#### Test 1

CO <sub>2</sub> Emission	Low	Medium	High	Extra High	Combined
Measured value $M_{CO_2,p,1} / M_{CO_2,c,2}$					
RCB correction coefficient: (5)					
$M_{CO_2,p,3} / M_{CO_2,c,3}$					
Regeneration factors (Ki) Additive					
Regeneration factors (Ki) Multiplicative					
$M_{CO_2,c,4}$			-		
$AF_{Ki} = M_{CO_2,c,3} / M_{CO_2,c,4}$			-		
$M_{CO_2,p,4} / M_{CO_2,c,4}$					-
ATCT correction (FCF) (4)					
<b>Temporary values</b> $M_{CO_2,p,5} / M_{CO_2,c,5}$					
<b>Declared value</b>	-	-	-	-	
<b><math>d_{CO_2}^1</math> * declared value</b>	-	-	-	-	

(4) FCF: family correction factor for correcting for representative regional temperature conditions (ATCT)

See FCF family report(s)

:

(5) correction as referred to in Sub-Annex 6 Appendix 2 of Annex XXI of this Regulation for ICE vehicles,  $K_{CO_2}$  for HEVs

Test 2 (if applicable)  
Same paragraph with  $d_{CO_2}^2$

Test 3 (if applicable)  
Same paragraph

Conclusion

CO <sub>2</sub> Emission (g/km)	Low	Medium	High	Extra High	Combined
Averaging $M_{CO_2,p,6} / M_{CO_2,c,6}$					
Alignment $M_{CO_2,p,7} / M_{CO_2,c,7}$					
<b>Final values</b> $M_{CO_2,p,H} / M_{CO_2,c,H}$					

**2.1.1.2.2. ATCT CO<sub>2</sub> Emission of vehicles with at least one combustion engine, of NOVC-HEV and of OVC-HEV in case of a charge-sustaining Type 1 test (ATCT)**

Test at 14°C (ATCT)

CO <sub>2</sub> Emission (g/km)	Low	Medium	High	Extra High	Combined
Measured value $M_{CO_2,p,1} / M_{CO_2,c,2}$					
RCB correction coefficient (5)					
$M_{CO_2,p,3} / M_{CO_2,c,3}$					

Conclusion (ATCT)

CO <sub>2</sub> Emission (g/km)	Combined
ATCT (14°C) $M_{CO_2,Treg}$	
Type 1 (23°C) $M_{CO_2,23^\circ}$	
<b>Family correction factor (FCF)</b>	

**2.1.1.2.3. CO<sub>2</sub> Mass Emission of OVC-HEVs in case of a charge-depleting Type 1 test**

Test 1:

CO <sub>2</sub> Mass Emission (g/km)	Combined
Calculated value $M_{CO_2,CD}$	
<b>Declared value</b>	
$d_{CO_2}^1$	

Test 2 (if applicable)  
Same paragraph with  $d_{CO_2}^2$

Test 3 (if applicable)  
Same paragraph

Conclusion

CO <sub>2</sub> Mass Emission (g/km)	Combined
Averaging $M_{CO_2,CD}$	
<b>Final value</b> $M_{CO_2,CD}$	

**2.1.1.2.4. UF-WEIGHTED CO<sub>2</sub> Mass Emission of OVC-HEVs**

CO <sub>2</sub> Mass Emission (g/km)	Combined
Calculated value $M_{CO_2,weighted}$	

**2.1.1.3 FUEL CONSUMPTION (IF APPLICABLE, NOT ATCT)**

**2.1.1.3.1. Fuel consumption of vehicles with only a combustion engine, of NOVC-HEVs and of OVC-HEVs in case of a charge-sustaining Type 1 test**

For each operating modes tested the paragraphs below has to be repeated (predominant mode or best case mode and worst case, mode if applicable)

<b>Consumption (l/100 km)</b>	Low	Medium	High	Extra High	Combined
Final values $FC_{p,H}/FC_{c,H}$ (6)					

(6) Calculated from aligned CO<sub>2</sub> values

#### 2.1.1.3.2. Fuel consumption of OVC-HEVs in case of a charge-depleting Type 1 test

Test 1:

<b>Fuel Consumption (l/100 km)</b>	Combined
Calculated value $FC_{CD}$	

Test 2 (if applicable)

Same paragraph

Test 3 (if applicable)

Same paragraph

Conclusion

<b>Fuel Consumption (l/100km)</b>	Combined
Averaging $FC_{CD}$	
<b>Final value</b> $FC_{CD}$	

#### 2.1.1.3.3. UF-Weighted Fuel consumption of OVC-HEVs

<b>Fuel Consumption (l/100 km)</b>	Combined
Calculated value $FC_{weighted}$	

#### 2.1.1.3.4. Fuel consumption of vehicles of NOVC-FCHVs in case of a charge-sustaining Type 1 test

For each operating modes tested the paragraphs below has to be repeated (predominant mode or best case mode and worst case, mode if applicable)

<b>Consumption (kg/100 km)</b>	Low	Medium	High	Extra High	Combined
Measured values					
RCB correction coefficient					
Final values $FC_p/FC_c$					

#### 2.1.1.4. RANGES (IF APPLICABLE)

##### 2.1.1.4.1. Ranges for OVC-HEVs (if applicable)

##### 2.1.1.4.1.1. All electric Range

Test 1

<b>AER (km)</b>	City	Combined
Measured/Calculated values AER		
<b>Declared value</b>	-	

Test 2 (if applicable)

Same paragraph

Test 3 (if applicable)

Same paragraph

Conclusion

<b>AER (km)</b>	City	Combined
Averaging AER (if applicable)		
<b>Final values</b> AER		

##### 2.1.1.4.1.2. Equivalent All electric Range

<b>EAER (km)</b>	City	Combined
<b>Final values</b> EAER		



2.1.1.4.1.3. Actual Charge-Depleting Range

<b>R<sub>CDA</sub> (km)</b>	Combined
<b>Final value R<sub>CDA</sub></b>	

2.1.1.4.1.4. Charge-Depleting Cycle Range

Test 1

<b>R<sub>CDC</sub> (km)</b>	Combined
<b>Final value R<sub>CDC</sub></b>	
Index Number of the transition cycle	
REEC of confirmation-cycle (%)	

Test 2 (if applicable)

Same paragraph

Test 3 (if applicable)

Same paragraph

2.1.1.4.2. Ranges for PEVs - Pure electric Range (if applicable)

Test 1

<b>PER (km)</b>	City	Combined
Calculated values PER		
<b>Declared value</b>	-	

Test 2 (if applicable)

Same paragraph

Test 3 (if applicable)

Same paragraph

Conclusion

<b>PER (km)</b>	City	Combined
Averaging PER		
Final values PER		

2.1.1.5. ELECTRIC CONSUMPTION (IF APPLICABLE)

2.1.1.5.1. Electric Consumption of OVC-HEVs (if applicable)

2.1.1.5.1.1. Electric consumption EC

<b>EC (Wh/km)</b>	Low	Medium	High	Extra High	City	Combined
Final values EC						

2.1.1.5.1.2. UF-weighted charge-depleting electric consumption

Test 1

<b>EC<sub>AC,CD</sub> (Wh/km)</b>	Combined
Calculated value EC <sub>AC,CD</sub>	

Test 2 (if applicable)

Same paragraph

Test 3 (if applicable)

Same paragraph

Conclusion (if applicable)

<b>EC<sub>AC,CD</sub> (Wh/km)</b>	Combined
Averaging EC <sub>AC,CD</sub>	
<b>Final value</b>	

2.1.1.5.1.3. UF-weighted electric consumption

Test 1

<b>EC<sub>AC,weighted</sub> (Wh)</b>	Combined
Calculated value EC <sub>AC,weighted</sub>	

Test 2 (if applicable)  
Same paragraph

Test 3 (if applicable)  
Same paragraph

Conclusion (if applicable)

<b>EC<sub>AC,weighted</sub> (Wh/km)</b>	Combined
Averaging EC <sub>AC,weighted</sub>	
<b>Final value</b>	

#### 2.1.1.5.2. Electric consumption of PEVs (if applicable)

Test 1

<b>EC (Wh/km)</b>	City	Combined
Calculated values EC		
<b>Declared value</b>	-	

Test 2 (if applicable)  
Same paragraph

Test 3 (if applicable)  
Same paragraph

<b>EC (Wh/km)</b>	Low	Medium	High	Extra High	City	Combined
Averaging EC						
<b>Final values EC</b>						

#### 2.1.2. VEHICLE LOW (IF APPLICABLE)

Repeat § 2.1.1.

#### 2.1.3. VEHICLE M (IF APPLICABLE)

Repeat § 2.1.1.

#### 2.1.4. FINAL CRITERIA EMISSIONS VALUES (IF APPLICABLE)

Pollutants	CO (mg/km)	THC (a) (mg/km)	NMHC (a) (mg/km)	NO <sub>x</sub> (mg/km)	THC+NO <sub>x</sub> (b) (mg/km)	PM (mg/km)	PN (#.10 <sup>11</sup> /km)
<b>Highest values<sup>(3)</sup></b>							

<sup>(3)</sup> for each pollutant within all test results of VH, VL (if applicable) and VIM (if applicable)

#### 2.2. TYPE 2 (a) TEST (not ATCT)

Included the emissions data required for roadworthiness testing

Test	CO ( % vol)	Lambda	Engine speed (min <sup>-1</sup> )	Oil temperature (°C)
Idle		-		
High idle				

#### 2.3. TYPE 3 (a) TEST (not ATCT)

Emission of crankcase gases into the atmosphere: none

#### 2.4. TYPE 4 (a) TEST (not ATCT)

See report(s)	:	
---------------	---	--

## 2.5. TYPE 5 TEST (not ATCT)

See durability family report(s)	:	
Type 1/I cycle for criteria emissions testing	:	Annex XXI, Sub-Annex 4 or UN/ECE Regulation No 83 <sup>3</sup>

## 2.6. RDE TEST (not ATCT)

RDE family number	:	MSxxxx
See family report(s)	:	

## 2.7. TYPE 6 (a) TEST (not ATCT)

Date of tests	:	(day/month/year)
Place of tests	:	
Method of setting of the chassis dyno	:	coast down (road load reference)
Inertia mass (kg)	:	
If deviation from the vehicle of type 1	:	
Tyres	:	
Make	:	
Type	:	
Dimensions front/rear	:	
Circumference (m)	:	
Tyre pressure (kPa)	:	

Pollutants		CO (g/km)	HC (g/km)
Test	1		
	2		
	3		
Average			
Limit			

## 2.8. ON BOARD DIAGNOSTIC SYSTEM (not ATCT)

See family report(s)	:	
----------------------	---	--

## 2.9. SMOKE OPACITY (b) TEST (not ATCT)

### 2.9.1. STEADY SPEEDS TEST

See family report(s)	:	
----------------------	---	--

### 2.9.2. FREE ACCELERATION TEST

Measured absorption value (m <sup>-1</sup> )	:	
Corrected absorption value (m <sup>-1</sup> )	:	

## 2.10. ENGINE POWER (not ATCT)

See family report(s)	:	
----------------------	---	--

## 2.11. TEMPERATURE INFORMATION RELATED TO VEHICLE HIGH (VH)

<sup>3</sup> Indicate as applicable

Engine coolant temperature at the end of soaking time (°C) sub-ann6a §3.9.2	:	
Average soak area temperature over the 3 last hours (°C) sub-ann6a §3.9.2	:	
Difference between engine coolant end temperature and average soak area temperature of the last 3 hours $\Delta_{T\_ATCT}$ (°C) sub-ann6a §3.9.3	:	
The minimum soaking time $t_{soak\_ATCT}$ (s) sub-ann6a §3.9.1	:	
Location of temperature sensor sub-ann6a §3.9.5	:	

## Annex of the test report (not applicable ATCT test and PEV),

1 - By electronic format, all the input data for the correlation tool, listed in Annex 1 point 2.4 to Regulation yyy/2016 (Correlation regulation).

Reference of input file: ...

2 – Co2mpas output:

3 – NEDC test results (if applicable):

[...]

## Appendix 8b

### Road Load Test Report

The following information, if applicable, is the minimum data required for the road load determination test.

#### REPORT number

<b>APPLICANT</b>	
<b>Manufacturer</b>	
<b>SUBJECT</b>	Determination of a vehicle road load
<b>Object submitted to tests</b>	
	Make :
	Type :
<b>CONCLUSION</b>	The object submitted to tests complies with the requirements mentioned in the subject.

PLACE,

DD/MM/YYYY

#### 1. CONCERNED VEHICLE(S)

Make(s) concerned	:	
Type(s) concerned	:	
Commercial description	:	
Maximal speed (km/h)	:	
Powered axle(s)	:	

#### 2. DESCRIPTION OF TESTED VEHICLES

##### 2.1 GENERAL

If no interpolation: the worst-case vehicle (regarding energy demand) has to be described

##### 2.1.1. Vehicle High

Make	:	
Type	:	
Version	:	
Cycle energy demand over a complete WLTC Class 3 cycle independent of the vehicle class	:	
Deviation from production series	:	
Mileage	:	

##### 2.1.2. Vehicle Low

Make	:	
Type	:	
Version	:	
Cycle energy demand over a complete WLTC Class 3 cycle independent of the vehicle class	:	(4 to 35 % based on $H_R$ )
Deviation from production series	:	
Mileage	:	

##### 2.1.3. Representative vehicle of the road load matrix family (if applicable)

Make	:	
Type	:	
Version	:	
Cycle energy demand over a complete WLTC	:	
Deviation from production series	:	
Mileage	:	

## 2.2. MASSES

### 2.2.1. Vehicle High

Test mass (kg)	:	
Average mass $m_{av}$ (kg)	:	(average before and after the test)
Rotational mass $m_r$ (kg)	:	3% of (MRO+25kg) or measured
Weight distribution		
Front	:	
Rear	:	

### 2.2.2. Vehicle Low

Repeat §2.2.1. with VL data

### 2.2.3. Representative vehicle of the road load matrix family (if applicable)

Test mass (kg)	:	
Average mass $m_{av}$ (kg)	:	(average before and after the test)
Technically permissible maximum laden mass ( $\geq 3000$ kg)	:	
Estimated arithmetic average of the mass of optional equipment	:	
Weight distribution		
Front	:	
Rear	:	

## 2.3. TYRES

### 2.3.1. Vehicle High

Size designation	:	front/rear if different
Make	:	front/rear if different
Type	:	front/rear if different
Rolling resistance (kgf/1000 kg)		
Front	:	
Rear	:	
Front pressure (kPa)	:	
Rear pressure (kPa)	:	

### 2.3.2. Vehicle Low

Repeat §2.3.1. with VL data

### 2.3.3. Representative vehicle of the road load matrix family (if applicable)

Repeat §2.3.1. with the representative vehicle data

## 2.4. BODYWORK

### 2.4.1. Vehicle High

Type	:	AA/AB/AC/AD/AE/AF BA/BB/BC/BD
Version	:	
Aerodynamic devices		
Movable aerodynamic body parts	:	y/n and list if applicable

Installed aerodynamic options list	:	
------------------------------------	---	--

#### 2.4.2. Vehicle Low

Repeat §2.4.1. with VL data

Delta ( $C_d \cdot A_f$ ) <sub>LH</sub> compared to VH	:	
--	---	--

#### 2.4.3. Representative vehicle of the road load matrix family (if applicable)

Body shape description	:	Square box (if no representative body shape for a complete vehicle can be determined)
------------------------	---	---

Repeat §2.4.1. with the representative vehicle data if applicable

Frontal area $A_{fr}$	:	
-----------------------	---	--

### 2.5. POWERTRAIN

#### 2.5.1. Vehicle High

Engine code	:																												
Transmission type	:	manual, automatic, CVT																											
Transmission model (manufacturer's codes)	:	(torque rating and no of clutches → to be included in info doc)																											
Covered transmission models (manufacturer's codes)	:																												
Engine rotational speed divided by vehicle speed	:	<table border="1"> <thead> <tr> <th>Gear</th> <th>Gear ratio</th> <th>N/V ratio</th> </tr> </thead> <tbody> <tr> <td>1<sup>st</sup></td> <td>1/..</td> <td></td> </tr> <tr> <td>2<sup>nd</sup></td> <td>1..</td> <td></td> </tr> <tr> <td>3<sup>rd</sup></td> <td>1/..</td> <td></td> </tr> <tr> <td>4<sup>th</sup></td> <td>1/..</td> <td></td> </tr> <tr> <td>5<sup>th</sup></td> <td>1/..</td> <td></td> </tr> <tr> <td>6<sup>th</sup></td> <td>1/..</td> <td></td> </tr> <tr> <td>..</td> <td></td> <td></td> </tr> <tr> <td>..</td> <td></td> <td></td> </tr> </tbody> </table>	Gear	Gear ratio	N/V ratio	1 <sup>st</sup>	1/..		2 <sup>nd</sup>	1..		3 <sup>rd</sup>	1/..		4 <sup>th</sup>	1/..		5 <sup>th</sup>	1/..		6 <sup>th</sup>	1/..		..			..		
Gear	Gear ratio	N/V ratio																											
1 <sup>st</sup>	1/..																												
2 <sup>nd</sup>	1..																												
3 <sup>rd</sup>	1/..																												
4 <sup>th</sup>	1/..																												
5 <sup>th</sup>	1/..																												
6 <sup>th</sup>	1/..																												
..																													
..																													
Electric machine(s) coupled in position N	:	n.a. (no electric machine or no coastdown mode)																											
Type and number of electric machines	:	construction type: asynchronous/ synchronous...																											
Type of coolant	:	air, liquid,...																											

#### 2.5.2. Vehicle Low

Repeat §2.5.1. with VL data

### 2.6. TEST RESULTS

#### 2.6.1. Vehicle High

Dates of tests	:	dd/mm/yyyy
----------------	---	------------

#### ON ROAD (Annex XXI, Sub Annex 4, §4)

Method of the test	:	coastdown (Annex XXI, Sub Annex 4, §4.3.) or torque meter method (Annex XXI, Sub Annex 4, §4.4.)
Facility (name / location / track's reference)	:	
Coastdown mode	:	y/n
Wheel alignment	:	Toe and camber values
Maximum reference speed (km/h) Annex XXI, Sub Annex 4, §4.2.4.1.2.	:	
Anemometry	:	stationary or on board: influence of anemometry ( $cd \cdot A$ ) and if it was corrected.
Number of split(s)	:	
Wind	:	average, peaks and direction in conjunction with direction of the test track



Air pressure	:	
Temperature (mean value)	:	
Wind correction	:	y/n
Tyre pressure adjustment	:	y/n
Raw results	:	Torque method: c0= c1= c2=  Coastdown method: f0 f1 f2
Final results	:	Torque method: c0= c1= c2= and f0= f1= f2=  Coastdown method: f0= f1= f2=

Or

**WIND TUNNEL METHOD (Annex XXI, Sub Annex 4, §6)**

Facility (name/location/dynamometer's reference)	:							
Qualification of the facilities	:	Report reference and date						
Dynamometer								
Type of dynamometer	:	flat belt or chassis dynamometer						
Method	:	stabilised speeds or deceleration method						
Warm up	:	warm-up by dyno or by driving the vehicle						
Correction of the roller curve (Annex XXI, Sub Annex 4, §6.6.3.)	:	(for chassis dynamometer, if applicable)						
Method of chassis dynamometer setting	:	Fixed run / iterative / alternative with its own warmup cycle						
Measured aerodynamic drag coefficient multiplied by the frontal area	:	<table border="1"> <thead> <tr> <th>Velocity (km/h)</th> <th>C<sub>d</sub>*A (m<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td>...</td> <td>...</td> </tr> <tr> <td>...</td> <td>...</td> </tr> </tbody> </table>	Velocity (km/h)	C <sub>d</sub> *A (m <sup>2</sup> )	...	...	...	...
Velocity (km/h)	C <sub>d</sub> *A (m <sup>2</sup> )							
...	...							
...	...							
Result	:	f0= f1= f2=						

Or

**ROAD LOAD MATRIX (Annex XXI, Sub Annex 4, §5)**

Method of the test	:	coastdown (Annex XXI, Sub Annex 4, §4.3) or torque meter method (Annex XXI, Sub Annex 4, §4.4)
Facility (name/location/track's reference)	:	
Coastdown mode	:	y/n
Wheel alignment	:	Toe and camber values
Maximum reference speed (km/h) Annex XXI, Sub Annex 4, §4.2.4.1.2.	:	

Anemometry	:	stationary or on board: influence of anemometry (cd*A) and if it was corrected.
Number of split(s)	:	
Wind	:	average, peaks and direction in conjunction with direction of the test track
Air pressure	:	
Temperature (mean value)	:	
Wind correction	:	y/n
Tyre pressure adjustment	:	y/n
Raw results	:	Torque method: c0r= c1r= c2r=  Coastdown method: f0r f1r f2r
Final results	:	Torque method: c0r= c1r= c2r= and f0r= f1r= f2r=  Coastdown method: f0r= f1r= f2r=

**2.6.2. Vehicle Low**  
Repeat §2.6.1. with VL data

## Appendix 8c – Template for Test Sheet

The 'test sheet' shall include the test data that are recorded, but not included in any test report.

The test sheet(s) shall be retained by the technical service or the manufacturer for at least 10 years.

The following information, if applicable, is the minimum data required for test sheets.

Adjustable wheel alignment parameters Annex XXI, Sub-Annex 4, § 4.2.1.8.3.	:																											
The coefficients, c0, c1 and c2,	:	c0= c1= c2=																										
The coastdown times measured on the chassis dynamometer Annex XXI, Sub-Annex 4, §4.4.4.	:	<table border="1"> <thead> <tr> <th>Vehicle speed (km/h)</th> <th>Coastdown time (s)</th> </tr> </thead> <tbody> <tr><td>125-115</td><td></td></tr> <tr><td>115-105</td><td></td></tr> <tr><td>105-95</td><td></td></tr> <tr><td>95-85</td><td></td></tr> <tr><td>85-75</td><td></td></tr> <tr><td>75-65</td><td></td></tr> <tr><td>65-55</td><td></td></tr> <tr><td>55-45</td><td></td></tr> <tr><td>45-35</td><td></td></tr> <tr><td>35-25</td><td></td></tr> <tr><td>25-15</td><td></td></tr> <tr><td>15-05</td><td></td></tr> </tbody> </table>	Vehicle speed (km/h)	Coastdown time (s)	125-115		115-105		105-95		95-85		85-75		75-65		65-55		55-45		45-35		35-25		25-15		15-05	
Vehicle speed (km/h)	Coastdown time (s)																											
125-115																												
115-105																												
105-95																												
95-85																												
85-75																												
75-65																												
65-55																												
55-45																												
45-35																												
35-25																												
25-15																												
15-05																												
Additional weight may be placed on or in the vehicle to eliminate tyre slippage Annex XXI, Sub-Annex 4, §7.1.1.1.1.	:	weight (kg) on/in the vehicle																										
The coastdown times after performing the vehicle coast down procedure according paragraph 4.3.1.3 of Annex XXI, Sub-Annex 4 Annex XXI, Sub-Annex 4, §8.2.4.2.	:	<table border="1"> <thead> <tr> <th>Vehicle speed (km/h)</th> <th>Coastdown time (s)</th> </tr> </thead> <tbody> <tr><td>125-115</td><td></td></tr> <tr><td>115-105</td><td></td></tr> <tr><td>105-95</td><td></td></tr> <tr><td>95-85</td><td></td></tr> <tr><td>85-75</td><td></td></tr> <tr><td>75-65</td><td></td></tr> <tr><td>65-55</td><td></td></tr> <tr><td>55-45</td><td></td></tr> <tr><td>45-35</td><td></td></tr> <tr><td>35-25</td><td></td></tr> <tr><td>25-15</td><td></td></tr> <tr><td>15-05</td><td></td></tr> </tbody> </table>	Vehicle speed (km/h)	Coastdown time (s)	125-115		115-105		105-95		95-85		85-75		75-65		65-55		55-45		45-35		35-25		25-15		15-05	
Vehicle speed (km/h)	Coastdown time (s)																											
125-115																												
115-105																												
105-95																												
95-85																												
85-75																												
75-65																												
65-55																												
55-45																												
45-35																												
35-25																												
25-15																												
15-05																												

<u>NOx converter efficiency</u> Indicated concentrations (a); (b), (c), (d), and the concentration when the NOx analyser is in the NO mode so that the calibration gas does not pass through the converter Annex XXI, Sub-Annex 5, §5.5	:	(a)= (b)= (c)= (d)= Concentration in NO mode=
The distance actually driven by the vehicle Annex XXI, Sub-Annex 6, §1.2.6.4.6. and 1.2.12.6.	:	
For manual shift transmission vehicle, MT vehicle that cannot follow the cycle trace: The deviations from the driving cycle Annex XXI, Sub-Annex 6, §1.2.6.5.1	:	
<u>Drive trace indices:</u> The following indices shall be calculated according to SAE J2951(Revised JAN2014): (a) ER : Energy Rating (b) DR : Distance Rating (c) EER : Energy Economy Rating (d) ASCR : Absolute Speed Change Rating (e) IWR : Inertial Work Rating (f) RMSSE : Root Mean Squared Speed Error Annex XXI, Sub-Annex 6, §1.2.8.5. and 7.	:	
<u>Particulate sample filter weighing</u> Filter before the test Filter after the test Reference filter Annex XXI, Sub-Annex 6, §1.2.10.1.2 and 1.2.14.3.1	:	
Content of each of the compounds measured after stabilization of the measuring device Annex XXI, Sub-Annex 6, §1.2.14.2.8	:	
<u>Regeneration factor determination</u> The number of cycles D between two WLTCs where regeneration events occur The number of cycles over which emission measurements are made n The mass emissions measurement $M'_{sij}$ for each compound i over each cycle j Annex XXI, Sub-Annex 6, Appendix 1, §2.1.3.	:	
<u>Regeneration factor determination</u> The number of applicable test cycles d measured for complete regeneration Annex XXI, Sub-Annex 6, Appendix 1, § 2.2.6.	:	
<u>Regeneration factor determination</u> Msi Mpi Ki Annex XXI, Sub-Annex 6, Appendix 1, §3.1.1	:	
<u>ATCT</u> The air temperature and humidity of the test cell measured at the vehicle cooling fan outlet at a minimum frequency of 1 Hz. Annex XXI, Sub-Annex 6a, §3.2.1.1.	:	Temperature set point = $T_{reg}$ Actual temperature value $\pm 3 \text{ }^\circ\text{C}$ at the start of the test $\pm 5 \text{ }^\circ\text{C}$ during the test
The temperature of the soak area measured continuously at a minimum frequency of 1 Hz.	:	Temperature set point = $T_{reg}$ Actual temperature value

Annex XXI, Sub-Annex 6a, §3.2.2.1.		± 3 °C at the start of the test ± 5 °C during the test
The time of transfer from the preconditioning to the soak area Annex XXI, Sub-Annex 6a, §3.6.2.	:	≤ 10 minutes
The time between the end of the Type 1 test and the cool down procedure The measured soaking time, and shall be recorded in all relevant test sheets. Annex XXI, Sub-Annex 6a, §3.9.2.	:	≤ 10 minutes time between the measurement of the end temperature and the end of the Type 1 test at 23 °C

## ANNEX II

### *IN-SERVICE CONFORMITY*

#### **1. INTRODUCTION**

1.1. This Annex sets out the tailpipe emissions and OBD (inclusive IUPR<sub>M</sub>) in-service conformity requirements for vehicles type approved to this Regulation.

#### **2. Requirements**

The in-service conformity requirements shall be those specified in paragraph 9 and Appendices 3, 4 and 5 of UN/ECE Regulation No 83 with exceptions described in the following sections.

2.1. Paragraph 9.2.1. of UN/ECE Regulation No 83 shall be understood as being as follows:

The audit of in-service conformity by the approval authority shall be conducted on the basis of any relevant information that the manufacturer has, under the same procedures as those for the conformity of production defined in Article 12(1) and (2) of Directive 2007/46/EC and in points 1 and 2 of Annex X to that Directive. If information is provided to the approval authority from any approval authority or Member State surveillance testing, it shall complement the in-service monitoring reports supplied by the manufacturer.

2.2. Paragraph 9.3.5.2 of UN/ECE Regulation No 83 shall be amended with the addition of the following new sub-paragraph:

“ ...

Vehicles of small series productions with less than 1000 vehicles per OBD family are exempted from minimum IUPR requirements as well as the requirement to demonstrate these to the approval authority.”

2.3. References to ‘Contracting Parties’ shall be understood as references to ‘Member States’.

2.4. Paragraph 2.6. of Appendix 3 to UN/ECE Regulation No 83 shall be replaced with the following:

The vehicle shall belong to a vehicle type that is type-approved under this Regulation and covered by a certificate of conformity in accordance with Directive 2007/46/EC. It shall be registered and have been used in the Union.

2.5. The reference in paragraph 2.2. of Appendix 3 to UN/ECE Regulation No 83 to the ‘1958 Agreement’ shall be understood as reference to Directive 2007/46/EC.

2.6. Paragraph 2.6. of Appendix 3 to UN/ECE Regulation No 83 shall be replaced with the following:

The lead content and sulphur content of a fuel sample from the vehicle tank shall meet the applicable standards laid down in Directive 2009/30/EC of the European Parliament and of the Council<sup>4</sup> and there shall be no evidence of mis-fuelling. Checks may be done in the tailpipe.

2.7. Reference in paragraph 4.1. of Appendix 3 to UN/ECE Regulation No 83 to ‘emissions tests in accordance with Annex 4a’ shall be understood as being to ‘emissions tests conducted in accordance with Annex XXI to this Regulation’.

2.8. Reference in paragraph 4.1. of Appendix 3 to UN/ECE Regulation No 83 to ‘paragraph 6.3. of Annex 4a’ shall be understood as being to ‘paragraph 1.2.6. of Sub-Annex 6 to Annex XXI to this Regulation’.

2.9. Reference in paragraph 4.4. of Appendix 3 to UN/ECE Regulation No 83 to ‘the 1958 Agreement’ shall be understood as reference to ‘Article 13(1) or (2) of Directive 2007/46/EC’.

2.10. In paragraph 3.2.1., paragraph 4.2. and footnotes 1 and 2 of Appendix 4 to UN/ECE Regulation No 83, the reference to the limit values given in Table 1 of paragraph 5.3.1.4. shall be understood as reference to Table 1 of Annex I to Regulation (EC) No 715/2007.

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<sup>4</sup> OJL 140, 5.6.2009, p88