

Commission Regulation (EU) No 582/2011 of 25 May 2011 implementing and amending Regulation (EC) No 595/2009 of the European Parliament and of the Council with respect to emissions from heavy duty vehicles (Euro VI) and amending Annexes I and III to Directive 2007/46/EC of the European Parliament and of the Council (Text with EEA relevance)

ANNEX I

ADMINISTRATIVE PROVISIONS FOR EC TYPE-APPROVAL

1. REQUIREMENTS ON FUEL RANGE

1.1. **Requirements on universal fuel range type-approval**

A universal fuel range approval shall be granted subject to the requirements specified in points 1.1.1 to 1.1.6.1.

- 1.1.1. The parent engine shall meet the requirements of this Regulation on the appropriate reference fuels specified in Annex IX. Specific requirements shall apply to natural gas fuelled engines, as laid down in point 1.1.3.
- 1.1.2. If the manufacturer permits to operate the engine family to run on market fuels not included in Directive 98/70/EC of the European Parliament and of the Council⁽¹⁾ and the EN 228 CEN standards in the case of unleaded petrol and EN 590 CEN standard in the case of diesel, such as running on B100, the manufacturer shall, in addition to the requirements in point 1.1.1:
- (a) declare the fuels the engine family is capable to run on in point 3.2.2.2.1 of Part 1 of Appendix 4;
 - (b) demonstrate the capability of the parent engine to meet the requirements of this Regulation on the fuels declared;
 - (c) be liable to meet the requirements of in-service conformity specified in Annex II on the fuels declared including any blend between the declared fuels and the market fuels included in Directive 98/70/EC and the relevant CEN standards.
- 1.1.3. In the case of a natural gas fuelled engine the manufacturer shall demonstrate the parent engines capability to adapt to any fuel composition that may occur on the market within the European Union.

In the case of natural gas there are generally two types of fuel, high calorific fuel (H-gas) and low calorific fuel (L-gas), but with a significant spread within both ranges; they differ significantly in their energy content expressed by the Wobbe Index and in their λ -shift factor (S_λ). Natural gases with a λ -shift factor between 0,89 and 1,08 ($0,89 \leq S_\lambda \leq 1,08$) are considered to belong to H-range, while natural gases with a λ -shift factor between 1,08 and 1,19 ($1,08 \leq S_\lambda \leq 1,19$) are considered to belong to L-range. The composition of the reference fuels reflects the extreme variations of S_λ .

The parent engine shall meet the requirements of this Regulation on the reference fuels G_R (fuel 1) and G_{25} (fuel 2), as specified in Annex IX, without any readjustment to the fuelling between the two tests. One adaptation run over one WHTC hot cycle without measurement is permitted after the change of the fuel. After the adaptation run the engine shall be cooled down in accordance with Section 7.6.1 of Annex 4B to UN/ECE Regulation No 49.

- 1.1.3.1. At the manufacturer's request the engine may be tested on a third fuel (fuel 3) if the λ -shift factor (S_λ) lies between 0,89 (that is the lower range of G_R) and 1,19 (that is the upper range of G_{25}), for example when fuel 3 is a market fuel. The results of this test may be used as a basis for the evaluation of the conformity of the production.
- 1.1.4. In the case of an engine fuelled with natural gas which is self adaptive for the range of H-gases on the one hand and the range of L-gases on the other hand, and which

switches between the H-range and the L-range by means of a switch, the parent engine shall be tested on the relevant reference fuel as specified in Annex IX for each range, at each position of the switch. The fuels are G_R (fuel 1) and G_{23} (fuel 3) for the H-range of gases and G_{25} (fuel 2) and G_{23} (fuel 3) for the L-range of gases. The parent engine shall meet the requirements of this Regulation at both positions of the switch without any readjustment to the fuelling between the two tests at each position of the switch. One adaptation run over one WHTC hot cycle without measurement is permitted after the change of the fuel. After the adaptation run the engine shall be cooled down in accordance with Section 7.6.1 of Annex 4B to UN/ECE Regulation No 49.

1.1.4.1. At the manufacturer's request the engine may be tested on a third fuel instead of G_{23} (fuel 3) if the λ -shift factor (S_λ) lies between 0,89 (that is the lower range of G_R) and 1,19 (that is the upper range of G_{25}), for example when fuel 3 is a market fuel. The results of this test may be used as a basis for the evaluation of the conformity of the production.

1.1.5. In the case of natural gas engines, the ratio of the emission results 'r' shall be determined for each pollutant as follows:

$$r = \frac{\text{emission result on reference fuel 2}}{\text{emission result on reference fuel 1}}$$

, or

$$r_a = \frac{\text{emission result on reference fuel 2}}{\text{emission result on reference fuel 3}}$$

, and

$$r_b = \frac{\text{emission result on reference fuel 1}}{\text{emission result on reference fuel 3}}$$

1.1.6. In the case of LPG the manufacturer shall demonstrate the parent engines capability to adapt to any fuel composition that may occur across the market.

In the case of LPG there are variations in C_3/C_4 composition. These variations are reflected in the reference fuels. The parent engine shall meet the emission requirements on the reference fuels A and B as specified in Annex IX without any readjustment to the fuelling between the two tests. One adaptation run over one WHTC hot cycle without measurement is permitted after the change of the fuel. After the adaptation run the engine shall be cooled down in accordance with Section 7.6.1 of Annex 4B to UN/ECE Regulation No 49.

1.1.6.1. The ratio of emission results 'r' shall be determined for each pollutant as follows:

$$r = \frac{\text{emission result on reference fuel B}}{\text{emission result on reference fuel A}}$$

1.2. Requirements on restricted fuel range type-approval in case of positive-ignition engines fuelled with natural gas or LPG

Fuel range restricted approval shall be granted subject to the requirements specified in points 1.2.1 to 1.2.2.3.

1.2.1. Exhaust emissions type-approval of an engine running on natural gas and laid out for operation on either the range of H-gases or on the range of L-gases.

The parent engine shall be tested on the relevant reference fuel, as specified in Annex IX, for the relevant range. The fuels are G_R (fuel 1) and G_{23} (fuel 3) for the H-range of gases and G_{25} (fuel 2) and G_{23} (fuel 3) for the L-range of gases. The parent engine shall meet the requirements of this Regulation without any readjustment to the fuelling between the two tests. One adaptation run over one WHTC hot cycle without measurement is permitted after the change of the fuel.

After the adaptation run the engine shall be cooled down in accordance with Section 7.6.1 of Annex 4B to UN/ECE Regulation No 49.

1.2.1.1. At the manufacturer's request the engine may be tested on a third fuel instead of G_{23} (fuel 3) if the λ -shift factor (S_λ) lies between 0,89 (that is the lower range of G_R) and 1,19 (that is the upper range of G_{25}), for example when fuel 3 is a market fuel. The results of this test may be used as a basis for the evaluation of the conformity of the production.

1.2.1.2. The ratio of emission results 'r' shall be determined for each pollutant as follows:

$$r = \frac{\text{emission result on reference fuel 2}}{\text{emission result on reference fuel 1}}$$

, or

$$r_a = \frac{\text{emission result on reference fuel 2}}{\text{emission result on reference fuel 3}}$$

, and

$$r_b = \frac{\text{emission result on reference fuel 1}}{\text{emission result on reference fuel 3}}$$

1.2.1.3. On delivery to the customer the engine shall bear a label as specified in Section 3.3 stating for which range of gases the engine is approved.

1.2.2. Exhaust emissions type-approval of an engine running on natural gas or LPG and designed for operation on one specific fuel composition.

The parent engine shall meet the emission requirements on the reference fuels G_R and G_{25} in the case of natural gas, or the reference fuels A and B in the case of LPG, as specified in Annex IX. Fine tuning of the fuelling system is allowed between the tests. This fine tuning will consist of a recalibration of the fuelling database, without any alteration to either the basic control strategy or the basic structure of the database. If necessary the exchange of parts that are directly related to the amount of fuel flow such as injector nozzles is allowed.

1.2.2.1. At the manufacturer's request the engine may be tested on the reference fuels G_R and G_{23} , or on the reference fuels G_{25} and G_{23} , in which case the type-approval is only valid for the H-range or the L-range of gases respectively.

1.2.2.2. On delivery to the customer the engine shall bear a label as specified in Section 3.3 stating for which fuel composition the engine has been calibrated.

2. EXHAUST EMISSIONS TYPE-APPROVAL OF A MEMBER OF A FAMILY

2.1. With the exception of the case mentioned in point 2.2, the type-approval of a parent engine shall be extended to all family members, without further testing, for any fuel composition within the range for which the parent engine has been approved (in the case of engines described in point 1.2.2) or the same range of fuels (in the case of engines described in either point 1.1 or 1.2) for which the parent engine has been type-approved.

2.2. If the technical service determines that, with regard to the selected parent engine the submitted application does not fully represent the engine family defined in Part 1 of Appendix 4, an alternative and if necessary an additional reference test engine may be selected by the technical service and tested.

3. ENGINE MARKINGS

- 3.1. In the case of an engine type approved as a separate technical unit or a vehicle type approved with regard to emissions and access to vehicle repair and maintenance information, the engine shall bear:
- (a) the trademark or trade name of the manufacturer of the engine;
 - (b) the manufacturer's commercial description of the engine;
 - (c) in case of an NG engine one of the following markings to be placed after the EC type-approval mark:
 - (i) H in case of the engine being approved and calibrated for the H-range of gases;
 - (ii) L in case of the engine being approved and calibrated for the L-range of gases;
 - (iii) HL in case of the engine being approved and calibrated for both the H-range and L-range of gases;
 - (iv) H_t in case of the engine being approved and calibrated for a specific gas composition in the H-range of gases and transformable to another specific gas in the H-range of gases by fine tuning of the engine fuelling;
 - (v) L_t in case of the engine being approved and calibrated for a specific gas composition in the L-range of gases and transformable to another specific gas in the L-range of gases after fine tuning of the engine fuelling;
 - (vi) HL_t in the case of the engine being approved and calibrated for a specific gas composition in either the H-range or the L-range of gases and transformable to another specific gas in either the H-range or the L-range of gases by fine tuning of the engine fuelling.
- 3.2. Every engine conforming to the type approved under this Regulation as a separate technical unit shall bear an EC type-approval mark. This mark shall consist of:
- 3.2.1. A rectangle surrounding the lower-case letter 'e' followed by the distinguishing number of the Member State which has granted the EC separate technical unit type-approval:
- | | |
|----|------------------------|
| 1 | for Germany |
| 2 | for France |
| 3 | for Italy |
| 4 | for the Netherlands |
| 5 | for Sweden |
| 6 | for Belgium |
| 7 | for Hungary |
| 8 | for the Czech Republic |
| 9 | for Spain |
| 11 | for the United Kingdom |
| 12 | for Austria |
| 13 | for Luxembourg |
| 17 | for Finland |
| 18 | for Denmark |
| 19 | for Romania |
| 20 | for Poland |

21	for Portugal
23	for Greece
24	for Ireland
26	for Slovenia
27	for Slovakia
29	for Estonia
32	for Latvia
34	for Bulgaria
36	for Lithuania
49	for Cyprus
50	for Malta

3.2.2. The EC type-approval mark shall also include in the vicinity of the rectangle the 'base approval number' contained in Section 4 of the type-approval number referred to in Annex VII to Directive 2007/46/EC, preceded by the two figures indicating the sequence number assigned to the latest technical amendment to Regulation (EC) No 595/2009 or this Regulation on the date EC type-approval for a separate technical unit was granted. For this Regulation, the sequence number is 00.

3.2.3. The EC type-approval mark shall be affixed to the engine in such a way as to be indelible and clearly legible. It shall be visible when the engine is installed on the vehicle and shall be affixed to a part necessary for normal engine operation and not normally requiring replacement during engine life.

3.2.4. Appendix 8 gives examples of the EC type-approval mark.

3.3. Labels for NG and LPG fuelled engines

In the case of NG and LPG fuelled engines with a fuel range restricted type-approval, the following labels containing information provided in point 3.3.1 shall be affixed.

3.3.1. The following information shall be given on the label:

In the case of point 1.2.1.3, the label shall state 'ONLY FOR USE WITH NATURAL GAS RANGE H'. If applicable, 'H' is replaced by 'L'.

In the case of point 1.2.2.2, the label shall state 'ONLY FOR USE WITH NATURAL GAS SPECIFICATION ...' or 'ONLY FOR USE WITH LIQUEFIED PETROLEUM GAS SPECIFICATION ...', as applicable. All the information in the appropriate table in Annex IX shall be given with the individual constituents and limits specified by the engine manufacturer.

The letters and figures shall be at least 4 mm in height.

If lack of space prevents such labelling, a simplified code may be used. In this event, explanatory notes containing all the above information shall be easily accessible to any person filling the fuel tank or performing maintenance or repair on the engine and its accessories, as well as to the authorities concerned. The site and content of these explanatory notes shall be determined by agreement between the manufacturer and the approval authority.

3.3.2. Properties

Labels shall be durable for the useful life of the engine. Labels shall be clearly legible and their letters and figures shall be indelible. Additionally, labels shall be attached in such a manner that their fixing is durable for the useful life of the engine, and the labels cannot be removed without destroying or defacing them.

3.3.3. Placing

Labels shall be secured to an engine part necessary for normal engine operation and not normally requiring replacement during engine life. Additionally, these labels shall be located so as to be readily visible after the engine has been completed with all the auxiliaries necessary for engine operation.

- 3.4. In case of an application for EC type-approval of a vehicle with an approved engine with regard to emissions and access to vehicle repair and maintenance information or an EC type-approval of a vehicle with regard to emissions and access to vehicle repair and maintenance information, the label specified in Section 3.3 shall also be placed close to the fuel filling aperture.

4. INSTALLATION ON THE VEHICLE

- 4.1. The engine installation on the vehicle shall be performed in such a way as to ensure that the type-approval requirements are met. The following characteristics in respect to the type-approval of the engine shall be taken into consideration:

- 4.1.1. Intake depression shall not exceed that declared for the engine type-approval in Part 1 of Appendix 4;

- 4.1.2. Exhaust back pressure shall not exceed that declared for the engine type-approval in Part 1 of Appendix 4;

- 4.1.3. Power absorbed by the auxiliaries needed for operating the engine shall not exceed that declared for the engine type-approval in Part 1 of Appendix 4;

- 4.1.4. The characteristics of the exhaust after-treatment system shall be in accordance with those declared for the engine type-approval in Part 1 of Appendix 4.

4.2. **Installation of a type-approved engine on a vehicle**

The installation of an engine type approved as a separate technical unit on a vehicle shall, in addition, comply with the following requirements:

- (a) as regard the compliance of the OBD system, the installation shall, according to Appendix 1 of Annex 9B to UN/ECE Regulation No 49, meet the manufacturer's installation requirements as specified in Part 1 of Appendix 4;
- (b) as regard the compliance of the system ensuring the correct operation of NO_x control measures, the installation shall, according to Appendix 4 of Annex XIII, meet the manufacturer's installation requirements as specified in Part 1 of Appendix 4.

4.3. **Inlet to fuel tanks in the case of a petrol or E85 fuelled engine**

- 4.3.1. The inlet orifice of the petrol or E85 tank shall be designed so it prevents the tank from being filled from a fuel pump delivery nozzle that has an external diameter of 23,6 mm or greater.

- 4.3.2. Point 4.3.1 shall not apply to a vehicle for which both of the following conditions are satisfied:

- (a) the vehicle is designed and constructed so that no device designed to control the emission of gaseous pollutants is adversely affected by leaded petrol;

- (b) the vehicle is conspicuously, legibly and indelibly marked with the symbol for unleaded petrol specified in ISO 2575:2004 in a position immediately visible to a person filling the fuel tank. Additional marking are permitted.

- 4.3.3. 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) or in case of M_1 or N_1 vehicles, 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 utilising 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.

5. REQUIREMENTS AND TESTS FOR IN-SERVICE TESTING

5.1. Introduction

This Section sets out the specifications and tests of the ECU data at type-approval for the purpose of in-service testing.

5.2. General Requirements

- 5.2.1 For the purpose of in-service testing, the calculated load (engine torque as a percentage of maximum torque and the maximum torque available at the current engine speed), the engine speed, the engine coolant temperature, the instantaneous fuel consumption, and the reference maximum engine torque as a function of engine speed shall be made available by the OBD system in real time and at a frequency of at least 1 Hz, as mandatory data stream information.
- 5.2.2. The output torque may be estimated by the ECU using built-in algorithms to calculate the produced internal torque and the friction torque.
- 5.2.3 The engine torque in Nm resulting from the above data stream information shall permit a direct comparison with the values measured when determining the engine power according to Annex XIV. In particular, any eventual corrections as regards auxiliaries shall be included in the above data stream information.
- 5.2.4. Access to the information required in point 5.2.1 shall be provided in accordance with the requirements set out in Annex X and with the standards referred to in Appendix 6 to Annex 9B to UN/ECE Regulation No 49.
- 5.2.5. The average load at each operating condition in Nm calculated from the information requested in point 5.2.1 shall not differ from the average measured load at that operating condition by more than:
- (a) 7 % when determining the engine power according to Annex XIV;
 - (b) 10 % when performing the World Harmonised Steady state Cycle (hereinafter 'WHSC') test according to Annex III.

The UN/ECE Regulation No 85⁽²⁾ allows the actual maximum load of the engine to differ from the reference maximum load by 5 % in order to address the manufacturing process variability. This tolerance is taken into account in the above values.

- 5.2.6. External access to the information required in point 5.2.1 shall not influence the vehicle emissions or performance.

5.3. **Verification of the availability and conformity of the ECU information required for in-service testing**

- 5.3.1. The availability of the data stream information required in point 5.2.1 according to the requirements set out in point 5.2.2 shall be demonstrated by using an external OBD scan-tool as described in Annex X.
- 5.3.2. In the case where this information cannot be retrieved in a proper manner, using a scan-tool that is working properly, the engine is considered as non-compliant.
- 5.3.3. The conformity of the ECU torque signal to the requirements of points 5.2.2 and 5.2.3 shall be demonstrated when determining the engine power according to Annex XIV and when performing the WHSC test according to Annex III.
- 5.3.4. In the case where the engine under test does not match the requirements set out in Annex XIV concerning auxiliaries, the measured torque shall be corrected in accordance to the correction method set out in Annex 4B to UN/ECE Regulation No 49.
- 5.3.5. The conformity of the ECU torque signal is considered to be demonstrated if the torque signal remains within the tolerances set out in point 5.2.5.

6. ENGINE FAMILY

6.1. **Parameters defining the engine family**

The engine family, as determined by the engine manufacturer, shall comply with Section 5.2 of Annex 4B to UN/ECE Regulation No 49.

6.2. **Choice of the parent engine**

The parent engine of the family shall be selected in accordance with the requirements set out in point 5.2.4 of Annex 4B to UN/ECE Regulation No 49.

6.3. **Parameters for defining an OBD engine family**

The OBD engine family shall be determined by basic design parameters that shall be common to engine systems within the family in accordance with Section 6.1 of Annex 9B to UN/ECE Regulation No 49.

7. CONFORMITY OF PRODUCTION

7.1. **General requirements**

Measures to ensure conformity of production shall be taken in accordance with Article 12 of Directive 2007/46/EC. Conformity of production shall be checked on the basis of the description in the type-approval certificates set out in Appendix 4 to this Annex. In applying Appendices 1, 2 or 3, the measured emission of the gaseous and particulate pollutants from engines subject to checking for conformity of production shall be adjusted by application of the appropriate deterioration factors (DF's) for that engine as recorded in the Addendum to the EC type-approval certificate granted in accordance with this Regulation.

The provisions of Annex X to Directive 2007/46/EC shall be applicable where the approval authorities are not satisfied with the auditing procedure of the manufacturer.

All engines subject to tests shall be randomly taken from the series production.

7.2. **Emissions of pollutants**

7.2.1. If emissions of pollutants are to be measured and an engine type-approval has had one or more extensions, the tests shall be carried out on the engines described in the information package relating to the relevant extension.

7.2.2. Conformity of the engine subjected to a pollutant test:

After submission of the engine to the authorities, the manufacturer may not carry out any adjustment to the engines selected.

7.2.2.1. Three engines shall be taken from the series production of the engines under consideration. Engines shall be subjected to testing on the WHTC, and on the WHSC if applicable, for the checking of the production conformity. The limit values shall be those set out in Annex I to Regulation (EC) No 595/2009.

7.2.2.2. Where the approval authority is satisfied with the production standard deviation given by the manufacturer in accordance with Annex X to Directive 2007/46/EC, the tests shall be carried out according to Appendix 1 to this Annex.

Where the approval authority is not satisfied with the production standard deviation given by the manufacturer in accordance with Annex X to Directive 2007/46/EC, the tests shall be carried out according to Appendix 2 to this Annex.

At the manufacturer's request, the tests may be carried out in accordance with Appendix 3 to this Annex.

7.2.2.3. On the basis of tests of the engine by sampling as set out in point 7.2.2.2, the series production of the engines under consideration is regarded as conforming where a pass decision is reached for all the pollutants and as non-conforming where a fail decision is reached for one pollutant, in accordance with the test criteria applied in the appropriate Appendix.

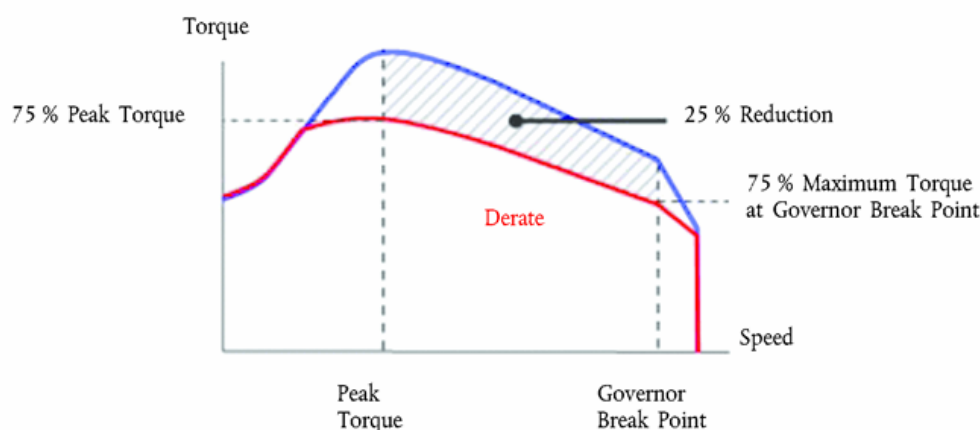
When a pass decision has been reached for one pollutant, this decision may not be changed as a consequence of a result from any additional tests made in order to reach a decision for the other pollutants.

If a pass decision is not reached for all the pollutants and if no fail decision is reached for any pollutant, a test is carried out on another engine (see Figure 1).

If no decision is reached, the manufacturer may at any time decide to stop testing. In that case a fail decision is recorded.

Figure 1

Schematic of production conformity testing



7.2.3. The tests shall be carried out on newly manufactured engines.

7.2.3.1. At the request of the manufacturer, the tests may be carried out on engines which have been run-in up to a maximum of 125 hours. In this case, the running-in procedure shall be conducted by the manufacturer who shall undertake not to make any adjustments to those engines.

7.2.3.2. When the manufacturer requests to conduct a running-in procedure in accordance with point 7.2.3.1, it may be carried out on either of the following:

- (a) all the engines that are tested;
- (b) the first engine tested, with the determination of an evolution coefficient as follows:
 - (i) the pollutant emissions shall be measured both on the newly manufactured engine and before the maximum of 125 hours set in point 7.2.3.1 on the first engine tested;
 - (ii) the evolution coefficient of the emissions between the two tests shall be calculated for each pollutant:

$\text{Emissions on second test} / \text{Emissions first test}$

The evolution coefficient may have a value less than one.

The subsequent test engines shall not be subjected to the running-in procedure, but their emissions when newly manufactured shall be modified by the evolution coefficient.

In this case, the values to be taken shall be the following:

- (a) for the first engine, the values from the second test;
- (b) for the other engines, the values when newly manufactured multiplied by the evolution coefficient.

7.2.3.3. For diesel, ethanol (ED95), petrol, E85 and LPG fuelled engines, all these tests may be conducted with the applicable market fuels. However, at the manufacturer's request, the reference fuels described in Annex IX may be used. This implies tests, as described in Section 1 of this Annex, with at least two of the reference fuels for each gas engine.

7.2.3.4. For NG fuelled engines, all these tests may be conducted with market fuel in the following way:

- (a) for H marked engines with a market fuel within the H-range ($0,89 \leq S\lambda \leq 1,00$);
- (b) for L marked engines with a market fuel within the L-range ($1,00 \leq S\lambda \leq 1,19$);
- (c) for HL marked engines with a market fuel within the extreme range of the λ -shift factor ($0,89 \leq S\lambda \leq 1,19$).

However, at the manufacturer's request, the reference fuels described in Annex IX may be used. This implies tests as described in Section 1 of this Annex.

7.2.3.5. In the case of dispute caused by the non-compliance of gas fuelled engines when using a market fuel, the tests shall be performed with a reference fuel on which the parent engine has been tested, or with the possible additional fuel 3 as referred to in points 1.1.4.1 and 1.2.1.1 on which the parent engine may have been tested. Then, the result shall be converted by a calculation applying the relevant factors 'r', 'r_a' or 'r_b' as described in points 1.1.5, 1.1.6.1 and 1.2.1.2. If r, r_a or r_b is less than 1, no correction shall take place. The measured results and the calculated results shall demonstrate that the engine meets the limit values with all relevant fuels (fuels 1, 2 and, if applicable, fuel 3 in the case of natural gas engines and fuels A and B in the case of LPG engines).

7.2.3.6. Tests for conformity of production of a gas fuelled engine laid out for operation on one specific fuel composition shall be performed on the fuel for which the engine has been calibrated.

7.3. On-board diagnostics (OBD)

7.3.1. When the approval authority determines that the quality of production seems unsatisfactory it may request a verification of the conformity of production of the OBD system. Such verification shall be carried out in accordance with the following:

An engine shall be randomly taken from series production and subjected to the tests described in Annex 9B to UN/ECE Regulation No 49. The tests may be carried out on an engine that has been run-in up to a maximum of 125 hours.

7.3.2. The production is deemed to conform if this engine meets the requirements of the tests described in Annex 9B to UN/ECE Regulation No 49.

7.3.3. If the engine taken from the series production does not satisfy the requirements of point 7.3.1, a further random sample of four engines shall be taken from the series production and subjected to the tests described in Annex 9B to UN/ECE Regulation No 49. The tests may be carried out on engines that have been run-in up to a maximum of 125 hours.

7.3.4. The production is deemed to conform if at least three engines out of the further random sample of four engines meet the requirements of the tests described in Annex 9B to UN/ECE Regulation No 49.

7.4. ECU information required for in-service testing

7.4.1. The availability of the data stream information requested in point 5.2.1 according to the requirements of point 5.2.2 shall be demonstrated by using an external OBD scan-tool as described in Annex X.

- 7.4.2. In the case where this information cannot be retrieved in a proper manner while the scan-tool is working properly according to Annex X, the engine shall be considered as non-compliant.
- 7.4.3. The conformity of the ECU torque signal with the requirements of points 5.2.2 and 5.2.3 shall be demonstrated by performing the WHSC test according to Annex III.
- 7.4.4. In the case where the test equipment does not match the requirements specified in Annex XIV concerning auxiliaries, the measured torque shall be corrected in accordance to the correction method set out in Annex 4B of UN/ECE Regulation No 49.
- 7.4.5. The conformity of the ECU torque signal shall be considered sufficient if the calculated torque remains within the tolerances specified in point 5.2.5.
- 7.4.6. The availability and conformity checks of the ECU information required for in-service testing shall be performed by the manufacturer on a regular basis on each produced engine type within each produced engine family.
- 7.4.7. The results of the manufacturer's survey shall be made available to the approval authority at its request.
- 7.4.8. At the request of the approval authority, the manufacturer shall demonstrate the availability or the conformity of the ECU information in serial production by performing the appropriate testing referred to in points 7.4.1 to 7.4.4 on a sample of engines selected from the same engine type. The sampling rules including sampling size and statistical pass-fail criteria shall be those specified in this Annex for checking the conformity of emissions.
8. DOCUMENTATION
- 8.1. The documentation package required by Articles 5, 7 and 9 enabling the approval authority to evaluate the emission control strategies and the systems on-board the vehicle and engine to ensure the correct operation of NO_x control measures shall be made available in the two following parts:
- (a) the 'formal documentation package' that may be made available to interested parties upon request;
- (b) the 'extended documentation package' that shall remain strictly confidential.
- 8.2. The formal documentation package may be brief, provided that it exhibits evidence that all outputs permitted by a matrix obtained from the range of control of the individual unit inputs have been identified. The documentation shall describe the functional operation of the inducement system required by Annex XIII, including the parameters necessary for retrieving the information associated with that system. This material shall be retained by the approval authority.
- 8.3. The extended documentation package shall include information on the operation of all AES and BES, including a description of the parameters that are modified by any AES and the boundary conditions under which the AES operate, and indication of which AES and BES are likely to be active under the conditions of the test procedures set out in Annex VI. The extended documentation package shall include a description of the fuel system control logic, timing strategies and switch points during all modes of operation. It shall also include a full description of the inducement system required in Annex XIII, including the associated monitoring strategies.

- 8.3.1. The extended documentation package shall remain strictly confidential. It may be kept by the approval authority, or, at the discretion of the approval authority, may be retained by the manufacturer. In the case the manufacturer retains the documentation package, that package shall be identified and dated by the approval authority once reviewed and approved. It shall be made open for inspection by the approval authority at the time of approval or at any time during the validity of the approval.

Appendix 1

Procedure for production conformity testing when standard deviation is satisfactory

1. This Appendix describes the procedure to be used to verify production conformity for the emissions of pollutants when the manufacturer's production standard deviation is satisfactory. The applicable procedure shall be the one set out in Appendix 1 to UN/ECE Regulation No 49, with the following exceptions:
 - 1.1. In Section 3 of Appendix 1 to UN/ECE Regulation No 49 the reference to Section 5.2.1 of that Appendix shall be understood as reference to the table of Annex I to Regulation (EC) No 595/2009.
 - 1.2. In Section 3 of Appendix 1 to UN/ECE Regulation No 49, the reference to Figure 2 shall be understood as reference to Figure 1 of Annex I to this Regulation.

Appendix 2

Procedure for production conformity testing when standard deviation is unsatisfactory or unavailable

1. This Appendix describes the procedure to be used to verify production conformity for the emissions of pollutants when the manufacturer's production standard deviation is either unsatisfactory or unavailable. The applicable procedure shall be the one set out in Appendix 2 to UN/ECE Regulation No 49, with the following exceptions:
 - 1.1. In Section 3 of Appendix 2 to UN/ECE Regulation No 49, the reference to Section 5.2.1 of that Appendix shall be understood as reference to the table of Annex I to Regulation (EC) No 595/2009.

Appendix 3

Procedure for production conformity testing at manufacturer's request

1. This Appendix describes the procedure to be used to verify, at the manufacturer's request, production conformity for the emissions of pollutants. The applicable procedure shall be the one set out in Appendix 3 to UN/ECE Regulation No 49, with the following exceptions:
 - 1.1. In Section 3 of Appendix 3 to UN/ECE Regulation No 49 the reference to Section 5.2.1 of that Appendix shall be understood as reference to the table of Annex I to Regulation (EC) No 595/2009.
 - 1.2. In Section 3 of Appendix 3 to UN/ECE Regulation No 49, the reference to Figure 2 shall be understood as reference to Figure 1 of Annex I to this Regulation.
 - 1.3. In Section 5 of Appendix 3 to UN/ECE Regulation No 49, the reference to Section 8.3.1 shall be understood as reference to point 7.2.2 of this Annex.

Appendix 4

Models of information document

relating to:

- EC type-approval of an engine or engine family as a separate technical unit,
- EC type-approval of vehicle with an approved engine with regard to emission and access to vehicle repair and maintenance information,
- EC type-approval of a vehicle with regard to emissions and access to vehicle repair and maintenance information.

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

If the systems, components or separate technical units referred to in this Appendix have electronic controls, information concerning their performance shall be supplied.

Explanatory notes (regarding filling in the table):

Letters A, B, C, D, E corresponding to engine family members shall be replaced by the actual engine family members' names.

In case when for a certain engine characteristic same value/description applies for all engine family members the cells corresponding to A-E shall be merged.

In case the family consists of more than five members new columns may be added.

In the case of application for EC type-approval of an engine or engine family as a separate technical unit the general part and Part 1 shall be filled in.

In the case of application for EC type-approval of vehicle with an approved engine with regard to emissions and access to vehicle repair and maintenance information the general part and Part 2 shall be filled in.

In the case of application for EC type-approval of a vehicle with regard to emissions and access to vehicle repair and maintenance information the general part and Parts 1 and 2 shall be filled in.

Explanatory footnotes can be found in Appendix 10 to this Annex.

	Parent Engine or Engine Type	Engine Family Members				
		A	B	C	D	E
0.	GENERAL					
0.1.	Make (trade name of manufacturer):					
0.2.	Type					
0.2.0.3.	Engine type as separate					

	technical unit/ engine family as separate technical unit/ vehicle with an approved engine with regard to emissions and access to vehicle repair and maintenance information/ vehicle with regard to emissions and access to vehicle repair and maintenance information ⁽¹⁾						
0.2.1.	Commercial name(s) (if available):						
0.3.	Means of identification of type, if marked on the separate technical unit ^(b) :						
0.3.1.	Location of that marking:						
0.5.	Name and address of manufacturer:						
0.7.	In the case of						

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	components and separate technical units, location and method of affixing of the EC approval mark:						
0.8.	Name(s) and address (es) of assembly plant(s):						
0.9.	Name and address of the manufacturer's representative (if any):						

- Part 1 : **ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE AND THE ENGINE TYPES WITHIN AN ENGINE FAMILY**
- Part 2 : **ESSENTIAL CHARACTERISTICS OF THE VEHICLE COMPONENTS AND SYSTEMS WITH REGARD TO EXHAUST-EMISSIONS**

Appendix to information document: Information on test conditions

PHOTOGRAPHS AND/OR DRAWINGS OF THE PARENT ENGINE, ENGINE TYPE AND, IF APPLICABLE, OF THE ENGINE COMPARTMENT.

LIST FURTHER ATTACHMENTS IF ANY.

DATE, FILE

PART 1

ESSENTIAL CHARACTERISTICS OF THE (PARENT) ENGINE AND THE ENGINE TYPES WITHIN AN ENGINE FAMILY

	Parent Engine or Engine Type	Engine Family Members				
		A	B	C	D	E
3.2.	Internal combustion engine					

3.2.1.	<i>Specific engine information</i>						
3.2.1.1.	Working principle: positive ignition/ compression ignition ⁽¹⁾ Cycle four stroke/ two stroke/ rotary ⁽¹⁾ :						
3.2.1.2.	Number and arrangement of cylinders:						
3.2.1.2.1.	Bore ⁽¹⁾ mm						
3.2.1.2.2.	Stroke ⁽¹⁾ mm						
3.2.1.2.3.	Firing order						
3.2.1.3.	Engine capacity ^(m) cm ³						
3.2.1.4.	Volumetric compression ratio ⁽²⁾ :						
3.2.1.5.	Drawings of combustion chamber, piston crown and, in the case of positive-ignition engines, piston rings						

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3.2.1.6.	Normal engine idling speed (²) min ⁻¹						
3.2.1.6.1.	High engine idling speed (²) min ⁻¹						
3.2.1.7.	Carbon monoxide content by volume in the exhaust gas with the engine idling (²): % as stated by the manufacturer (positive-ignition engines only)						
3.2.1.8.	Maximum net power (ⁿ) ... kW at ... min ⁻¹ (manufacturer's declared value)						
3.2.1.9.	Maximum permitted engine speed as prescribed by the manufacturer: min ⁻¹						
3.2.1.10.	Maximum net torque (ⁿ)						

	... Nm at ... min ⁻¹ (manufacturer's declared value)						
3.2.1.11.	Manufacturer references of the Documentation package required by Articles 5, 7 and 9 of Regulation (EU) No 582/2011 enabling the approval authority to evaluate the emission control strategies and the systems on- board the engine to ensure the correct operation of NO _x control measures						
3.2.2.	<i>Fuel</i>						
3.2.2.2.	Heavy duty vehicles Diesel/ Petrol/ LPG/NG- H/NG-L/ NG-HL/ Ethanol (ED95)/						

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	Ethanol (E85) ⁽¹⁾ ⁽⁶⁾						
3.2.2.2.1.	Fuels compatible with use by the engine declared by the manufacturer in accordance with point 1.1.2 of Annex I to Regulation (EU) No 582/2011 (as applicable)						
3.2.4.	<i>Fuel feed</i>						
3.2.4.2.	By fuel injection (compression ignition only): yes/no ⁽¹⁾						
3.2.4.2.1.	System description						
3.2.4.2.2.	Working principle: direct injection/ pre-chamber/ swirl chamber ⁽¹⁾						
3.2.4.2.3.	Injection 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 ⁽¹⁾ ⁽²⁾ ... mm ³ / stroke or						

	cycle at an engine speed of ... min^{-1} or, alternatively, a characteristic diagram (When boost control is supplied, state the characteristic fuel delivery and boost pressure versus engine speed)						
3.2.4.2.3.4.	Static injection timing (²)						
3.2.4.2.3.5.	Injection advance curve (²)						
3.2.4.2.3.6.	Calibration procedure: test bench/ engine (¹)						
3.2.4.2.4.	Governor						
3.2.4.2.4.1.	Type						
3.2.4.2.4.2.	Cut-off point						
3.2.4.2.4.2.	Speed at which cut-off starts under load: min^{-1}						
3.2.4.2.4.2.	Maximum no-load						

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	speed: min ⁻¹						
3.2.4.2.4.2.	Idling speed: min ⁻¹						
3.2.4.2.5.	Injection piping						
3.2.4.2.5.1.	Length: mm						
3.2.4.2.5.2.	Internal diameter: mm						
3.2.4.2.5.3.	Common rail, make and type:						
3.2.4.2.6.	Injector(s)						
3.2.4.2.6.1.	Make(s)						
3.2.4.2.6.2.	Type(s)						
3.2.4.2.6.3.	Opening pressure (²): kPa or characteristic diagram (²):						
3.2.4.2.7.	Cold start system						
3.2.4.2.7.1.	Make(s):						
3.2.4.2.7.2.	Type(s):						
3.2.4.2.7.3.	Description						
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 (¹)						
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 (in the case of systems other than continuous injection give equivalent details):						
3.2.4.2.9.3.	Make and type of the control unit (ECU)						
3.2.4.2.9.3.	Make and type of the fuel regulator						
3.2.4.2.9.3.	Make and type of the air-flow sensor						
3.2.4.2.9.3.	Make and type of fuel distributor						
3.2.4.2.9.3.	Make and type of the throttle housing						
3.2.4.2.9.3.	Make and type of water temperature sensor						
3.2.4.2.9.3.	Make and type of air temperature sensor						
3.2.4.2.9.3.	Make and type of air						

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	pressure sensor						
3.2.4.2.9.3	Software calibration number(s):						
3.2.4.3.	By fuel injection (positive ignition only): yes/no ⁽¹⁾						
3.2.4.3.1.	Working principle: intake manifold (single-/ multi-point/ direct injection ⁽¹⁾ / 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)						
3.2.4.3.4.2.	Make and type of fuel regulator						
3.2.4.3.4.3.	Make and type of						

	air-flow sensor						
3.2.4.3.4.4.	Make and type of fuel distributor						
3.2.4.3.4.5.	Make and type of pressure regulator						
3.2.4.3.4.6.	Make and type of micro switch						
3.2.4.3.4.7.	Make and type of idling adjustment screw						
3.2.4.3.4.8.	Make and type of throttle housing						
3.2.4.3.4.9.	Make and type of water temperature sensor						
3.2.4.3.4.10.	Make and type of air temperature sensor						
3.2.4.3.4.11.	Make and type of air pressure sensor						
3.2.4.3.4.12.	Software calibration number(s)						
3.2.4.3.5.	Injectors: opening pressure (²): ... kPa or characteristic diagram (²)						
3.2.4.3.5.1.	Make						

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3.2.4.3.5.2.	Type						
3.2.4.3.6.	Injection timing						
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 ⁽¹⁾ ⁽²⁾						
3.2.4.4.	Feed pump						
3.2.4.4.1.	Pressure ⁽²⁾ : ... kPa or characteristic diagram ⁽²⁾ :						
3.2.5.	<i>Electrical system</i>						
3.2.5.1.	Rated voltage: ... V, positive/ negative ground ⁽¹⁾						
3.2.5.2.	Generator						
3.2.5.2.1.	Type:						
3.2.5.2.2.	Nominal output: VA						
3.2.6.	<i>Ignition system (spark ignition engines only)</i>						
3.2.6.1.	Make(s)						
3.2.6.2.	Type(s)						
3.2.6.3.	Working principle						
3.2.6.4.	Ignition advance curve or map ⁽²⁾ :						

3.2.6.5.	Static ignition timing (²): ... degrees before TDC						
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 (¹)						
3.2.7.2.	Liquid						
3.2.7.2.1.	Nature of liquid						
3.2.7.2.2.	Circulating pump(s): yes/no (¹)						
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)						
3.2.7.3.	Air						
3.2.7.3.1.	Fan: yes/ no (¹)						
3.2.7.3.2.	Characteristics ... or						
3.2.7.3.2.1.	Make(s)						
3.2.7.3.2.2.	Type(s)						

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3.2.7.3.3.	Drive ratio(s)						
3.2.8.	<i>Intake system</i>						
3.2.8.1.	Pressure charger: yes/no ⁽¹⁾						
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 ⁽¹⁾						
3.2.8.2.1.	Type: air-air/air-water ⁽¹⁾						
3.2.8.3	Intake depression at rated engine speed and at 100 % load (compression-ignition engines only)						
3.2.8.3.1	Minimum allowable: ... kPa						
3.2.8.3.2.	Maximum allowable: ... kPa						
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)						
3.2.9.	<i>Exhaust system</i>						
3.2.9.1.	Description and/or drawings of the exhaust manifold						
3.2.9.2.	Description and/or drawing of the exhaust system						
3.2.9.2.1.	Description and/or drawing of the elements of the exhaust system that are part of the engine system						
3.2.9.3.	Maximum allowable exhaust back pressure at rated						

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	engine speed and at 100 % load (compression-ignition engines only): ... kPa (³)						
3.2.9.7.	Exhaust system volume: ... dm ³						
3.2.9.7.1.	Acceptable Exhaust system volume: ... dm ³						
3.2.10.	<i>Minimum cross-sectional areas of inlet and outlet ports</i>						
3.2.11.	<i>Valve timing or equivalent data</i>						
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 range ⁽³⁾ :						
3.2.12.	<i>Measures taken against air pollution</i>						
3.2.12.1.1	Device for recycling crankcase gases: yes/no ⁽²⁾ If yes, description and drawings: If no, compliance with Annex V to Regulation (EU) No 582/2011 required						
3.2.12.2.	Additional pollution control devices (if any, and if not covered by another heading)						
3.2.12.2.1.	Catalytic converter: yes/no ⁽¹⁾						
3.2.12.2.1.1	Number of catalytic converters and elements (provide this information below for each						

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	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 (¹)						
3.2.12.2.1.11	Regeneration systems/ method of exhaust after-						

	treatment systems, description:						
3.2.12.2.1.1	Normal operating temperature range ... K						
3.2.12.2.1.1	Consumable reagents: yes/no ⁽¹⁾						
3.2.12.2.1.1	Type and concentration of reagent needed for catalytic action						
3.2.12.2.1.1	Normal operational temperature range of reagent K						
3.2.12.2.1.1	International standard:						
3.2.12.2.1.1	Frequency of reagent refill: continuous/maintenance ⁽¹⁾ :						
3.2.12.2.1.1	Make of catalytic converter						
3.2.12.2.1.1	Identifying part number						
3.2.12.2.2.	Oxygen sensor: yes/no ⁽¹⁾						
3.2.12.2.2.1	Make						
3.2.12.2.2.2	Location						
3.2.12.2.2.3	Control range						
3.2.12.2.2.4	Type						

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3.2.12.2.2.5	Identifying part number						
3.2.12.2.3.	Air injection: yes/no ⁽¹⁾						
3.2.12.2.3.1	Type (pulse air, air pump, etc.)						
3.2.12.2.4.	Exhaust gas recirculation (EGR): yes/no ⁽¹⁾						
3.2.12.2.4.1	Characteristics (make, type, flow, etc.)						
3.2.12.2.6.	Particulate trap (PT): yes/no ⁽¹⁾						
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	Method or system of regeneration, description and/or drawing						

3.2.12.2.6.5	Make of particulate trap						
3.2.12.2.6.6	Identifying part number						
3.2.12.2.6.7	Normal operating temperature: ... (K) and pressure range: (kPa)						
3.2.12.2.6.8	In the case of periodic regeneration						
3.2.12.2.6.8	Number of WHTC test cycles without regeneration (n)						
3.2.12.2.6.8	Number of WHTC test cycles with regeneration (n _R)						
3.2.12.2.6.9	Other systems: yes/no ⁽¹⁾						
3.2.12.2.6.9	Description and operation						
3.2.12.2.7.	On-board-diagnostic (OBD) system						
3.2.12.2.7.0	Number of OBD engine families						

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	within the engine family						
3.2.12.2.7.0	List of the OBD engine families (when applicable)	OBD engine family 1: ... OBD engine family 2: ... etc. ...					
3.2.12.2.7.0	Number of the OBD engine family the parent engine/ the engine member belongs to						
3.2.12.2.7.0	Manufacturer references of the OBD-Documentation required by point 4(c) of Article 5 and point 4 of Article 9 of Regulation (EU) No 582/2011 and specified in Annex X to that Regulation for the purpose of approving the OBD system						
3.2.12.2.7.0	When appropriate, manufacturer						

	reference of the Documentation for installing in a vehicle an OBD equipped engine system	
3.2.12.2.7.2	List and purpose of all components monitored by the OBD system ⁽⁴⁾	
3.2.12.2.7.3	Written description (general working principles) for	
3.2.12.2.7.3	Positive-ignition engines ⁽⁴⁾	
3.2.12.2.7.3	Catalyst monitoring ⁽⁴⁾	
3.2.12.2.7.3	Misfire detection ⁽⁴⁾	
3.2.12.2.7.3	Oxygen sensor monitoring ⁽⁴⁾	
3.2.12.2.7.3	Other components monitored by the OBD system	
3.2.12.2.7.3	Compression-ignition engines ⁽⁴⁾	
3.2.12.2.7.3	Catalyst monitoring ⁽⁴⁾	

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3.2.12.2.7.3	Particulate trap monitoring ⁽⁴⁾	
3.2.12.2.7.3	Electronic fuelling system monitoring ⁽⁴⁾	
3.2.12.2.7.3	DeNO _x system monitoring ⁽⁴⁾	
3.2.12.2.7.3	Other components monitored by the OBD system ⁽⁴⁾	
3.2.12.2.7.4	Criteria for MI activation (fixed number of driving cycles or statistical method) ⁽⁴⁾	
3.2.12.2.7.5	List of all OBD output codes and formats used (with explanation of each) ⁽⁴⁾	
3.2.12.2.7.6	OBD Communication protocol standard ⁽⁴⁾	
3.2.12.2.7.7	Manufacturer reference of the OBD related information required by of	

	Article 5(4) (d) and Article 9(4) of Regulation (EU) No 582/2011 for the purpose of complying with the provisions on access to vehicle OBD and vehicle Repair and Maintenance Information, or	
3.2.12.2.7.7	As an alternative to a manufacturer reference provided in point 3.2.12.2.7.7 reference of the attachment to this Appendix that contains the following table, once completed according to the given example:	Component — Fault code — Monitoring strategy —

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	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 — Two Type 1 cycles — Type 1						
3.2.12.2.8.	<i>Other system (description and operation):</i>						
3.2.12.2.8.1	Systems to ensure the correct operation of NO _x control measures						
3.2.12.2.8.2	Engine with						

	permanent deactivation of the driver inducement, for use by the rescue services or in vehicles specified in point (3)(b) of Article 2 of Directive 2007/46/EC: yes/no					
3.2.12.2.8.3	Number of OBD engine families within the engine family considered when ensuring the correct operation of NO _x control measures					
3.2.12.2.8.4	List of the OBD engine families (when applicable)	OBD engine family 1: ... OBD engine family 2: ... etc....				
3.2.12.2.8.5	Number of the OBD engine family the parent engine/ the engine member					

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	belongs to						
3.2.12.2.8.6	Lowest concentration of the active ingredient present in the reagent that does not activate the warning system (CD _{min}): (% vol.)						
3.2.12.2.8.7	When appropriate, manufacturer reference of the Documentation for installing in a vehicle the systems to ensure the correct operation of NO _x control measures						
3.2.17.	<i>Specific information related to gas fuelled engines for heavy duty vehicles (in the case of systems laid out in a different</i>						

	<i>manner, supply equivalent information)</i>						
3.2.17.1.	Fuel: LPG/NG- H/NG- L/NG- HL ⁽¹⁾						
3.2.17.2.	Pressure regulator(s) or vaporiser/pressure regulator(s) ⁽¹⁾						
3.2.17.2.1.	Make(s)						
3.2.17.2.2.	Type(s)						
3.2.17.2.3.	Number of pressure reduction stages						
3.2.17.2.4.	Pressure in final stage minimum: ... kPa – maximum. kPa						
3.2.17.2.5.	Number of main adjustment points						
3.2.17.2.6.	Number of idle adjustment points						
3.2.17.2.7.	Type-approval number						
3.2.17.3.	Fuelling system: mixing unit/gas injection/liquid injection/						

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	direct injection ⁽¹⁾						
3.2.17.3.1.	Mixture strength regulation						
3.2.17.3.2.	System description and/or diagram and drawings						
3.2.17.3.3.	Type-approval number						
3.2.17.4.	Mixing unit						
3.2.17.4.1.	Number						
3.2.17.4.2.	Make(s)						
3.2.17.4.3.	Type(s)						
3.2.17.4.4.	Location						
3.2.17.4.5.	Adjustment possibilities						
3.2.17.4.6.	Type-approval number						
3.2.17.5.	Inlet manifold injection						
3.2.17.5.1.	Injection: single point/ multipoint ⁽¹⁾						
3.2.17.5.2.	Injection: continuous/ simultaneously timed/ sequentially timed ⁽¹⁾						
3.2.17.5.3.	Injection equipment						
3.2.17.5.3.1	Make(s)						
3.2.17.5.3.2	Type(s)						

3.2.17.5.3.3	Adjustment possibilities						
3.2.17.5.3.4	Type-approval number						
3.2.17.5.4.	Supply pump (if applicable)						
3.2.17.5.4.1	Make(s)						
3.2.17.5.4.2	Type(s)						
3.2.17.5.4.3	Type-approval number						
3.2.17.5.5.	Injector(s)						
3.2.17.5.5.1	Make(s)						
3.2.17.5.5.2	Type(s)						
3.2.17.5.5.3	Type-approval number						
3.2.17.6.	Direct injection						
3.2.17.6.1.	Injection pump/pressure regulator (1)						
3.2.17.6.1.1	Make(s)						
3.2.17.6.1.2	Type(s)						
3.2.17.6.1.3	Injection timing						
3.2.17.6.1.4	Type-approval number						
3.2.17.6.2.	Injector(s)						
3.2.17.6.2.1	Make(s)						
3.2.17.6.2.2	Type(s)						
3.2.17.6.2.3	Opening pressure or characteristic diagram (2)						

Status: This is the original version (as it was originally adopted).

3.2.17.6.2.4	Type-approval number						
3.2.17.7.	Electronic control unit (ECU)						
3.2.17.7.1.	Make(s)						
3.2.17.7.2.	Type(s)						
3.2.17.7.3.	Adjustment possibilities						
3.2.17.7.4.	Software calibration number(s)						
3.2.17.8.	NG fuel-specific equipment						
3.2.17.8.1.	Variant 1 (only in the case of approvals of engines for several specific fuel compositions)						
3.2.17.8.1.0	Self adaptive feature? Yes/ No (¹)						
3.2.17.8.1.0	Calibration for a specific gas composition NG-H/ NG-L/ NG-HL (¹) Transformation for a specific gas						

	composition NG- H _t /NG- L _t /NG- HL _t (1)						
3.2.17.8.1.1.	methane (CH ₄): ... basis:	%mole		min. ... %mole		max. %mole	
	ethane (C ₂ H ₆): ... basis:	%mole		min. ... %mole		max. %mole	
	propane (C ₃ H ₈): ... basis:	%mole		min. ... %mole		max. %mole	
	butane (C ₄ H ₁₀): ... basis:	%mole		min. ... %mole		max. %mole	
	C ₅ /C ₅₊ : ... basis:	%mole		min. ... %mole		max. %mole	
	oxygen (O ₂): ... basis:	%mole		min. ... %mole		max. %mole	
	inert (N ₂ , He, etc.): ... basis:	%mole		min. ... %mole		max. %mole	
3.5.4.	<i>CO₂ emissions for heavy duty engines</i>						
3.5.4.1.	CO ₂ mass emissions WHSC test: ... g/ kWh						
3.5.4.2.	CO ₂ mass emissions WHTC test: ... g/ kWh						
3.5.5.	<i>Fuel consumption for heavy duty engines</i>						
3.5.5.1.	Fuel consumption WHSC test: ... g/ kWh						

Status: This is the original version (as it was originally adopted).

3.5.5.2.	Fuel consumption WHTC test (⁵) ... g/kWh.						
3.6.	Temperatures permitted by the manufacturer						
3.6.1.	<i>Cooling system</i>						
3.6.1.1.	<i>Liquid cooling</i> Maximum temperature at outlet: ... K						
3.6.1.2.	<i>Air cooling</i>						
3.6.1.2.1.	Reference point:						
3.6.1.2.2.	Maximum temperature at reference point: ... K						
3.6.2.	<i>Maximum outlet temperature of the inlet intercooler: ... K</i>						
3.6.3.	<i>Maximum exhaust temperature at the point in the exhaust pipe(s) adjacent to the outer flange(s) of the exhaust</i>						

	<i>manifold(s)</i> <i>or</i> <i>turbocharger(s):</i> ... K						
3.6.4.	<i>Fuel temperature:</i> Minimum: K – maximum: K For diesel engines at injection pump inlet, for gas fuelled engines at pressure regulator final stage.						
3.6.5.	<i>Lubricant temperature</i> Minimum: K – maximum: K						
3.8	Lubrication system						
3.8.1.	<i>Description of the system</i>						
3.8.1.1.	Position of lubricant reservoir						
3.8.1.2.	Feed system (by pump/injection into intake/mixing with fuel, etc.) ⁽¹⁾						
3.8.2.	<i>Lubricating pump</i>						

Status: This is the original version (as it was originally adopted).

3.8.2.1.	Make(s)						
3.8.2.2.	Type(s)						
3.8.3.	<i>Mixture with fuel</i>						
3.8.3.1.	Percentage						
3.8.4.	<i>Oil cooler: yes/no</i> ⁽¹⁾						
3.8.4.1.	Drawing(s)						
3.8.4.1.1.	Make(s)						
3.8.4.1.2.	Type(s)						

PART 2

ESSENTIAL CHARACTERISTICS OF THE VEHICLE COMPONENTS AND SYSTEMS WITH REGARD TO EXHAUST-EMISSIONS

		Parent Engine or Engine Type	Engine Family Members				
			A	B	C	D	E
3.1	Manufacturer of the engine						
3.1.1.	Manufacturer's engine code (as marked on the engine or other means of identification)						
3.1.2.	Approval number (if appropriate) including fuel identification marking:						
3.2.2.	<i>Fuel</i>						
3.2.2.3.	Fuel tank inlet: restricted						

	orifice/ label	
3.2.3.	<i>Fuel tank(s)</i>	
3.2.3.1.	Service fuel tank(s)	
3.2.3.1.1.	Number and capacity of each tank	
3.2.3.2.	Reserve fuel tank(s)	
3.2.3.2.1.	Number and capacity of each tank	
3.2.8.	<i>Intake system</i>	
3.2.8.3.3.	Actual Intake system depression at rated engine speed and at 100 % load on the vehicle: kPa	
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	
3.2.8.4.3.1.	Make(s)	
3.2.8.4.3.2.	Type(s)	

Status: This is the original version (as it was originally adopted).

3.2.9.	<i>Exhaust system</i>	
3.2.9.2.	Description and/or drawing of the exhaust system	
3.2.9.2.2.	Description and/or drawing of the elements of the exhaust system that are not part of the engine system	
3.2.9.3.1	Actual exhaust back pressure at rated engine speed and at 100 % load on the vehicle (compression-ignition engines only): ... kPa	
3.2.9.7.	Exhaust system volume: ... dm ³	
3.2.9.7.1.	Actual volume of the complete Exhaust system (vehicle and engine	

	system): ... dm ³	
3.2.12.2.7.	<i>On-board-diagnostic (OBD) system</i>	
3.2.12.2.7.0	Alternative approval as defined in point 2.4 of Annex X to Regulation (EU) No 582/2011 used. Yes/No	
3.2.12.2.7.1	OBD components on-board the vehicle	
3.2.12.2.7.2	When appropriate, manufacturer reference of the documentation package related to the installation on the vehicle of the OBD system of an approved engine	
3.2.12.2.7.3	Written description and/or drawing of the MI ⁽⁶⁾	
3.2.12.2.7.4	Written description	

Status: This is the original version (as it was originally adopted).

	and/or drawing of the OBD off-board communication interface ⁽⁶⁾	
3.2.12.2.8.	<i>Systems to ensure the correct operation of NO_x control measures</i>	
3.2.12.2.8.0	Alternative approval as defined in point 2.1 of Annex XIII to Regulation (EU) No 582/2011 used. Yes/No	
3.2.12.2.8.1	Components on-board the vehicle of the systems ensuring the correct operation of NO _x control measures	
3.2.12.2.8.2	Activation of the creep mode 'disable after restart'/'disable after fuelling'/'disable	

	after parking' (7)	
3.2.12.2.8.3	When appropriate, manufacturer reference of the documentation package related to the installation on the vehicle of the system ensuring the correct operation of NO _x control measures of an approved engine	
3.2.12.2.8.4	Written description and/or drawing of the warning signal (6)	
3.2.12.2.8.5	Heated/non-heated reagent tank and dosing system (see point 2.4 of Annex XIII to Regulation (EU) No 582/2011)	

Appendix

to information document

Information on test conditions

1. Spark plugs

1.1. Make:

1.2. Type:

1.3. Spark-gap setting:

2. Ignition coil

2.1. Make:

2.2. Type:

3. Lubricant used

3.1. Make:

3.2. Type: (state percentage of oil in mixture if lubricant and fuel mixed)

4. Engine-driven equipment

4.1. The power absorbed by the auxiliaries/equipment needs only be determined,

(a) if auxiliaries/equipment required are not fitted to the engine; and/or

(b) if auxiliaries/equipment not required are fitted to the engine.

Note: requirements for engine-driven equipment differ between emissions test and power test.

4.2. Enumeration and identifying details:

4.3. Power absorbed at engine speeds specific for emissions test

Table 1

Power absorbed at engine speeds specific for emissions test

Equipment	Idle	Low Speed	High Speed	Preferred Speed (²)	n95h
P _a Auxiliaries/ equipment required according to UN/ECE R 49, Annex 4B, Appendix 7					
P _b Auxiliaries/ equipment					

Table 1

Power absorbed at engine speeds specific for emissions test

not required according to UN/ECE R 49, Annex 4B, Appendix 7					
---	--	--	--	--	--

5. **Engine performance (declared by manufacturer) ⁽⁸⁾**

5.1. Engine test speeds for emissions test according to Annex III ⁽⁹⁾

Low speed (n_{lo}) ... rpm

High speed (n_{hi}) ... rpm

Idle speed ... rpm

Preferred speed ... rpm

n_{95h} ... rpm

5.2. Declared values for power test according to Annex XIV to Regulation (EU) No 582/2011

5.2.1. Idle speed ... rpm

5.2.2. Speed at maximum power ... rpm

5.2.3. Maximum power ... kW

5.2.4. Speed at maximum torque ... rpm

5.2.5. Maximum torque ... Nm

6. **Dynamometer load setting information (if applicable)**

6.3. Fixed load curve dynamometer setting information (if used)

6.3.1. Alternative dynamometer load setting method used (yes/no)

6.3.2. Inertia mass (kg):

6.3.3. Effective power absorbed at 80 km/h including running losses of the vehicle on the dynamometer (kW)

6.3.4. Effective power absorbed at 50 km/h including running losses of the vehicle on the dynamometer (kW)

6.4. Adjustable load curve dynamometer setting information (if used)

6.4.1. Coast down information from the test track.

6.4.2. Tyres make and type:

6.4.3. Tyre dimensions (front/rear):

- 6.4.4. Tyre pressure (front/rear) (kPa):
- 6.4.5. Vehicle test mass including driver (kg):
- 6.4.6. Road coast down data (if used)

Table 2

Road coast down data			
V (km/h)	V2 (km/h)	V1 (km/h)	Mean corrected coast down time
120			
100			
80			
60			
40			
20			

- 6.4.7. Average corrected road power (if used)

Table 3

Average corrected road power	
V (km/h)	CP corrected (kW)
120	
100	
80	
60	
40	
20	

7. **Test conditions for OBD testing**
- 7.1. Test cycle used for the verification of the OBD system:
- 7.2. Number of preconditioning cycles used before OBD verification tests:

Appendix 5

Model of EC type-approval certificate of an engine type/component as separate technical unit

Explanatory foot notes can be found in Appendix 10 to this Annex.

Maximum format: A4 (210 × 297 mm)

EC TYPE-APPROVAL CERTIFICATE

Communication concerning:	Stamp of type-approval authority
— EC type-approval ⁽¹⁾	
— extension of EC type-approval ⁽¹⁾	
— refusal of EC type-approval ⁽¹⁾	
— withdrawal of EC type-approval ⁽¹⁾	

of a type of component/separate technical unit ⁽¹⁾ with regard to Regulation (EC) No 595/2009 as implemented by Regulation (EU) No 582/2011.

Regulation (EC) No 595/2009 and Regulation (EU) No 582/2011, as last amended by ...

EC type-approval number:

Reason for extension:

SECTION 0.1.

I

Make (trade name of manufacturer):

0.2. Type:

0.3. Means of identification of type, if marked on the component/separate technical unit ⁽¹⁾ ^(a):

0.3.1. Location of that marking:

0.4. Name and address of manufacturer:

0.5. In the case of components and separate technical units, location and method of affixing of the EC approval mark:

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

0.7. Name and address of the manufacturer's representative (if any)

SECTION.

II

Additional information (where applicable): see Addendum

2. Technical service responsible for carrying out the tests:

3. Date of test report:

4. Number of test report:

5. Remarks (if any): see Addendum

Status: This is the original version (as it was originally adopted).

6. Place:

7. Date:

8. Signature:

Attachments: Information package.

Test report.

Addendum

to EC type-approval certificate No ...

1. ADDITIONAL INFORMATION
 - 1.1. Particulars to be completed in relation to the type-approval of a vehicle with an engine installed:
 - 1.1.1. Make of engine (name of undertaking):
 - 1.1.2. Type and commercial description (mention any variants):
 - 1.1.3. Manufacturer's code as marked on the engine:
 - 1.1.4. Category of vehicle (if applicable) ^(b):
 - 1.1.5. Category of engine: Diesel/Petrol/LPG/NG-H/NG-L/NG-HL/Ethanol (ED95)/Ethanol (E85) ⁽¹⁾
 - 1.1.6. Name and address of manufacturer:
 - 1.1.7. Name and address of manufacturer's authorised representative (if any):
 - 1.2. If the engine referred to in 1.1 has been type approved as a separate technical unit:
 - 1.2.1. Type-approval number of the engine/engine family ⁽¹⁾:
 - 1.2.2. Engine Control Unit (ECU) software calibration number:
 - 1.3. Particulars to be completed in relation to the type-approval of an engine/engine family ⁽¹⁾ as a separate technical unit (conditions to be respected in the installation of the engine on a vehicle):
 - 1.3.1. Maximum and/or minimum intake depression:
 - 1.3.2. Maximum allowable back pressure:
 - 1.3.3. Exhaust system volume:
 - 1.3.4. Restrictions of use (if any):
 - 1.4. Emission levels of the engine/parent engine ⁽¹⁾:

Deterioration Factor (DF): calculated/fixed ⁽¹⁾

Specify the DF values and the emissions on the WHSC (if applicable) and WHTC tests in the table below

If CNG and LPG fuelled engines are tested on different reference fuels, the tables shall be reproduced for each reference fuel tested.

- 1.4.1. *WHSC test*

TABLE 4

WHSC test

Status: This is the original version (as it was originally adopted).

WHSC test (if applicable)						
DFMult/ add ⁽¹⁾	CO	THC	NO_x	PM Mass	NH₃	PM Number
Emissions	CO(mg/ kWh)	THC(mg/ kWh)	NO_x(mg/ kWh)	PM Mass(mg/ kWh)	NH₃ppm	PM Number(#/ kWh)
Test result						
Calculated with DF						
CO ₂ emissions mass emission: ... g/kWh						
Fuel consumption: ... g/kWh						

1.4.2. WHTC test

TABLE 5

WHTC test

WHTC test						
DFMult/ add ⁽¹⁾	CO	THC	NO_x	PM Mass	NH₃	PM Number
Emissions	CO(mg/ kWh)	THC(mg/ kWh)	NO_x(mg/ kWh)	PM Mass(mg/ kWh)	NH₃ppm	PM Number
Cold start						
Hot start w/o regeneration						
Hot start with regeneration ⁽¹⁾						
k _{r,u} (mult/ add) ⁽¹⁾ k _{r,d} (mult/ add) ⁽¹⁾						
Weighted test result						
Final test result with DF						
CO ₂ emissions mass emission: ... g/kWh						
Fuel consumption: ... g/kWh						

1.4.3. Idle test

Status: This is the original version (as it was originally adopted).

TABLE 6

Idle test

Test	CO value(% vol.)	Lambda (¹)	Engine speed (min ⁻¹)	Engine oil temperature (°C)
Low idle test		N/A		
High idle test				

1.5 **Power measurement**

1.5.1. *Engine power measured on test bench*

TABLE 7

Engine power measured on test bench

Measured engine speed (rpm)							
Measured fuel flow (g/h)							
Measured torque (Nm)							
Measured power (kW)							
Barometric pressure (kPa)							
Water vapour pressure (kPa)							
Intake air temperature (K)							
Power correction factor							
Corrected power (kW)							
Auxiliary power (kW) (¹)							

Status: This is the original version (as it was originally adopted).

Net power (kW)							
Net torque (Nm)							
Corrected specific fuel consumption (g/kWh)							

1.5.2. *Additional data*

Appendix 6

Model of ECT type-approval certificate of a type of vehicle with an approved engine

Explanatory foot notes can be found in Appendix 10 to this Annex.

Maximum format: A4 (210 × 297 mm)

EC TYPE-APPROVAL CERTIFICATE

Communication concerning:	Stamp of type-approval authority
— EC type-approval ⁽¹⁾	
— extension of EC type-approval ⁽¹⁾	
— refusal of EC type-approval ⁽¹⁾	
— withdrawal of EC type-approval ⁽¹⁾	

of a type of a vehicle with an approved engine with regard to Regulation (EC) No 595/2009 as implemented by Regulation (EU) No 582/2011.

Regulation (EC) No 595/2009 and Regulation (EU) No 582/2011, as last amended by ...

EC type-approval number:

Reason for extension:

SECTION 1.

I

Make (trade name of manufacturer):

0.2. Type:

0.3. Means of identification of type, if marked on the component/separate technical unit ⁽¹⁾ ^(a):

0.3.1. Location of that marking:

0.4. Name and address of manufacturer:

0.5. In the case of components and separate technical units, location and method of affixing of the EC approval mark:

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

0.7. Name and address of the manufacturer's representative (if any)

SECTION.

II

Additional information (where applicable): see Addendum

2. Technical service responsible for carrying out the tests:

3. Date of test report:

4. Number of test report:

5. Remarks (if any): see Addendum

6. Place:

Status: This is the original version (as it was originally adopted).

7. Date:

8. Signature:

Appendix 7

Model of EC type-approval certificate of a type of vehicle with regard to a system

Explanatory foot notes can be found in Appendix 10 to this Annex.

Maximum format: A4 (210 × 297 mm)

EC TYPE-APPROVAL CERTIFICATE

Communication concerning:	Stamp of type-approval authority
— EC type-approval ⁽¹⁾	
— extension of EC type-approval ⁽¹⁾	
— refusal of EC type-approval ⁽¹⁾	
— withdrawal of EC type-approval ⁽¹⁾	

of a type of a vehicle with regard to a system with regard to Regulation (EC) No 595/2009 as implemented by Regulation (EU) No 582/2011.

Regulation (EC) No 595/2009 and Regulation (EU) No 582/2011, as last amended by ...

EC type-approval number:

Reason for extension:

SECTION 1.

I

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 ⁽¹⁾ ^(a):

0.3.1. Location of that marking:

0.4. Category of vehicle ^(b):

0.5. Name and address of manufacturer:

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

0.7. Name and address of the manufacturer's representative (if any):

SECTION II.

II

Additional information (where applicable): see Addendum

2. Technical service responsible for carrying out the tests:

3. Date of test report:

4. Number of test report:

5. Remarks (if any): see Addendum

6. Place:

Status: This is the original version (as it was originally adopted).

7. Date:

8. Signature:

Attachments: Information package.

Test report.

Addendum

Addendum

to EC type-approval certificate No ...

1. ADDITIONAL INFORMATION
 - 1.1. Particulars to be completed in relation to the type-approval of a vehicle with an engine installed:
 - 1.1.1. Make of engine (name of undertaking):
 - 1.1.2. Type and commercial description (mention any variants):
 - 1.1.3. Manufacturer's code as marked on the engine:
 - 1.1.4. Category of vehicle (if applicable):
 - 1.1.5. Category of engine: Diesel/Petrol/LPG/NG-H/NG-L/NG-HL/Ethanol (ED95)/Ethanol (E85) ⁽¹⁾
 - 1.1.6. Name and address of manufacturer:
 - 1.1.7. Name and address of manufacturer's authorised representative (if any):
 - 1.2. If the engine referred to in 1.1 has been type-approved as a separate technical unit:
 - 1.2.1. Type-approval number of the engine/engine family ⁽¹⁾:
 - 1.2.2. Engine Control Unit (ECU) software calibration number:
 - 1.3. Particulars to be completed in relation to the type-approval of an engine/engine family ⁽¹⁾ as a separate technical unit (conditions to be respected in the installation of the engine on a vehicle):
 - 1.3.1. Maximum and/or minimum intake depression:
 - 1.3.2. Maximum allowable back pressure:
 - 1.3.3. Exhaust system volume:
 - 1.3.4. Restrictions of use (if any):
 - 1.4. Emission levels of the engine/parent engine ⁽¹⁾:

Deterioration Factor (DF): calculated/fixed ⁽¹⁾

Specify the DF values and the emissions on the WHSC (if applicable) and WHTC tests in the table below

If CNG and LPG fuelled engines are tested on different reference fuels, the tables shall be reproduced for each reference fuel tested.

- 1.4.1. *WHSC test*

TABLE 4

WHSC test

Status: This is the original version (as it was originally adopted).

WHSC test (if applicable)						
DFMult/ add ⁽¹⁾	CO	THC	NO_x	PM Mass	NH₃	PM Number
Emissions	CO(mg/ kWh)	THC(mg/ kWh)	NO_x(mg/ kWh)	PM Mass(mg/ kWh)	NH₃ppm	PM Number(#/ kWh)
Test result						
Calculated with DF						
CO ₂ emissions mass emission: ... g/kWh						
Fuel consumption: ... g/kWh						

1.4.2. WHTC test

TABLE 5

WHTC test

WHTC test						
DFMult/ add ⁽¹⁾	CO	THC	NO_x	PM Mass	NH₃	PM Number
Emissions	CO(mg/ kWh)	THC(mg/ kWh)	NO_x(mg/ kWh)	PM Mass(mg/ kWh)	NH₃ppm	PM Number
Cold start						
Hot start w/o regeneration						
Hot start with regeneration ⁽¹⁾						
k _{r,u} (mult/ add) ⁽¹⁾ k _{r,d} (mult/ add) ⁽¹⁾						
Weighted test result						
Final test result with DF						
CO ₂ emissions mass emission: ... g/kWh						
Fuel consumption: ... g/kWh						

1.4.3. Idle test

TABLE 6

Idle test

Test	CO value(% vol.)	Lambda (¹)	Engine speed (min⁻¹)	Engine oil temperature (°C)
Low idle test		N/A		
High idle test				

1.5 Power measurement**1.5.1. Engine power measured on test bench**

TABLE 7

Engine power measured on test bench

Measured engine speed (rpm)							
Measured fuel flow (g/ h)							
Measured torque (Nm)							
Measured power (kW)							
Barometric pressure (kPa)							
Water vapour pressure (kPa)							
Intake air temperature (K)							
Power correction factor							
Corrected power (kW)							
Auxiliary power (kW) (¹)							

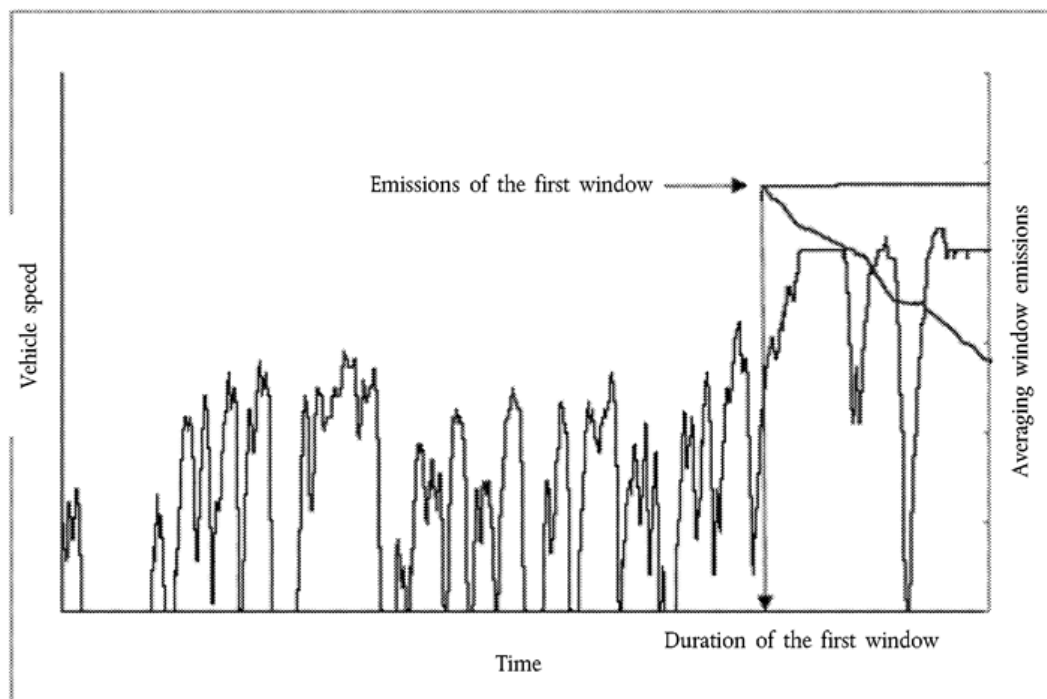
Status: This is the original version (as it was originally adopted).

Net power (kW)							
Net torque (Nm)							
Corrected specific fuel consumption (g/kWh)							

1.5.2. *Additional data*

Appendix 8

Example of the EC type-approval mark



The approval mark in this Appendix affixed to an engine approved as a separate technical unit shows that the type concerned has been approved in Belgium (e 6), pursuant to this Regulation. The first two digits of the approval number (00) indicate that this engine approved as a separate technical unit was approved according to this Regulation. The following four digits (0004) are those allocated by the type-approval authority to engine approved as a separate technical unit as the base approval number.

Appendix 9

EC Type-Approval Certification Numbering System

1. Section 3 of the EC type-approval number issued according to Articles 6(1), 8(1) and 10(1) shall be composed by the number of the implementing regulatory act or the latest amending regulatory act applicable to the EC type-approval. The number shall be followed by an alphabetical character reflecting the requirements of OBD and SCR systems in accordance with Table 1.

Table 1

Character	NO _x OTL ^a	PM OTL ^b	Reagent quality and consumption ^c	Implementation dates: new types	Implementation dates: all vehicles	Latest date of registration
A	Row 'phase-in period' of Tables 1 and 2	Performance Monitoring ^c	Phase in ^d	31.12.2012	31.12.2013	1.9.2015
B	Row 'phase-in period' of Tables 1 and 2	Row 'phase-in period' of Table 1	Phase in ^d	1.9.2014	1.9.2015	31.12.2016
C	Row 'general requirements' of Tables 1 and 2	Row 'general requirements' of Table 1	General ^e	31.12.2015	31.12.2016	

Key:

a 'NO_x OTL' monitoring requirements as set out in Table 1 and 2 of Annex X.

b 'PM OTL' monitoring requirements as set out in Table 1 of Annex X.

c 'Performance monitoring' requirements as set out in point 2.3.3.3 of Annex X.

d Reagent quality and consumption 'phase-in' requirements as set out in points 7.1.1.1 and 8.4.1.1 of Annex XIII.

e Reagent quality and consumption 'general' requirements as set out in points 7.1.1 and 8.4.1 of Annex XIII.

Appendix 10

Explanatory notes

- (1) Delete where not applicable (there are cases where nothing needs to be deleted when more than one entry is applicable).
- (2) Specify the tolerance.
- (3) Please fill in here the upper and lower values for each variant.
- (4) To be documented in case of a single OBD engine family and if not already documented in the documentation package(s) referred to in line 3.2.12.2.7.0.4.
- (5) Fuel consumption for the combined WHTC including cold and hot part according to Annex VIII.
- (6) To be documented if not documented in the documentation referred to in point 3.2.12.2.7.1.1.
- (7) Delete as appropriate.
- (8) Information concerning engine performance shall only be given for the parent engine.
- (9) Specify the tolerance; to be within $\pm 3\%$ of the values declared by the manufacturer.
 - (a) 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 document, such characters shall be represented in the documentation by the symbol ‘?’ (e.g. ABC?123??).
 - (b) Classified according to definitions listed in Section A of Annex II to Directive 2007/46/EC.
- (l) This figure shall be rounded off to the nearest tenth of a millimetre.
- (m) This value shall be calculated and rounded off to the nearest cm^3 .
- (n) Determined in accordance with the requirements of Annex XIV.

Status: This is the original version (as it was originally adopted).

- (1) OJ L 350, 28.12.1998, p. 58.
- (2) OJ L 326, 24.11.2006, p. 55.