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:

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

[F1 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 1.2.2.2.**]**

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.

Textual Amendments

F1 Substituted by Commission Regulation (EU) No 64/2012 of 23 January 2012 amending Regulation (EU) No 582/2011 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) (Text with EEA relevance).

(**1**) OJ L 350, 28.12.1998, p. 58.

Status:
Point in time view as at 03/02/2012.

Changes to legislation:
There are outstanding changes not yet made to Commission Regulation (EU) No 582/2011. Any changes that have already been made to the legislation appear in the content and are referenced with annotations.