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1958 Agreement – Consideration of draft amendments to existing Regulations submitted by GRPE

Proposal for Supplement 8 to the 05 series of amendments to Regulation No. 49 (Compression ignition and positive ignition (LPG and CNG) engines)

Submitted by the Working Party on Pollution and Energy*

The text reproduced below was adopted by the Working Party on Pollution and Energy (GRPE) at its sixty-ninth session (ECE/TRANS/WP.29/GRPE/69, para. 20). It is based on ECE/TRANS/WP.29/GRPE/2014/12 and Addendum 1 to the report. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Executive Committee AC.1 for consideration.

* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

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Paragraph 4.10.8., amend to read:

"4.10.8. If the manufacturer chooses, until the date specified in paragraph 13.2.3. for new type approvals, he may use alternative provisions for the monitoring of the Diesel Particulate Filter (DPF) as set out in paragraph 2.3.2.2. of Annex 9A."

Paragraphs 13.2.1. to 13.3.3., amend to read:

"13.2.1. Contracting Parties applying this Regulation shall, from the date of entry into force of the 06 series of amendments to this Regulation, grant a type-approval to an engine system or vehicle only if it complies with:

(a) The requirements of paragraph 4.1. of this Regulation;

(b) The performance monitoring requirements of paragraph 2.3.2.2. of Annex 9A in the case of compression ignition and dual-fuel engines and vehicles;

(c) The NO_x OTL monitoring requirements as set out in the row "phase in period" of Table 1 of Annex 9A, in the case of compression ignition and dual-fuel engines and vehicles;

(d) The NO_x OTL monitoring requirements as set out in the row "phase in period" of Table 2 of Annex 9A, in the case of positive ignition engines and vehicles;

(e) The Reagent quality "phase-in" requirements as set out in paragraph 7.1.1.1. of Annex 11.

13.2.1.1. In accordance with the requirements of paragraph 6.4.4. of Annex 9A manufacturers are exempted from providing a statement of OBD in-use Performance compliance.

13.2.2. In the case of positive ignition engines and vehicles, Contracting Parties applying this Regulation shall, from 1 September 2014, grant a type-approval to an engine system or vehicle only if it complies with:

(a) The requirements of paragraph 4.1. of this Regulation;

(b) The NOx OTL monitoring requirements as set out in the row "phase-in period" of Table 2 of Annex 9A;

(c) The CO OTL monitoring requirements as set out in the row "phase-in period" of Table 2 of Annex 9A;

(d) The Reagent quality "phase-in" requirements as set out in paragraph 7.1.1.1. of Annex 11.

13.2.2.1. In accordance with the requirements of paragraph 6.4.4. of Annex 9A manufacturers are exempted from providing a statement of OBD in-use Performance compliance.

13.2.3. Contracting Parties applying this Regulation shall, from 31 December 2015, grant a type-approval to an engine system or vehicle only if it complies with:

(a) The requirements of paragraph 4.1. of this Regulation;

(b) The PM Mass OTL monitoring requirements as set out in the row "general requirements" of Table 1 of Annex 9A in the case of compression ignition and dual-fuel engines and vehicles;

(c) The NOx OTL monitoring requirements as set out in the row "general requirements" of Table 2 of Annex 9A in the case of compression ignition and dual-fuel engines and vehicles;

(d) The NOx and CO OTL monitoring requirements as set out in the row "general requirements" of Table 2 of Annex 9A in the case of positive ignition engines and vehicles;

(e) The Reagent quality "general" requirements as set out in paragraph~~s~~ 7.1.1.1. of Annex 11;

(f) The requirements regarding the plan and implementation of the monitoring techniques according to paragraphs 2.3.1.2. and 2.3.1.2.1. of Annex 9A;

(g) The requirements of paragraph 6.4.1. of Annex 9A for providing a statement of OBD in-use Performance compliance.

13.3. Limit of validity of type approvals

13.3.1. As from the 1 January 2014, type approvals granted to this Regulation as amended by the 05 series of amendments shall cease to be valid.

13.3.2. As from 1 September 2015, in the case of positive ignition engines, type approvals granted to this Regulation as amended by the 06 series of amendments, which do not comply with the requirements of paragraph 13.2.2., shall cease to be valid.

13.3.3. As from 31 December 2016, type approvals granted to this Regulation as amended by the 06 series of amendments, which do not comply with the requirements of paragraph 13.2.3., shall cease to be valid."

Insert a new paragraph 13.3.4., to read:

"13.3.4. Type approvals granted to compression ignition and dual-fuel engines and vehicles which comply with the requirements of this Regulation and however have a Character B after the approval number specified in Annex 3 to this Regulation, shall remain valid until the date considered in paragraph 13.3.3."

Annex 1, Part 1, in the table, delete paragraph 3.2.12.2.8.6.

Annex 3, Table 1, including reference notes, amend to read:

"Table 1

Letters with reference to requirements of OBD and SCR systems

Character	*NO_x OTL*[1]	*PM OTL*[2]	*CO OTL*[6]	*IUPR*[13]	*Reagent quality*	*Additional OBD monitors*[12]	*Implementation dates: new types*	*Last date for vehicle first registration*
A	Row "phase-in period" of Tables 1 and 2 of Annex 9A	Performance. monitoring[3]	N/A	Phase-in[7]	Phase in[4]	N/A	Date of entry into force of 06 series of R49	31 August 2015[9] 31 December 2016[10]
B[11]	Row "phase-in period" of Tables 1 and 2 of Annex 9A	N/A	Row "phase-in period" of Table 2 of Annex 9A	Phase-in[7]	Phase in[4]	N/A	1 September 2014	31 December 2016
C	Row "general requirements" of Tables 1 and 2 of Annex 9A	Row "general requirements" of Table 1 of Annex 9A	Row "general requirements" of Table 2 of Annex 9A	General[8]	General[5]	Yes	31 December 2015	

Notes:

1 "NOx OTL" monitoring requirements as set out in Table 1 of Annex 9A for compression ignition and dual-fuel engines and vehicles and in Table 2 of Annex 9A for positive ignition engines and vehicles.

2 "PM OTL" monitoring requirements as set out in Table 1 of Annex 9A for compression ignition and dual-fuel engines and vehicles.

3 "Performance monitoring" requirements as set out in paragraph 2.3.2.2. of Annex 9A.

4 Reagent quality "phase-in" requirements as set out in paragraph 7.1.1.1. of Annex 11.

5 Reagent quality "general" requirements as set out in paragraph 7.1.1. of Annex 11.

6 "CO OTL" monitoring requirements as set out in Table 2 of Annex 9A for positive ignition engines and vehicles.

7 excluding the statement required by paragraph 6.4.1. of Annex 9A.

8 including the statement required by paragraph 6.4.1. of Annex 9A.

9 For positive-ignition engines and vehicles.

10 For compression-ignition and dual-fuel engines and vehicles.

11 Only applicable to positive-ignition engines and vehicles.

12 "Additional provisions concerning monitoring requirements" as set out in paragraph 2.3.1.2. of Annex 9A.

13 IUPR specifications are set out in Annexes 9A and 9C of this Regulation. PI engines are not subjected to IUPR."

Annex 9A

Paragraph 2.2., amend to read:

"2.2. Requirements regarding operating sequences and driving cycles for hybrid vehicles and vehicles with stop-start systems."

Insert new paragraphs 2.2.1. to 2.2.2.3., to read:

"2.2.1. Operating sequence

2.2.1.1. For vehicles that employ engine shut-off strategies that are commanded by the engine control system (for example hybrid bus with engine shut-off at idle) and that are followed by an engine cranking, the (engine shut-off – engine cranking) sequence shall be considered as part of the existing operating sequence.

2.2.1.2. The manufacturer shall provide the description of such strategies in the documentation considered in paragraphs 3.1.3.(a) and 3.1.3.(b) of this Regulation.

2.2.1.3. In the case of a hybrid vehicle, the operating sequence shall start at the time of the engine start or at the time when the vehicle starts moving, whichever occurs first.

2.2.2. Driving cycle

2.2.2.1. For vehicles that employ engine shut-off strategies that are commanded by the engine control system (for example hybrid bus with engine shut-off at idle) and that are followed by an engine cranking, the (engine shut-off – engine cranking) sequence shall be considered as part of the existing driving cycle.

2.2.2.2. The manufacturer shall provide the description of such strategies in the documentation considered in paragraphs 3.1.3.(a) and 3.1.3.(b) of this Regulation.

2.2.2.3. In the case of a hybrid vehicle, the driving cycle shall start at the time of the engine start or at the time when the vehicle starts moving, whichever occurs first."

Paragraph 2.3.2.2., amend to read:

"2.3.2.2. In the case of a wall flow diesel particulate filter (DPF), until the date specified in paragraph 13.2.3. of this Regulation for new type approvals and paragraph 13.3.3. for new registrations, the manufacturer may choose to apply the performance monitoring requirements set out in Appendix 8 to Annex 9B instead of the requirements of paragraph 2.3.2.1., if he can demonstrate with technical documentation that in case of deterioration there is a positive correlation between the loss of filtration efficiency and the loss of pressure drop ("delta pressure") across the DPF under the operating conditions of the engine specified in the test described in Appendix 8 to Annex 9B."

Paragraph 2.4.1., including footnote, amend to read:

"2.4.1. If requested by the manufacturer, for vehicles of categories M_2 and N_1, for vehicles of categories M_1 and N_2 with a technically permissible maximum laden mass not exceeding 7.5 tonnes, and for vehicles of category M_3 Class I, Class II and Class A and B[1] with a permissible mass not exceeding 7.5 tonnes, compliance with the requirements of Annex 11 to the 07 series of

amendments to Regulation No. 83 shall be considered equivalent to the compliance with this annex, according to the following equivalences:

[1] As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2. - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html"

Insert new paragraphs 2.4.1.1. to 2.4.1.3.2.2., to read:

"2.4.1.1. The OBD standard "Interim OBD threshold limits" in Table A11/3 of Annex 11 to the 07 series of amendments to Regulation No. 83 shall be considered as equivalent to the character A of the Table 1 of Annex 3 to this Regulation.

2.4.1.2. The OBD standard "Preliminary OBD threshold limits" in Table A11/2 of Annex 11 to the 07 series of amendments to Regulation No. 83 shall be considered as equivalent to the character B of the Table 1 of Annex 3 to this Regulation.

2.4.1.3. The OBD standard "Final OBD threshold limits" in Table A11/1 of Annex 11 to the 07 series of amendments to Regulation No. 83 shall be considered as equivalent to the character C of the Table 1 of Annex 3 to this Regulation.

2.4.1.3.1. If such alternative approval is used, the information related to OBD systems in section 3.2.12.2.7. of Part 2 of Annex 1 is replaced by the information of section 3.2.12.2.7. of Annex 1 to the 07 series of amendments to Regulation No. 83.

2.4.1.3.2. The equivalences set out in paragraph 2.4.1. shall apply in the following manner:

2.4.1.3.2.1. The OTLs and dates referred to in Table 1 of Annex 3 to this Regulation and relevant to the assigned character for which the type-approval is sought shall apply;

2.4.1.3.2.2. The requirements on NOx control measures described in paragraphs 2.1.2.2.1. to 2.1.2.2.4. of Annex 11 shall apply."

Table 2, amend to read:

"Table 2
OTLs (positive ignition engines)

	Limit in mg/kWh	
	NO_x	*CO*
Phase-in period	1 500	7 500[1]
General requirements	1 200	7 500

[1] Mandatory as from the dates specified in paragraphs 13.2.2. and 13.3.2. of this Regulation, as appropriate."

Annex 9B

Paragraph 3.5., amend to read:

"3.5. *"Continuous-MI"* means the malfunction indicator showing a steady indication from the time the key is moved to on (run) position and the engine is started (ignition on – engine on) or the vehicle starts moving, whichever occurs first, and extinguishing when the key is moved to off."

Paragraph 3.22., amend to read:

"3.22. *"Short-MI"* means the malfunction indicator showing a 15 seconds steady indication from the time the key is moved to on (run) position and the engine is started (ignition on - engine on) or the vehicle starts moving, and extinguishing either after these 15 seconds or when the key is moved to off, whichever occurs first."

Paragraph 4.6.4., amend to read:

"4.6.4. MI activation at key-on/engine-off

The MI activation at key-on/engine-off shall consist of two sequences separated by a 5 seconds MI off:

(a) The first sequence is designed to provide an indication of the MI functionality and the readiness of the monitored components;

(b) The second sequence is designed to provide an indication of the presence of a malfunction.

The first sequence starts from the first time the system is at key-on position and stops either at its normal completion or when the key is set to the key-off position, whichever occurs first.

The second sequence is repeated until either the engine is started[1], the vehicle starts moving, or the key is set to the key-off position, whichever occurs first.

[1] An engine may be considered started during the cranking phase."

Paragraphs 4.6.5.1.1. and 4.6.5.1.2., amend to read:

"4.6.5.1.1. Continuous-MI counter

The OBD system shall contain a continuous-MI counter to record the number of hours during which the internal combustion engine has been operated while a continuous-MI is activated. … "

"4.6.5.1.2. Cumulative continuous-MI counter

The OBD system shall contain a cumulative continuous-MI counter to record the cumulative number of hours during which the internal combustion engine has been operated over its life while a continuous-MI is activated. …"

Paragraph 4.6.5.2.1., amend to read:

"4.6.5.2.1. Single B1-counter

The OBD system shall contain a B1 counter to record the number of hours during which the internal combustion engine has operated while a Class B1 malfunction is present. …"

Appendix 3, item 3, amend to read:

"Selective Catalytic Reduction (SCR) monitoring

For the purpose of this item, SCR means selective catalytic reduction or other lean NO_x catalyst device. The OBD system shall monitor the following elements of the SCR system on engines so-equipped for proper operation:

(a) Active/intrusive reagent injection system: the system's ability to regulate reagent delivery properly, whether delivered via an in-exhaust injection or an in-cylinder injection - performance monitoring;

(b) Active/intrusive reagent: to the extent feasible the quality of the reagent if a reagent other than fuel is used (e.g. urea) - performance monitoring;

(c) SCR catalyst conversion efficiency: the catalyst's SCR ability to convert NO_x emission threshold monitoring."

Annex 9C, paragraph 5.5., amend to read:

"5.5. Requirements for incrementing the ignition cycle counter

The ignition cycle counter shall be incremented once and only once per driving cycle."

Annex 11, paragraph 2.1.1., including footnote, amend to read:

"2.1.1. If requested by the manufacturer, for vehicles of categories M_2 and N_1, for vehicles of categories M_1 and N_2 with a technically permissible maximum laden mass not exceeding 7.5 tonnes, and for vehicles of category M_3 Class I, Class II and Class A and Class B[1] with a permissible mass not exceeding 7.5 tonnes, compliance with the requirements of Annex 6 to the 07 series of amendments to Regulation No. 83 shall be considered equivalent to the compliance with this annex.

[1] As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.3, para. 2. - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html"

Annex 11, insert new paragraphs 2.1.2. to 2.1.2.2.5., to read:

"2.1.2. If the alternative approval is used:

2.1.2.1. The information related to the correct operation of NOx control measures in paragraphs 3.2.12.2.8.1. to 3.2.12.2.8.5. of Part 2 of Annex 1 to this Regulation is replaced by the information of paragraph 3.2.12.2.8. of Annex 1 to the 07 series of amendments to Regulation No. 83.

2.1.2.2. The following exceptions shall apply regarding the application of the requirements set out in Appendix 6 to the 07 series of amendments to Regulation No. 83 and those of this Annex:

2.1.2.2.1. The provisions on reagent quality monitoring set out in paragraphs 7.1. to 7.1.2. of this annex shall apply, instead of paragraphs 4.1. and 4.2. of Appendix 6 to the 07 series of amendments to Regulation No. 83.

2.1.2.2.2. The provisions on dosing activity monitoring set out in section 8.4 of this Annex shall apply, instead of section 5. of Appendix 6 to the 07 series of amendments to Regulation No. 83.

2.1.2.2.3. The driver warning system referred to in sections 4., 7. and 8. of this annex shall be understood as the driver warning system in section 3. of Appendix 6 to the 07 series of amendments to Regulation No. 83.

2.1.2.2.4. Section 6. of Appendix 6 to the 07 series of amendments to Regulation No. 83 shall not apply.

2.1.2.2.5. The provisions set out in paragraph 5.2. of this Annex shall apply in the case of vehicles for use by the rescue services or to vehicles designed and constructed for use by the armed services, civil defence, fire services and forces responsible for maintaining public order."

Annex 11, paragraphs 7.1.1. to 7.1.1.2., amend to read:

"7.1.1. The manufacturer shall specify a value CD_{min}, which is greater than the highest reagent concentration that results in tailpipe emissions exceeding the limit values specified in paragraph 5.3. of this Regulation.

7.1.1.1. During the phase-in period specified in paragraph 4.10.7. of this Regulation and upon request of the manufacturer for the purpose of paragraph 7.1.1. the reference to the NO_x emission limit specified in paragraph 5.3. to this Regulation shall be replaced by the value of 900 mg/kWh.

7.1.1.2. The value of CD_{min} shall be demonstrated during type approval by the procedure defined in Appendix 6 to this annex and recorded in the extended documentation package as specified in paragraph 5.1.4. to this Regulation."

Annex 11, paragraphs 8.1. to 8.2.3., amend to read:

"8.1. The vehicle shall include a means of determining interruption of the reagent dosing activity (including due to a blocked reagent dosing system).

8.2. Dosing activity counters

8.2.1. A specific counter shall be attributed to the dosing activity (the "dosing activity counter"). This counter shall count the number of engine operating hours which occur with an interruption of the reagent dosing activity.

8.2.2. Details of the reagent dosing counter activation and deactivation criteria and mechanisms are described in Appendix 2 to this annex.

8.2.3. The dosing counter information shall be made available in a standardised manner according to the provisions of Appendix 5 to this annex."

Annex 11, paragraphs 8.3. to 8.3.2., shall be deleted.

Annex 11, paragraphs 8.4.1. and 8.4.1.1., shall be deleted.

Annex 11, paragraph 8.4.2. (former), renumber as paragraph 8.4.1.

Annex 11, paragraphs 8.5.1. and 8.5.2., amend to read:

"8.5.1. The low-level inducement system described in paragraph 5.3. shall be enabled, and subsequently activated according to the requirements of that section, if an interruption in reagent dosing is not rectified within 10 engine operating hours after the activation of the driver warning system specified in paragraphs 8.4.1.

8.5.2. The severe inducement system described in paragraph 5.4. shall be enabled, and subsequently activated according to the requirements of that section, an interruption in reagent dosing is not rectified within 20 engine operating hours after the activation of the driver warning system in paragraphs 8.4.1."

Annex 11, Appendix 2, paragraph A.2.2.1., amend to read:

"A.2.2.1. The driver warning system shall be activated when the diagnostic trouble code (DTC) associated with a malfunction justifying its activation has got the "confirmed and active" status."

Annex 11, Appendix 2, Table 1, shall be deleted.

Annex 11, Appendix 2, paragraph A.2.4.1.1., amend to read:

"A.2.4.1.1. To comply with the requirements of this annex, the system shall contain separate counters to record the number of hours during which the engine has been operated while the system has detected any of the following:

(a) An incorrect reagent quality;

(b) An interruption of reagent dosing activity;

(c) An impeded EGR valve;

(d) A failure of the monitoring system as defined of paragraph 9.1. (b) of this annex"

Annex 11, Appendix 2, Table 2, amend to read:

"Table 2
Counters and inducement

	DTC status for first activation of the counter	*Counter value for low-level inducement*	*Counter value for severe inducement*	*Frozen value held by the counter during the period just after severe inducement*
Reagent quality counter	Confirmed and active	10 hours	20 hours	18 hours
Dosing counter	Confirmed and active	10 hours	20 hours	18 hours
EGR valve counter	Confirmed and active	36 hours	100 hours	95 hours
Monitoring system counter	Confirmed and active	36 hours	100 hours	95 hours

"

Annex 15, paragraph 4.2.2., amend to read:

"4.2.2. The operability restriction applicable to dual-fuel vehicles when they operate in service mode is the one activated by the "*severe inducement system*" specified in Annex 11 or, in the special case described in section 4.2.2.3., the power limitation described in that section."

Annex 15, insert new paragraphs 4.2.2.2. to 4.2.2.3.3., to read:

"4.2.2.2. De-activation of the operability restriction

In case of an empty gas tank, the operability restriction in dual-fuel mode due to a lack of gaseous fuel, shall be de-activated as soon as the gas tank is refilled above the critical level.

4.2.2.3. Repair and maintenance of LNG Type A dual-fuel engines and vehicles

In the case of LNG Type A dual-fuel engines and vehicles, the manufacturer may, instead of limiting the vehicle speed at 20 km/h, opt for limiting the power of the engine to 20 per cent of the declared maximum power in dual-fuel mode, and this at any engine speed, when the service mode is activated during a repair or maintenance operation.

4.2.2.3.1. The power limitation scheme may only be activated if the system concludes to an empty gas tank not later than 5 minutes after engine cranking, the engine being at idle.

4.2.2.3.2. The power limitation scheme shall not be activated when the system concludes that the gas tank is empty from a previous driving cycle and the gas tank has not been refilled.

4.2.2.3.3. The manufacturer shall demonstrate at type-approval that the power limitation scheme can only be activated during a repair or maintenance operation."