

## **Comments to the draft 07 series of amendments to Regulation No. 83 (ECE/TRANS/WP.29/GRPE/2014/2)**

The purpose of this proposal is to modify the content of ECE/TRANS/WP.29/GRPE/2014/2 in order to avoid misinterpretation for practical application and implementation of the regulation.

The modifications to ECE/TRANS/WP.29/GRPE/2014/2 are marked in bold for new or strikethrough for deleted characters.

### **I. Proposal**

*Page 5, delete paragraph 2.25.3.:*

~~“2.25.3. “Flex fuel H2NG vehicle” means a flex fuel vehicle that can run on different mixtures of hydrogen and NG/biomethane.”~~

*Page 9, Paragraphs 4.8. and 4.8.1. amend to read:*

“4.8. Additional requirements for vehicles fuelled by LPG **or** NG/biomethane, ~~or flex fuel H2NG~~

4.8.1. The additional requirements for vehicles fuelled by LPG **or** NG/biomethane, ~~or flex fuel H2NG~~ are provided in Annex 12 to this Regulation. “

*Page 13, Paragraph 5.2.3., amend to read:*

5.2.3. Compression ignition engine-powered vehicles and hybrid electric vehicles equipped with a compression ignition engine shall be subject to the following tests:

Type I (verifying the average exhaust emissions after a cold start);

Type V (durability of anti-pollution control devices);

OBD test;

~~Engine power test.~~

*Page 14, Paragraph 5.2.3., Table A, amend to read:*

~~Delete two columns in the right end: “Pure electric vehicles” and “Hydrogen Fuel cell vehicles”.~~

*Delete the right hand column under “Flex-Fuel” which refers to “NG/Bio-Methane” and “H2NG”*

*Delete the bottom row “Engine power”.*

*Page 14, Paragraph 5.2.3., Table A, note 6, amend to read:*

~~“6 Reference fuel is ‘Hydrogen for fuel cell vehicles’ as specified in Annex 10a.~~

**6 Positive ignition particulate mass and number limits for vehicles with positive ignition engines including hybrids shall apply only to vehicles with direct injection engines.”**

*Page 14, Paragraph 5.2.3., Table A, add shoulder note “6” to all “Yes” in the row “Particulate mass and particulate number (Type I test)” of the column “Vehicles with positive ignition engines including hybrids.”*

*Page 14, Paragraph 5.2.3., Table A should therefore read as follows:*

“Table A. Requirements

Application of test requirements for type approval and extensions

Vehicle category	Vehicles with positive ignition engines including hybrids								Vehicles with compression ignition engines including hybrids			Pure electric vehicles	Hydrogen fuel cell vehicles
	Mono fuel				Bi-fuel <sup>6</sup>			Flex-fuel <sup>6</sup>	Flex fuel	Mono fuel	Delete 2 columns		
Reference fuel	Petrol (E5/E10) <sup>7</sup>	LPG	NG/ Bio-methane	Hydrogen (ICE) <sup>5</sup>	Petrol (E5/E10)	Petrol (E5/E10)	Petrol (E5/E10)	Petrol (E5/E10)	NG/Bio-methane	Diesel (B5/B7) <sup>7</sup>	Diesel (B5/B7) <sup>7</sup>	for "Pure electric" <sup>6</sup> Vehicles"	
Gaseous pollutants (Type I test)	Yes	Yes	Yes	Yes <sup>4</sup>	Yes (both fuels)	Yes (both fuels)	Yes (both fuels) <sup>4</sup>	Yes (both fuels)	Yes (both fuels)	Yes (B5/B7 only) <sup>2,7</sup>	Yes	and "Hydrogen Fuel cell vehicles"	
Particulate mass and particulate number (Type I test)	Yes <sup>6</sup>	—	—	—	Yes <sup>6</sup> (petrol only)	Yes <sup>6</sup> (petrol only)	Yes <sup>6</sup> (petrol only)	Yes <sup>6</sup> (both fuels)	H2NG vehicles <sup>6</sup>	Yes (B5/B7 only) <sup>2,7</sup>	Yes		
Idle emissions (Type II test)	Yes	Yes	Yes	—	Yes (both fuels)	Yes (both fuels)	Yes (petrol only)	Yes (both fuels)	Yes (NG/Bio-methane only)	—	—		
Crankcase emissions (Type III test)	Yes	Yes	Yes	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (NG/Bio-methane only)	—	—		
Evaporative emissions (Type IV test)	Yes	—	—	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	—	—	—		
Durability (Type V test)	Yes	Yes	Yes	Yes	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes (NG/Bio-methane only)	Yes (B5/B7 only) <sup>2,7</sup>	Yes		
Low temperature emissions (Type VI test)	Yes	—	—	—	Yes (petrol only)	Yes (petrol only)	Yes (petrol only)	Yes <sup>3</sup> (both fuels)	—	—	—		
In-service conformity	Yes	Yes	Yes	Yes	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (both fuels)	Yes (B5/B7 only) <sup>2,7</sup>	Yes		
On-board diagnostics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Engine power	Yes	Yes	Yes	Yes	Delete row for "Engine power"			Yes	Yes	Yes	Yes	Yes	Yes

<sup>6</sup> Reference fuel is 'Hydrogen for fuel cell vehicles' as specified in Annex 10a.

**6 Positive ignition particulate mass and number limits for vehicles with positive ignition engines including hybrids shall apply only to vehicles with direct injection engines."**

Page 16, Paragraph 5.3.1.4., Table 1, amend to read:

"2 Until three years after the dates specified in paragraphs 12.2.1. and 12.2.2. of this Regulation for new type

approvals and new vehicles respectively, a particle number emission limit of  $6.0 \times 10^{12}$  #/km shall apply to PI direct injection vehicles upon the choice of the manufacturer. ~~Until those dates at the latest a type approval test method ensuring the effective limitation of the number of particles emitted by vehicles under real driving conditions shall be implemented.~~"

Page 22, paragraph 5.3.7.3. delete point (g) and the following note:

- “(a) for petrol (E5) 1.89;
- (b) for petrol (E10) 1.93;
- (c) for LPG 2.53;
- (d) for NG/biomethane 4.0;
- (e) for ethanol (E85) 2.74;
- (f) for ethanol (E75) 2.61;
- ~~(g) for H2NG:  $((1.256 \cdot A + 136)/(0.654 \cdot A))$~~

~~A being the quantity of NG/biomethane within the H2NG mixture, expressed in per cent volume.”~~

Page 23, delete Paragraph 5.3.9.

Page 30, paragraphs 8.6. and 8.6.1., amend to read:

- “8.6. Checking the conformity of a vehicle fuelled by LPG ~~or~~ NG/biomethane ~~or H2NG~~.
- 8.6.1. Tests for conformity of production may be performed with a commercial fuel of which the C3/C4 ratio lies between those of the reference fuels in the case of LPG, or of which the Wobbe index lies between those of the extreme reference fuels in the case of NG ~~or H2NG~~. In that case a fuel analysis shall be presented to the Type Approval Authority.”

Page 36 and 37, delete Paragraph 12.3., 12.3.1., 12.3.4., 12.3.5., 12.3.6., 12.3.7., 12.3.8., 12.3.9., 12.3.10., 12.3.11.

Page 62, paragraph 3.2.2.1., amend to read:

- “3.2.2.1. Light-duty vehicles: Diesel/Petrol/LPG/NG or Biomethane/Ethanol
- “(E85)/Biodiesel/Hydrogen/~~H2NG~~<sup>9+1</sup>

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

Page 70, delete paragraphs 3.2.19. to 3.2.19.4.3.:

“3.2.19. H2NG fuelling system: yes/no<sup>9</sup>

3.2.19.1. Percentage of hydrogen in the fuel (the maximum specified by the manufacturer):

3.2.19.2. Type approval number according to Regulation No. 110

3.2.19.3. Electronic engine management control unit for H2NG fuelling

3.2.19.3.1. ——— Make(s):

3.2.19.3.2. ——— Type(s):

3.2.19.3.3. ——— Emission related adjustment possibilities:

3.2.19.4. Further documentation

3.2.19.4.1. ——— Description of the safeguarding of the catalyst at switch over from petrol to H2NG or back:

3.2.19.4.2. ——— System lay out (electrical connections, vacuum connections compensation hoses, etc.):

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3.2.19.4.3. ——— Drawing of the symbol: ———“

Page 82 and 83, Addendum to Annex 2, delete Paragraph 3., 3.1., 3.2.

Page 89, Annex 4a, paragraph 2.amend to read:

“2. Introduction

This annex describes the procedure for the Type I test defined in paragraph 5.3.1. of this Regulation.

When the reference fuel to be used is LPG or NG/biomethane or H2NG, the provisions of Annex 12 shall apply additionally.”

Page 90, Annex 4a, paragraph 3.3.2. amend to read:

“3.3.2. Vehicles that are fuelled either with petrol or with LPG or NG/biomethane, or H2NG shall be tested according to Annex 12 with the appropriate reference fuel(s) as defined in Annex 10 or Annex 10a.”

Page 90, Annex 4a, 3.2.7., amend to read:

“3.2.7. The daytime running lamps of the vehicle as defined in Section 2 of Regulation No 48 shall be switched on during the test cycle. The vehicle tested shall be equipped with the daytime running lamp system that has the highest electrical energy consumption among the daytime running lamp systems, which are fitted by the manufacturer to vehicles in the group represented by the type-approved vehicle. The manufacturer shall supply appropriate technical documentation to the type-approval

authorities in this respect.”

Page 99, Annex 4a, 6.6.2., amend to read:

“6.6.2. Total mass of gaseous and particulate pollutants emitted

The mass M of each pollutant emitted by the vehicle during the test shall be determined by obtaining the product of the volumetric concentration and the volume of the gas in question, with due regard for the following densities under above-mentioned reference conditions:

In the case of carbon monoxide (CO):  $d = 1.25 \text{ g/l}$

In the case of hydrocarbons:

For petrol (E5) (C1H1.89O0.016)	$d = 0.631 \text{ g/l}$
For petrol (E10) (C1H1.93O0.033)	$d = 0.645 \text{ g/l}$
For diesel (B5) (C1H1.86O0.005)	$d = 0.622 \text{ g/l}$
For diesel (B7) (C1H1.86O0.007)	$d = 0.623 \text{ g/l}$
For LPG (CH2.525)	$d = 0.649 \text{ g/l}$
For LPG (CH2.525)	$d = 0.649 \text{ g/l}$
For NG/biomethane (C1H4)	$d = 0.714 \text{ g/l}$
For ethanol (E85) (C1H2,74O0.385)	$d = 0.932 \text{ g/l}$
For ethanol (E75) (C1H2,61O0,329)	$d = 0.886 \text{ g/l}$

~~For H2NG  $d = ((9.104 \cdot A + 136)/(1,524.152 - 0.583A)) \text{ g/l}$~~

~~A being the quantity of NG/biomethane within the H2NG mixture, expressed in per cent volume~~

In the case of nitrogen oxides (NOx):  $d = 2.05 \text{ g/l}$ ”

Page 100, Annex 4a, 6.6.4., delete formula (5i), renumber formula (5j) as (5i) and delete the definition of A as follows:

“.....

$$DF = \frac{12.5}{C_{CO_2} + (C_{HC} + C_{CO}) \cdot 10^{-4}} \text{ for ethanol (E75) (5h)}$$

$$DF = \frac{X}{C_{CO_2} + (C_{HC} + C_{CO}) \cdot 10^{-4}} \text{ ~~for H2NG~~ (5i)}$$

Where:  $X = \frac{65.4 A}{4.922 A + 195.84}$

$$DF = \frac{35.03}{C_{H_2O} - C_{H_2O-DA} + C_{H_2} \cdot 10^{-4}} \quad \text{for hydrogen} \quad (5j)(5i)$$

In these equations:

- $C_{CO_2}$  = concentration of CO<sub>2</sub> in the diluted exhaust gas contained in the sampling bag, expressed in per cent volume,
- $C_{HC}$  = concentration of HC in the diluted exhaust gas contained in the sampling bag, expressed in ppm carbon equivalent,
- $C_{CO}$  = concentration of CO in the diluted exhaust gas contained in the sampling bag, expressed in ppm,
- $C_{H_2O}$  = concentration of H<sub>2</sub>O in the diluted exhaust gas contained in the sampling bag, expressed in per cent volume,
- $C_{H_2O-DA}$  = concentration of H<sub>2</sub>O in the air used for dilution, expressed in per cent volume,
- $C_{H_2}$  = concentration of hydrogen in the diluted exhaust gas contained in the sampling bag, expressed in ppm,
- $A$  = ~~quantity of NG/biomethane within the H<sub>2</sub>NG mixture, expressed in per cent volume.~~

Non-methane hydrocarbon concentration is calculated as follows: . . . . .”

Page 222, Annex 11, add 3.3.4.9. and 3.3.4.10., and delete 3.3.5.1. and 3.3.5.2. as follows:

“3.3.4. Monitoring requirements for vehicles equipped with compression-ignition engines

In satisfying the requirements of paragraph 3.3.2. of this annex the OBD system shall monitor:

...

**3.3.4.9. The following devices should however be monitored for total failure or removal (if removal would cause the applicable emission limits to be exceeded):**

- (a) **A particulate trap fitted to compression ignition engines as a separate unit or integrated into a combined emission control device;**
- (b) **A NOx aftertreatment system fitted to compression ignition engines as a separate unit or integrated into a combined emission control device;**
- (c) **A diesel oxidation catalyst (DOC) fitted to compression ignition engines as a separate unit or integrated into a combined emission control device.**

**3.3.4.10. The devices referred to in paragraph 3.3.4.9. shall also be monitored for any failure that would result in exceeding the applicable OBD threshold limits.**

3.3.5. Manufacturers may demonstrate to the Type Approval Authority that certain components or systems need not be monitored if, in the event of their total failure or removal, emissions do not exceed the emission limits given in paragraph 3.3.2. of this annex. ”

Page 222, Annex 11, paragraph 3.3.5.1. and 3.3.5.2. to delete.

Page 239, Annex 12, title and paragraphs 1. and 2.1. amend to read as follows:

~~“Granting of an ECE type approval for a vehicle fuelled by LPG, NG/biomethane, or flex fuel H2NG~~

**Granting of an ECE type approval for a vehicle fuelled by LPG or NG/biomethane**

1. Introduction

This annex describes the special requirements that apply in the case of an approval of a vehicle that runs on LPG or NG/biomethane ~~or H2NG~~, or that can run either on petrol or LPG or NG/biomethane ~~or H2NG~~ in so far as the testing on LPG or NG/biomethane gas ~~or H2NG~~ is concerned.

In the case of LPG and NG/biomethane natural gas there is on the market a large variation in fuel composition, requiring the fuelling system to adapt its fuelling rates to these compositions. To demonstrate this capability, the vehicle has to be tested in the Type I test on two extreme reference fuels and demonstrate the self-adaptability of the fuelling system. Whenever the self- adaptability of a fuelling system has been demonstrated on a vehicle, such a vehicle may be considered as a parent of a family. Vehicles that comply with the requirements of members of that family, if fitted with the same fuelling system, need to be tested on only one fuel.

2. Definitions

For the purpose of this annex the following definitions shall apply:

- 2.1. A "family" means a group of vehicle types fuelled by LPG or NG/biomethane, ~~H2NG~~; identified by a parent vehicle. “

Page 240, Annex 12, delete the second section of paragraph 3.1.1. as follows:

- “3.1.1. The parent vehicle should demonstrate its capability to adapt to any fuel composition that may occur across the market. In the case of LPG there are variations in C3/C4 composition. In the case of NG/biomethane 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 Wobbe index. These variations are reflected in the reference fuels.
- ~~In the case of a flex fuel H2NG vehicle, the composition range may vary from 0 % hydrogen to a maximum percentage of hydrogen within the mixture, which shall be specified by the manufacturer. The parent vehicle shall demonstrate its capability to adapt to any percentage, within the range specified by the manufacturer. It shall also demonstrate its capability to adapt to any NG/biomethane composition that may occur across the market, regardless of the percentage of hydrogen in the mixture.”~~



Page 240, Annex 12, delete the second section of paragraph 3.1.2. as follows:

“3.1.2. In the case of vehicles fuelled by LPG, NG/biomethane, the parent vehicle(s) shall be tested in the Type I on the two extreme reference fuels of Annex 10a. In the case of NG/biomethane, if the transition from one fuel to another is in practice aided through the use of a switch, this switch shall not be used during type approval. In such a case on the manufacturer's request and with the agreement of the Technical Service the pre-conditioning cycle referred in paragraph 6.3. of Annex 4a may be extended.

~~In the case of flex fuel H2NG vehicles, the parent vehicle shall be tested in the Type I test with the following fuel compositions:~~

- ~~(a) 100 % H gas;~~
- ~~(b) 100 % L gas;~~
- ~~(c) The mixture of H gas and the maximum percentage of hydrogen specified by the manufacturer;~~
- ~~(d) The mixture of L gas and the maximum percentage of hydrogen specified by the manufacturer.”~~

Page 241, Annex 12, delete paragraphs 3.1.5. and 3.3.:

## II. Proposal for correcting clerical errors only:

Page 102, Annex 4a, Paragraph 6.6.4., amend to read:

$$DF = \frac{\text{---12.5--- } 12.7}{C_{CO_2} + (C_{HC} + C_{CO}) \cdot 10^{-4}} \text{ for ethanol (E75)} \quad (5h)$$

Page 105, Annex 4a, Paragraph 6.6.8., amend to read:

$\bar{C}_s$  = **corrected concentration** of particles from the diluted exhaust gas expressed as **the average particles per cubic centimetre figure from the emissions test including the full duration of the drive cycle.** If the volumetric mean **concentration results** ( $\bar{C}$ ) from the particle number counter are not output at **standard conditions** (273.2 K and 101.33 kPa), then the concentrations should **be corrected to those conditions** ( $\bar{C}_s$ ).

Page 105, Annex 4a, Paragraph 6.6.8., amend to read:

n shall be calculated from the following equation:

$$n = T \cdot f \quad n = T \cdot f$$

Page 130, Appendix 3 to Annex 4a

Need a line feed before 1.3.8.:

1.3.7. Nitrogen oxide (NO<sub>x</sub>) analysis:

The analyser shall be either of the chemi-luminescent (CLA) or of the non-dispersive ultra-violet resonance absorption (NDUVR) type, both with NO<sub>x</sub>-NO converters. 1.3.8. The analysers shall have a measuring range compatible with the accuracy required to measure the concentrations of the exhaust gas sample pollutants.

### III. Justification

1. Pure electric vehicles and hydrogen fuel cell vehicles are not needed in Application Table A because:
  - These vehicles are not needed to be tested regarding their emissions.
  - Electric energy consumption and fuel consumption values of these vehicles are tested according to the requirement of Regulation No. 101.
  - As stated in the below paragraph, engine power test should not be included in Regulation No. 83.
2. The requirement of Regulation No. 85 should not be introduced into Regulation No. 83. Although the requirement of Regulation No.85 was introduced to Euro 6 4<sup>th</sup> package in the framework of EU, it is not appropriate to introduce the requirement of Regulation No. 85 into Regulation No. 83 in UNECE, as the Contracting Parties applying Regulation No.83 and those applying Regulation No. 85 are not the same. Besides, when Euro 5 requirement was introduced into the 05 series of Regulation No. 83, requirements for smoke and fuel efficiency was not introduced into Regulation No. 83 since these were prescribed in Regulation No. 24 and Regulation No. 101 respectively.
3. As “real driving conditions” is currently under discussion in EU, it should not be included in the UN ECE Regulation.
4. As the clause for “Limit of validity of type-approvals” is no longer included in the latest UNECE guideline\* for transitional provisions, 12.3. should not be included. (\*ECE/TRANS/WP.29/1044/Rev.1: General Guidelines for UNECE Regulatory Procedures and Transitional Provisions in UNECE

Regulations).

5. Regarding the requirement for daytime running lamps, it should be clarified that the first sentence of Annex 4a §3.2.7. is only applied to the vehicles required to be equipped with daytime running lamps.
  6. The new articles included as 3.3.5.1. and 3.3.5.2. should be included in 3.3.4., where the requirements for vehicles equipped with compression-ignition engines are specified.
  7. The concept of H2NG flex fuel vehicles could introduce risks in the market if safety issues are not considered. As these issues are not complete and mandatory under the 1958 agreement, OICA considers it premature to introduce this concept into Regulation No. 83.
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